

## **Brunswick Mill, Bradford Road, Manchester**



**Paint analysis results and an assessment of the historical paint schemes applied to the structural cast iron columns throughout the mill.**

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Prepared by



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## Introduction

The Arrowsmith Group instructed M. Womersleys, through their Project Director, Jason Dones, to record the original paint colour scheme used on the structural columns supporting Brunswick Mill. These results are set out and assessed below within the context of the available information and known design trends from the early 19<sup>th</sup> century onwards.



Brunswick Mill was a substantial fireproof cotton spinning mill. It was built in c1839-40 by the firm of David Bellhouse but with possible involvement by William Fairbairn. Constructed mainly in a single phase to a courtyard plan, it consists of a primary spinning mill alongside the canal, two wings for spinning and ancillary processes, and a front block housing the main entrance and used for warehousing and offices. The main spinning mill is seven storeys, 28 bays long, with two rows of cast iron columns internally. It was possibly one of the first mills in Manchester to be converted to electric power and was continually used for cotton spinning until the mid-20th century. The internal fireproof construction uses cast iron columns supporting iron beams and transverse brick arches. Trussed wrought iron tie rods were added to strengthen the structure when the mill was converted to house the heavier ring spinning machinery in c1920. This report details the findings from paint samples taken from the cast iron columns over six floors in the main mill, the south and north wings and the Bradford Road elevation.

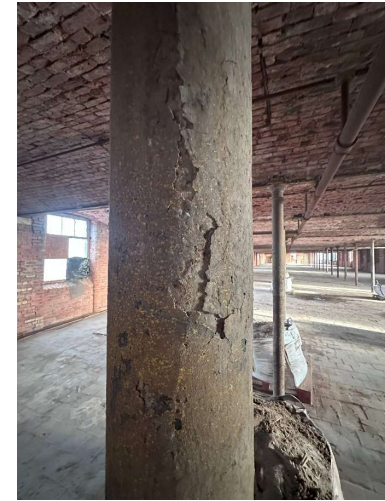
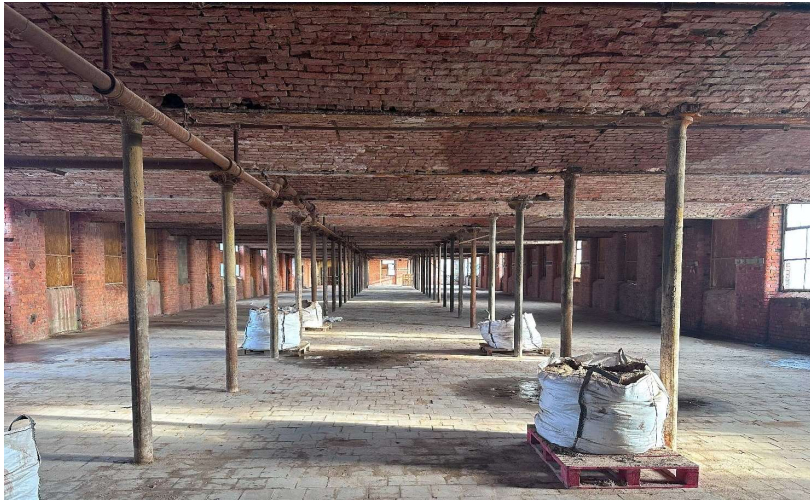
## **An assessment of the historic paint samples.**

Twelve thin-section paint samples could be produced from the pieces collected (some paint remnants were so damaged by rust or had lost most of their binder that they did not survive the thin-section production process). However, the thin sections produced provide a clear record of earlier paints used before the later banded decoration found on some of the columns today. The paint samples taken from the cast iron columns at Brunswick Mill suggest that the exposed iron surface was first primed with red lead mixed with boiled oil and a bit of turpentine (likely applied while still warm). The paint layers with references 'P', '1', '2' and '3' on the thin section photographs below will likely be priming and flattening undercoats containing red lead. This Red lead, chemically known as lead oxide ( $\text{Pb}_3\text{O}_4$ ), was frequently used as a primer due to its excellent corrosion resistance. Many early priming coats have been lost from the columns as they were stripped and repainted during the latter half of the 20<sup>th</sup> century.

