

# Surprising Discoveries From the Analysis of the Exterior Paints of “Bel-Mede” in Williamsburg, Virginia

Front Facade



## Introduction:

Architectural paint analysis using reflected visible and ultraviolet light cross-section microscopy analysis, pigment identification with polarized light microscopy, and color measurement and matching techniques, is now routinely commissioned by museums with period rooms and historic house associations. This approach makes it possible to identify the colors and compositions of the paints on original elements, and to align the paints on later additions or alterations to comparatively date the layers using an archaeological approach. Owners of private houses sometimes choose to have their buildings analyzed in the same manner, although because of the expense and time required, these types of projects are less frequent.

It can be difficult to find intact paint evidence on the exteriors of buildings because they are exposed to extreme weathering and are routinely sanded or stripped before repainting. However, it is often possible to find protected areas, such as the soffits of cornices, elements protected by porch roofs, weatherboards behind shutters, at the edges of architraves, and the interstices of moldings where early paints still remain. The goal of this modest paint investigation was to identify and document the surviving exterior paint evidence as part of a larger investigation of the interior and exterior paints on the historic fabric of this 1770 house.

## Background:

The first phase of work involved analysis of the interior paints in the first-floor rooms, consulting with the owners and architectural historian Mark R. Wenger. Wenger suggested that the alterations and upgrades to the 1770 building date stylistically to about 1810. The house was moved from Southampton County, Virginia in 1947 by a professor of fine art at The College of William & Mary, and reconstructed in a new residential neighborhood near the college. Black and white photographs from the scrapbook for this

restoration suggest that the paints on the exterior had almost completely weathered away before the house was moved. The restoration was remarkably careful, and most of the early paints on the interior woodwork were retained and simply painted over. The second phase of analysis involved the woodwork in the second-floor rooms and selected areas of the exterior.

#### Exterior Paint Analysis Findings:

When protected elements on the front elevation were examined with a portable 30X monocular microscope it appeared that most of the early paints on the weatherboards, door and door trim had either been lost to weathering or had been deliberately removed during later repainting efforts. However, in the most protected areas of the moldings, the top edge of the front door, and the undersides of several of the weatherboards, cross-section analysis showed that there were still thick accumulations of cracked and dirty paint. Four samples from representative areas of the front façade were taken to search for evidence of the earliest paints on the building with the hope of recreating the original palette.

#### Sample Locations

1. Front façade, top edge of right door leaf.
2. Front façade, door trim, right side at bead molding, about 5-feet up.
3. Front façade, weatherboard just left of door, about 5-feet up, under lip of bottom edge.
4. Front façade, door architrave, right side, at joint of backband.



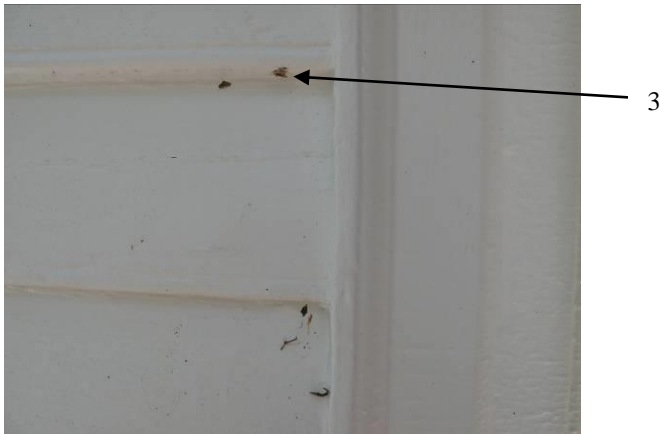
### Exterior Sample Locations – Front Door



Front door architrave



Weatherboard left of front door



The most remarkable discovery was that the first layer of paint on the weatherboards and door trim was a disrupted, weathered, distinctly pink layer of oil-bound paint. In sample 2 from the door trim this first pink layer was followed by an off-white paint. In sample 3 from a weatherboard the second generation was a slightly darker pink. It was difficult to discretely separate pigments from the first pink layer for pigment identification because

this paint was so degraded and disturbed, but in cross-section the first and second paint generations in sample 3 appear to be composed of red ochre, white lead, calcium carbonate, and a few red lead particles.