Other colours of boiled oil-bound topcoats were applied to this. Providing a hard, glossy finish to protect the columns, these initially appeared to have been pigmented with yellow ochres, as referenced with '5' on the thin sections below, probably from Derbyshire sources. Later, redder stone colours, likely coloured by red iron oxide, were used; see references '5', '6' and '7'. Both these ochres are known for their excellent compatibility with oil mediums. (While these ochres may absorb some UV light and re-emit it as visible light, the effect is subtle, and the primary visual characteristic remains their earthy and muted colour). Chromium yellow (lead chromate) may also have been used in some paint layers from the latter half of the 19<sup>th</sup> century. (This pigment shows some yellow fluorescence under UV light)

Synthetic paints appeared after the 1950s and can be found in the bright yellow, pink, orange, and later cream-coloured layers on the columns in some areas, especially on the lower floors. The bright yellow, referenced as '8' & '9', is probably the result of the synthetic pigment Hansa Yellow, also known as Arylide Yellow, which became widely used in the mid to late 20<sup>th</sup> century. It quickly became a preferred choice in various applications, including industrial paints and decorative coatings. (This synthetic organic pigment fluoresces brightly under UV light, emitting an intense yellow colour due to its structure containing an aryl group that allows for efficient energy absorption and re-emission.) Azo and Benzimidazolone yellow Pigments can be seen colouring much later paint layers from the mid to late 20<sup>th</sup> century in samples 5 & 9 ( when exposed to UV light, producing a bright white or near-white effect.)

Photographs of the columns where samples were collected from and the thin sections produced from them.



Figures 3 to 5. Sixth-floor main canal side spinning mill

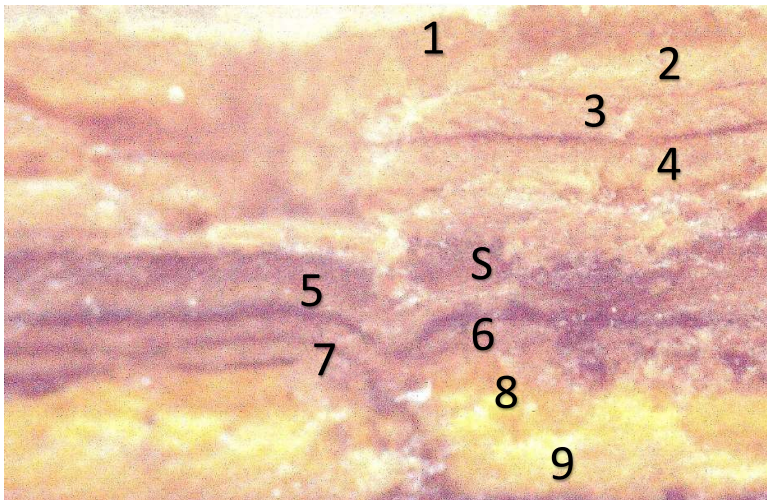


Figure 6. Sixth-floor main canal side spinning mill. Sample 1 at X40.

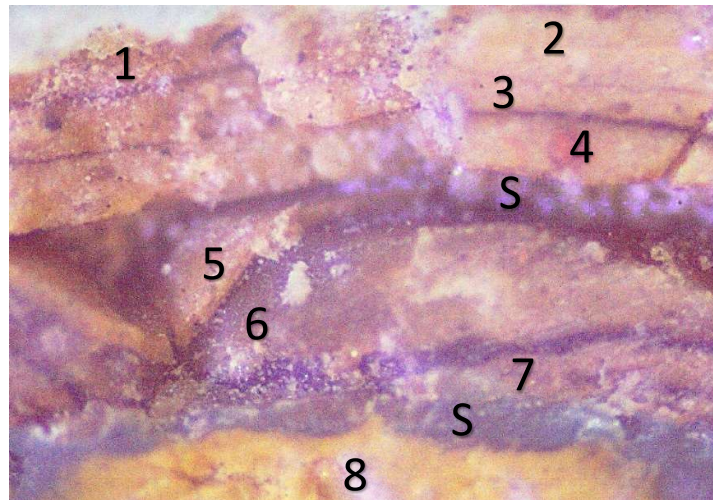


Figure 7. Sample 1 in UV light at X40.



Figures 8 & 9. Sixth-floor north wing.