In generation 3 the door trim was painted dark brown to match the front door and door architrave, and the weatherboards were painted off-white. All the subsequent layers on the door trim, door architrave and weatherboards were cream-colors followed by later off-whites. The cross-section images show that the siding and trim were painted with progressively brighter and cooler white colors over time.

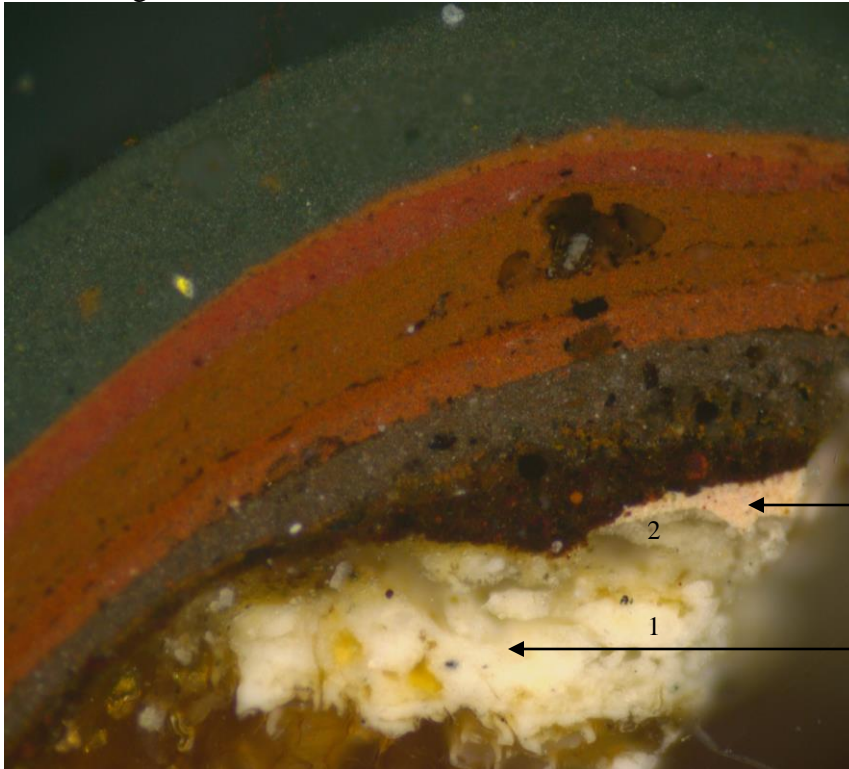
The evidence in sample 1 from the door suggests it was first painted off-white in generations 1 and 2, which is surprising for an element that was so exposed to abrasion and wear. The paint evidence on the door is quite fragmentary and uneven, so it is difficult to be confident about the earliest paint sequence as many early paints seem to be missing. The most recent nine layers of paint are dark browns and reddish-browns, followed by the most recent dark green.

A year after the first phase of exterior analysis was completed it was possible to get up to the cornice on the rear elevation of the house during roofing work, so a small paint investigation was undertaken by Sara Lapham, a Winterthur/University of Delaware Graduate Program in Art Conservation summer intern in the Colonial Williamsburg Department of Architectural and Archaeological Research. Her analysis confirmed that the cornice and trim were also originally painted with the same pink paint found on the front elevation. So, the surprising conclusion from the first group of samples and the later research effort is that the house was originally painted with dull pink weatherboards, cornice and door surround, in combination with an off-white door. It was repainted with a slightly darker pink paint before more conventional cream-colored paints were chosen.