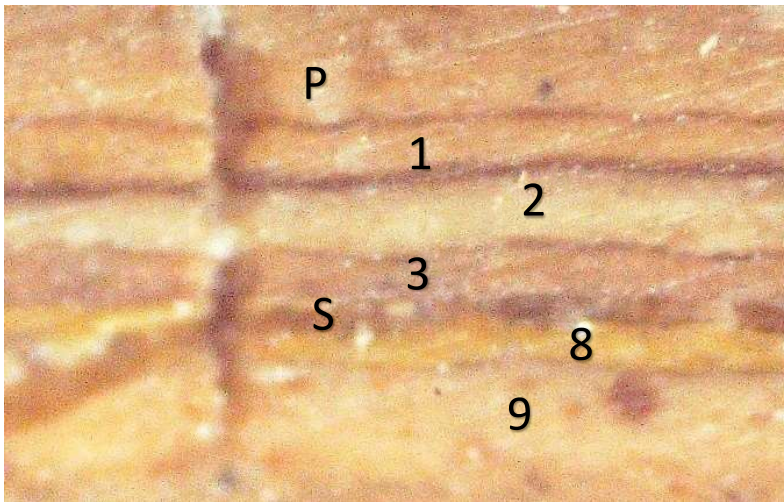


Figure 10. Sixth-floor north wing. Sample 2 at X40.

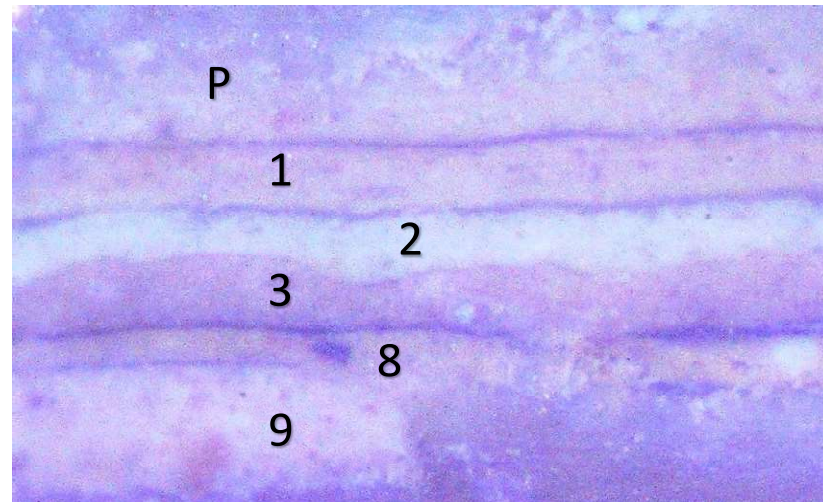


Figure 11. Sample 2 in UV light at X40.



Figures 12 & 13. Fifth-floor, south wing.

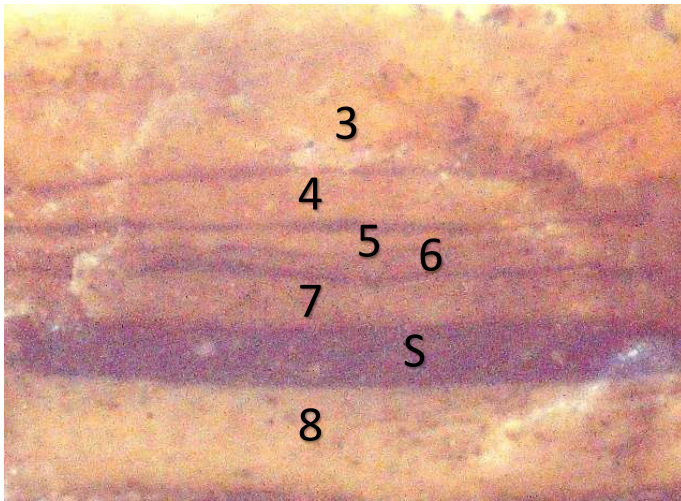


Figure 14. Fifth-floor, south wing. Sample 3 at X40.