The cross-section images from the four exterior samples show the progression of colors from the original disturbed and cracked pink paint to the most recent smooth, clean, relatively intact white weatherboard and trim paints, and the dark door paints. Binding media characterization with biological fluorochrome stains confirmed that all the coatings were traditional oil-bound paints.



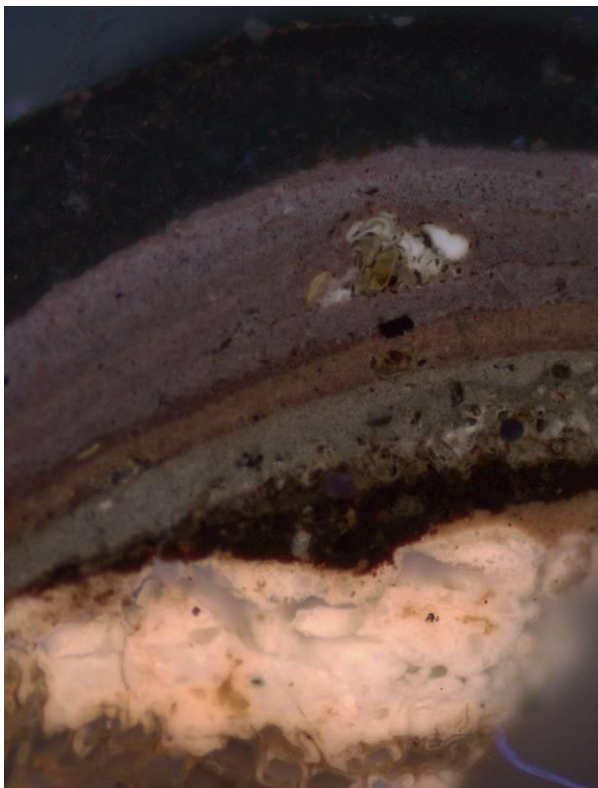
Sample 1. Front façade, top edge of right door leaf.  
Visible Light 200X



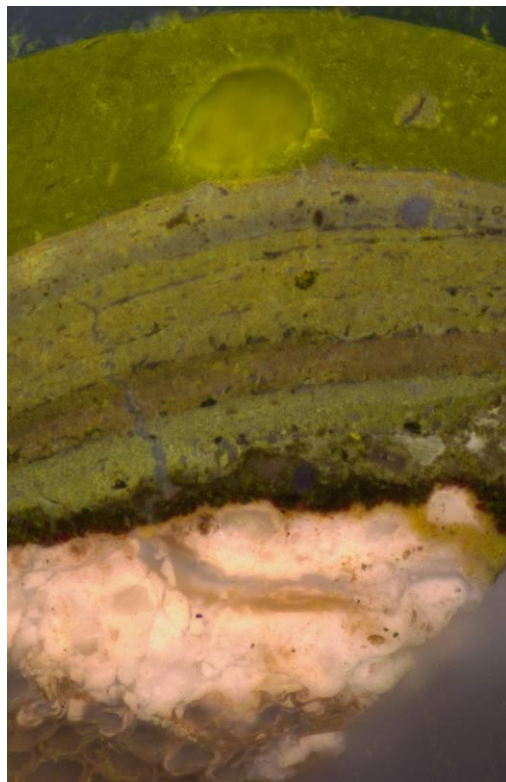
Likely a finely ground  
20<sup>th</sup> century coating

First weathered off-  
white paint layer

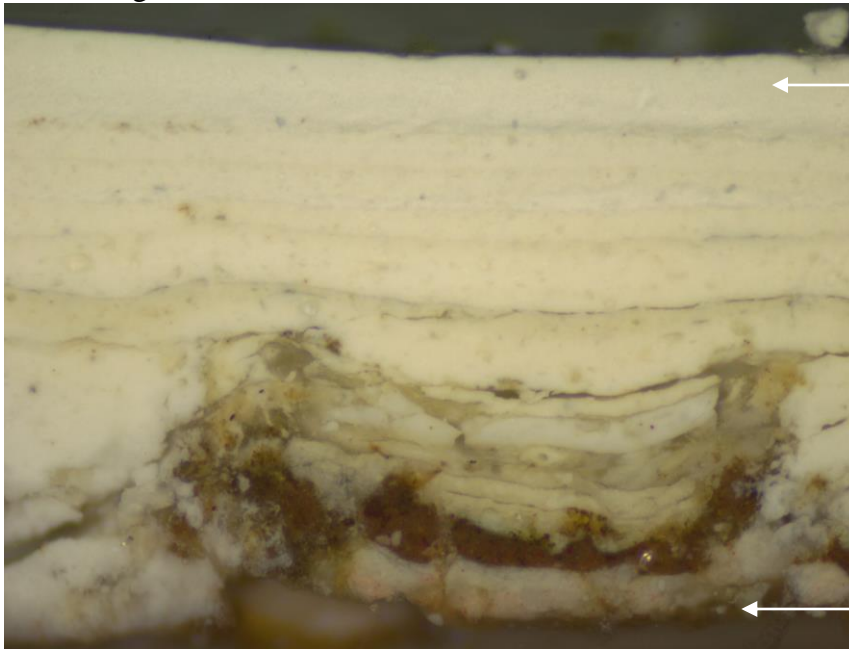
Ultraviolet Light 200X



UV Light & DCF for the presence of oils  
All layers reacted positively



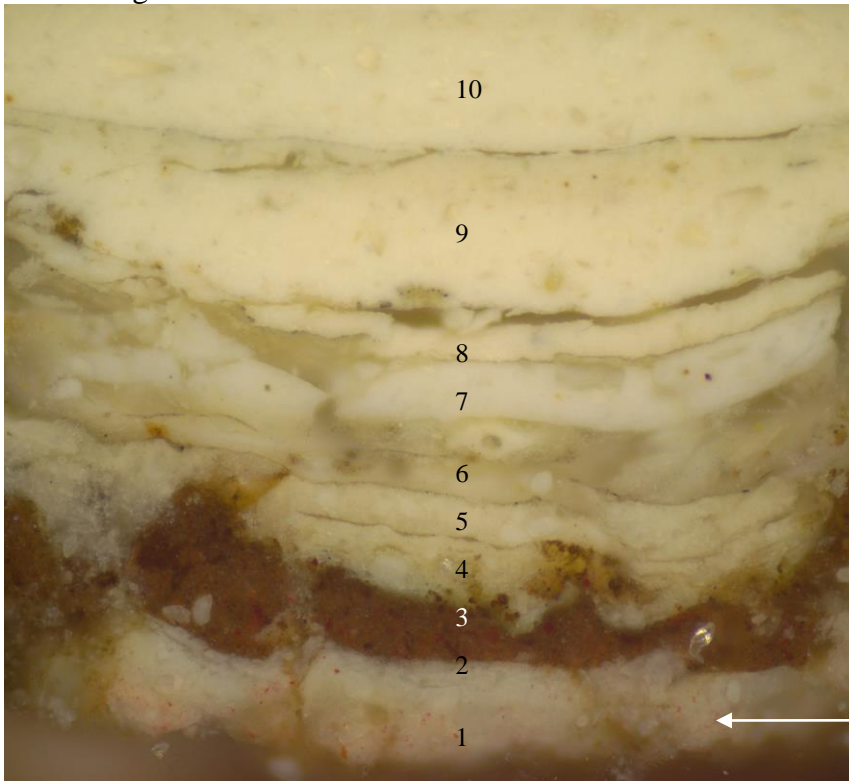
Sample 2. Front façade, door trim, right side at bead molding, about 5-feet up.  
Visible Light 100X