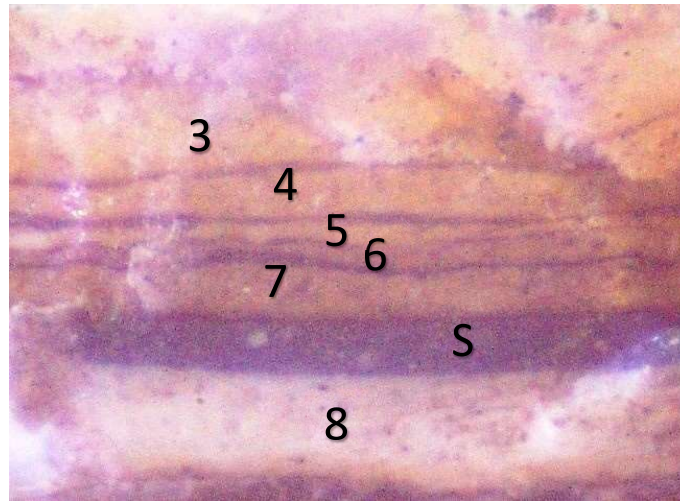


Figure 15. Sample 3 in UV light at X40.



Figures 16 & 17. Fifth-floor, main canal side spinning mill.

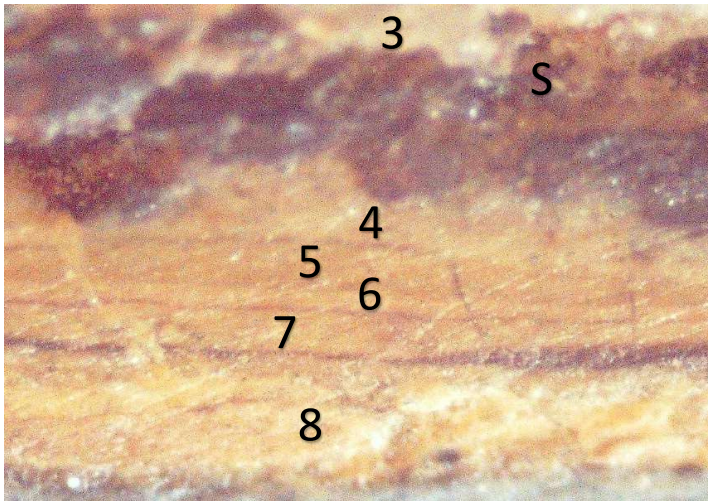


Figure 18. Fifth-floor, main canal side spinning mill. Sample 4 at X40.

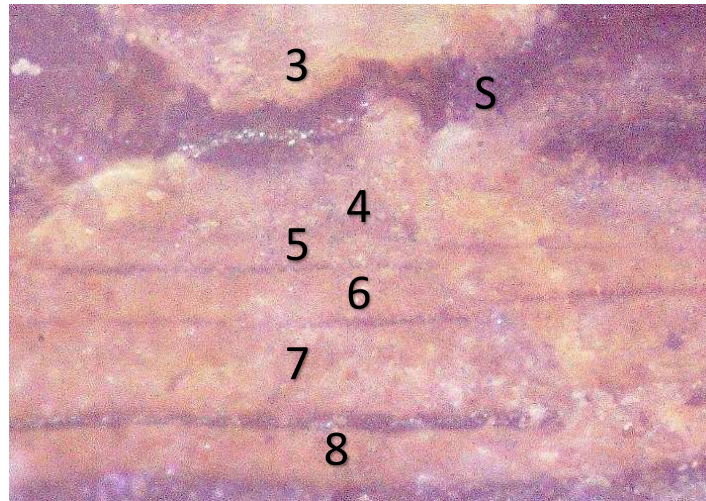
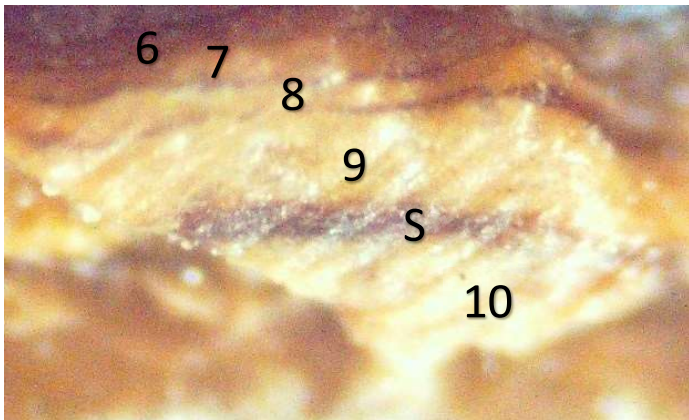


Figure 19. Sample 4 in UV light at X40.