Approximately 16 generations of paint remaining in the area sampled

Original dull pink paint

Visible Light 200X

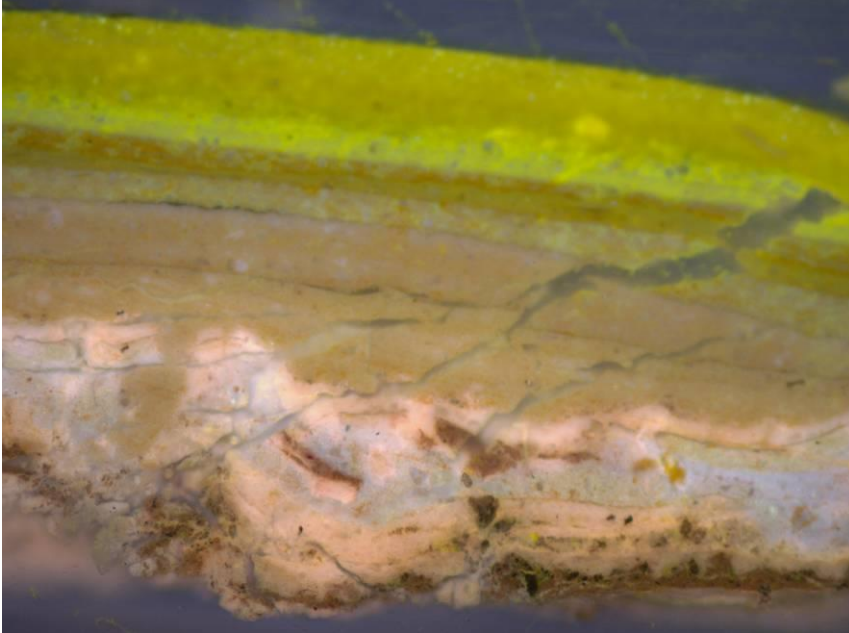


Original dull pink paint

Sample 2. Front façade, door trim, right side at bead molding, about 5-feet up.  
Ultraviolet Light 100X



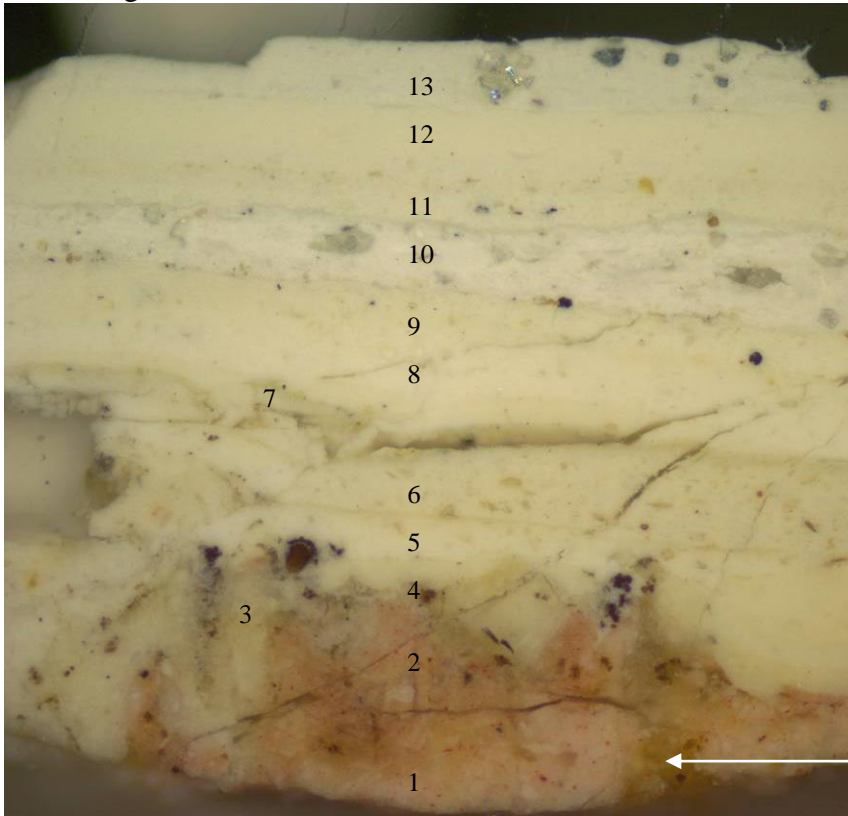
UV Light & DCF for the presence of saturated and unsaturated lipids 100X  
All layers reacted positively, to varying degrees, for saturated (cross-linked) oils