Figures 20 & 21. Fourth-floor south wing.



Figures 22. Fourth-floor south wing. Sample 5 at X40

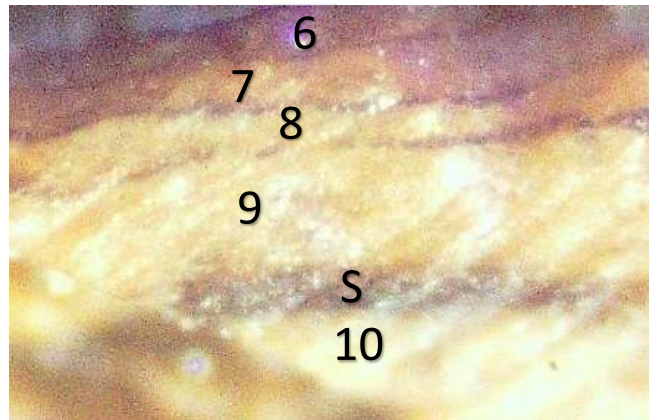


Figure 23. Sample 5 in UV light X40



Figures 24 & 25. Fourth-floor main spinning mill canal side.

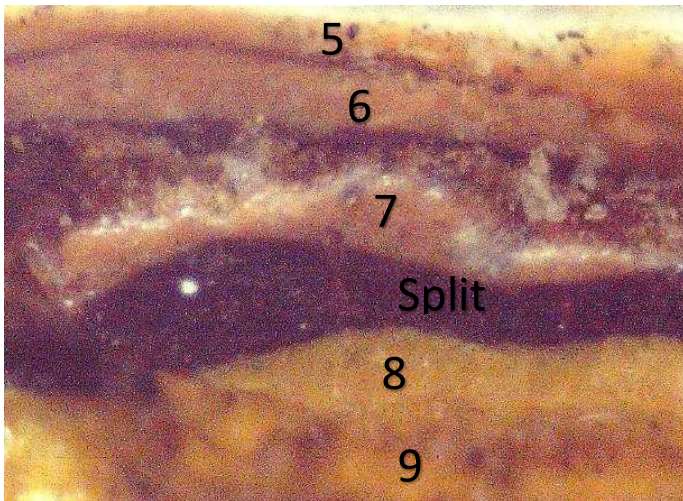


Figure 26. Fourth-floor canal side. Sample 6 at X40.

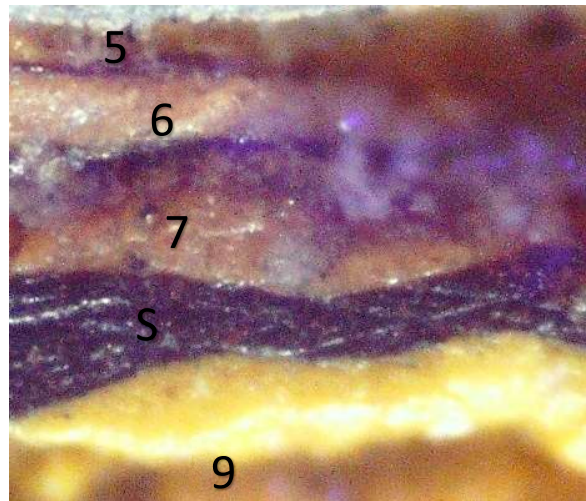


Figure 27. Sample 6 in UV light at X40



Figures 28 to 30. Third-floor main spinning mill canal side.

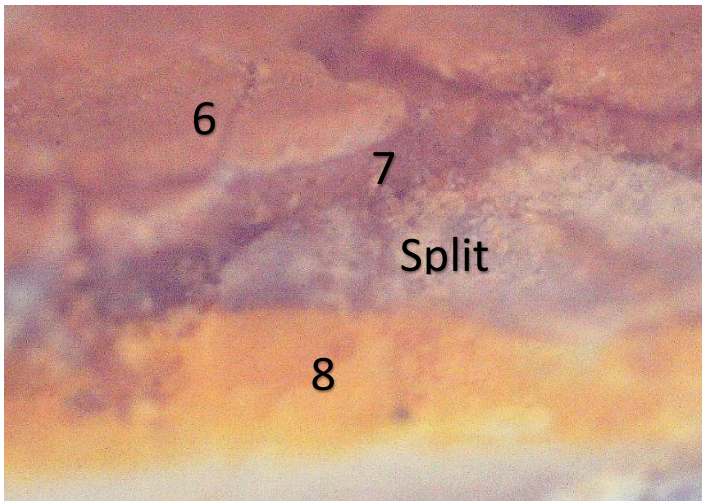


Figure 31. Third-floor main spinning mill canal side. Sample 7 at X40.

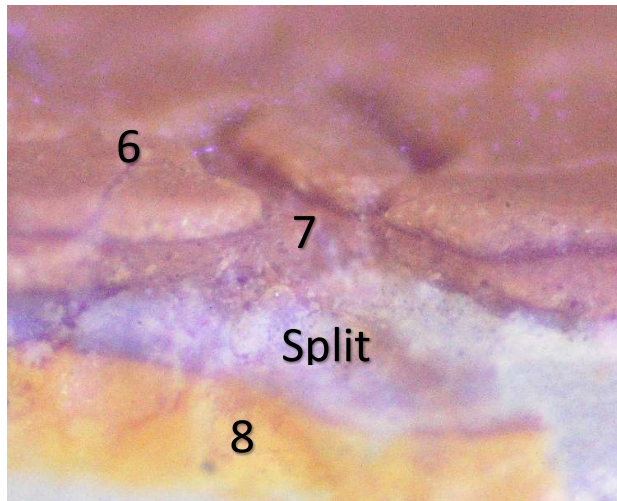


Figure 32. Sample 7 under UV light at X40



Figures 33 & 34. Third-floor south wing.

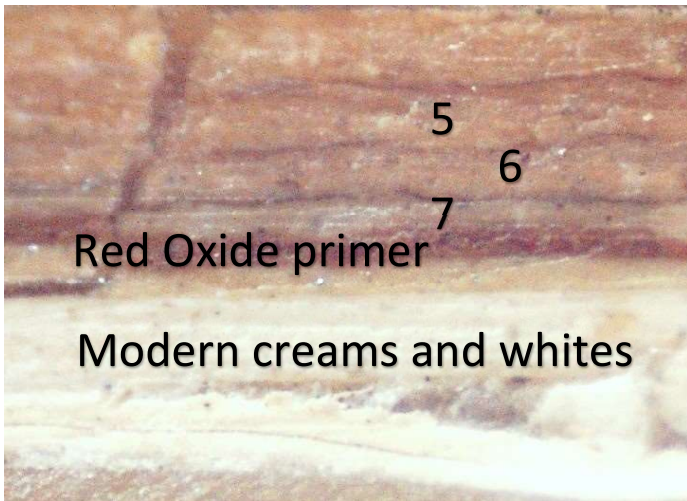


Figure 35. Third-floor south wing. Sample 8 at X40.



Figure 36. Sample 8 under UV light X40



Figures 37 & 38. Third-floor Bradford Road extension dating to the 1920s

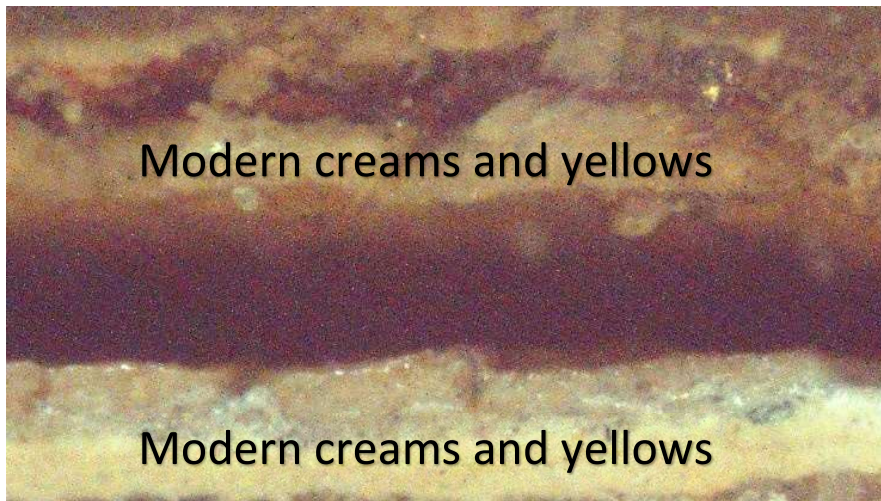


Figure 39. Third-floor Bradford Road extension. Sample 9 at X40



Figure 40. Sample 9 under UV light at X40



Figures 41 & 42. Second-floor south wing



Figures 43 & 44. Sample 10 could not be taken as the earlier paints under the modern layer were badly deteriorated.