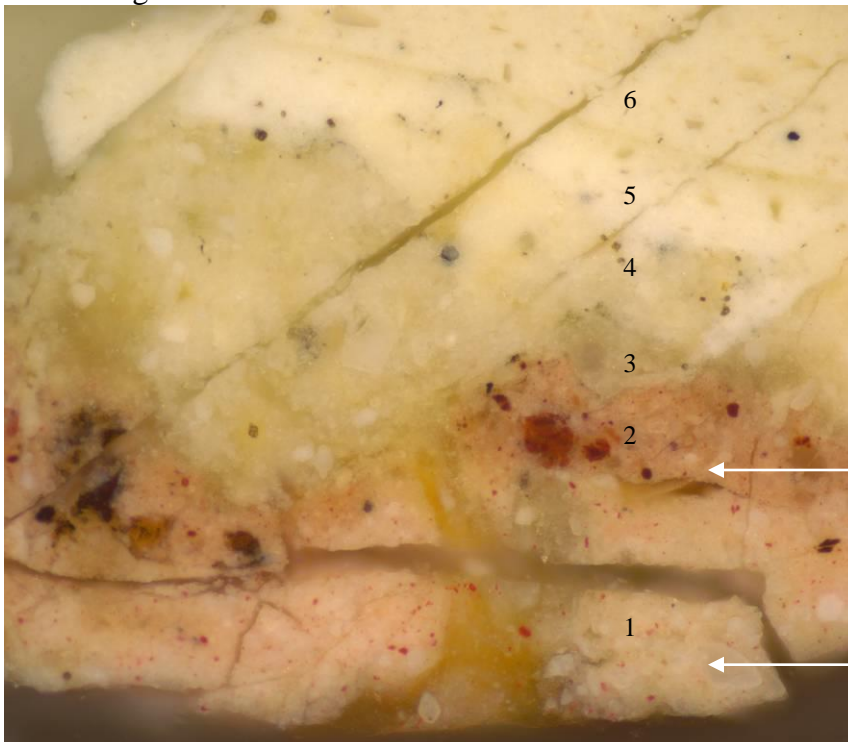
Sample 3. Front façade, weatherboard just left of door, about 5-feet up, under lip of bottom edge.