Figures 45 & 46. Second-floor, Bradford Road.

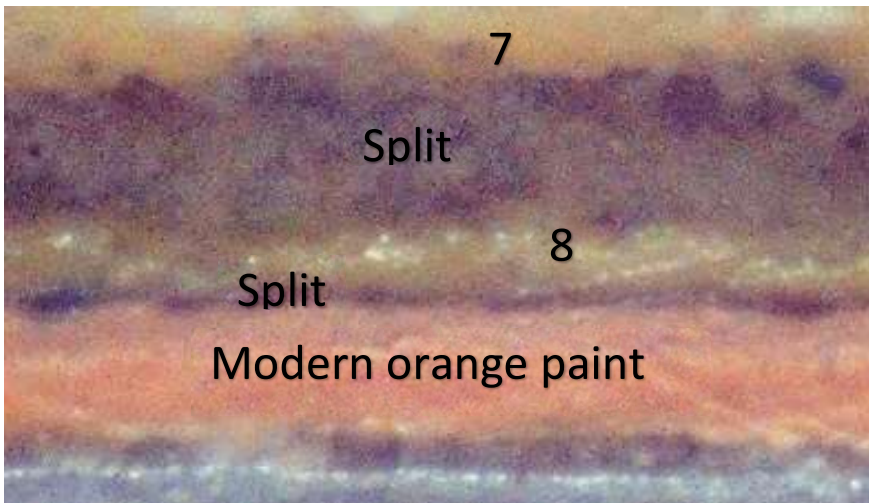


Figure 47. Second-floor, Bradford Road. Sample 11 at X40.



Figure 48. Sample 11 under UV light at X40



Figures 49 & 50. Second-floor, canal side.



Figure 51. Second-floor, canal side. Sample 12 at X40



Figure 52. Sample 12 under UV light at X 40.



Figures 53 & 54: First-floor, south wing.



Figure 55. First-floor, south wing. Sample 13 was only modern paints.



Figure 56. First-floor, Bradford Road. Sample 14 was modern paint.



Figures 57 & 58: First-floor, main canal-side mill with columns strengthened and encased with later steel. No sample 15 could be taken.



Figures 59 & 60. The ground floor, Bradford Road, previously masonry-encased columns, and paint remnants were just dusted when sample 16 was sought.



Figures 61 & 62. Ground floor, canal side.



Figure 63. Ground floor, canal side. Sample 17 at X40

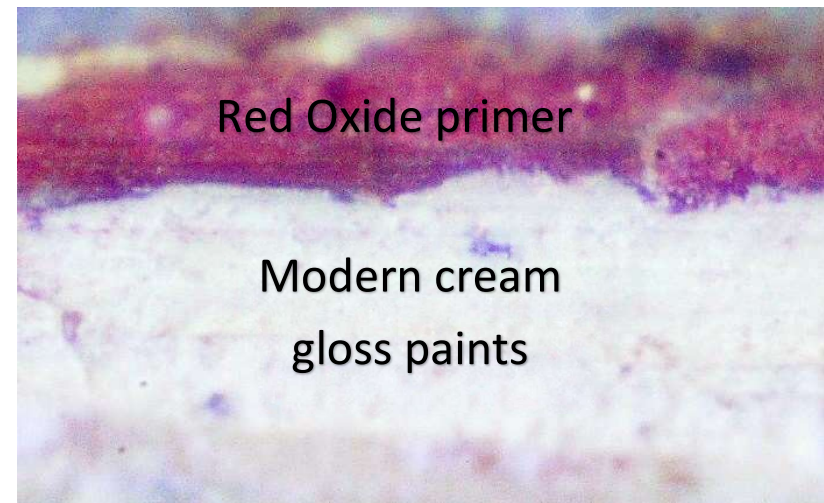


Figure 64. Sample 17 under UV light at X40