Visual Light 100X



First pinkish paint found on the weatherboards and door trim

Visible Light 200X



Second generation of darker dull pink paint

First pinkish paint found on the weatherboards and door trim

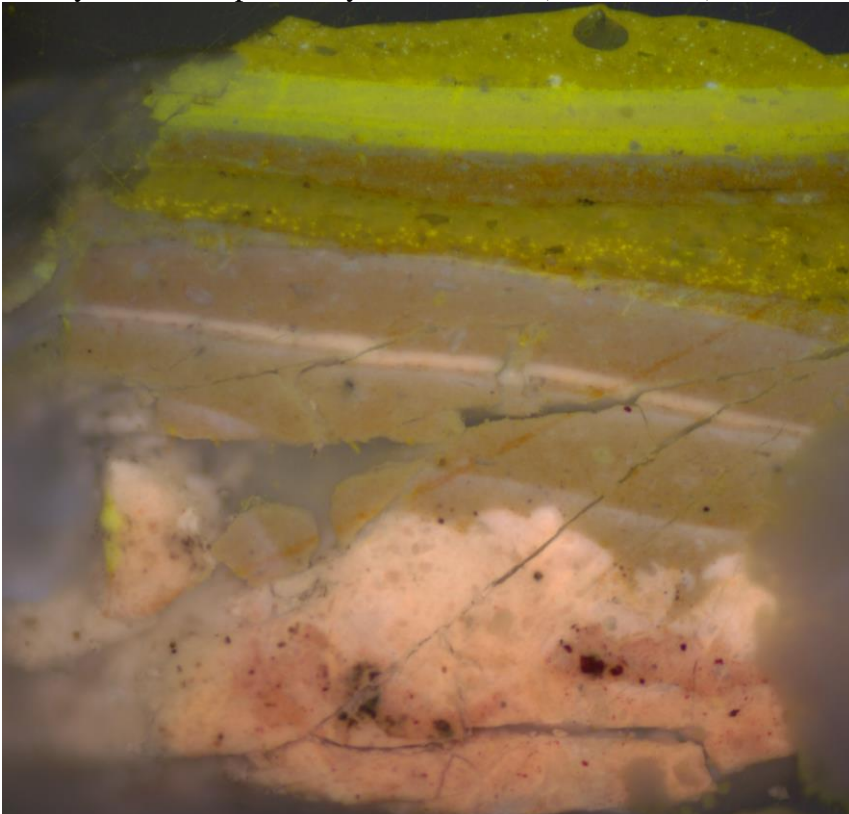


Sample 3. Front façade, weatherboard just left of door, about 5-feet up, under lip of bottom edge.

Ultraviolet Light 100X



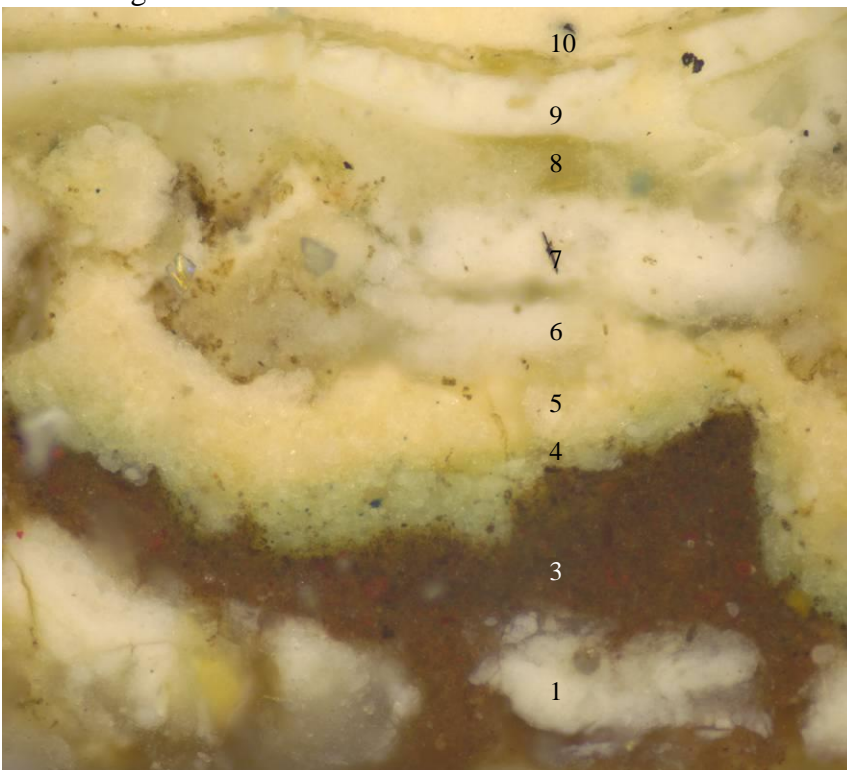
UV Light & DCF for the presence of saturated and unsaturated lipids 100X  
All layers reacted positively for saturated (cross-linked) oils



Sample 4. Front façade, door architrave, right side, at joint of backband.  
Visible Light 100X

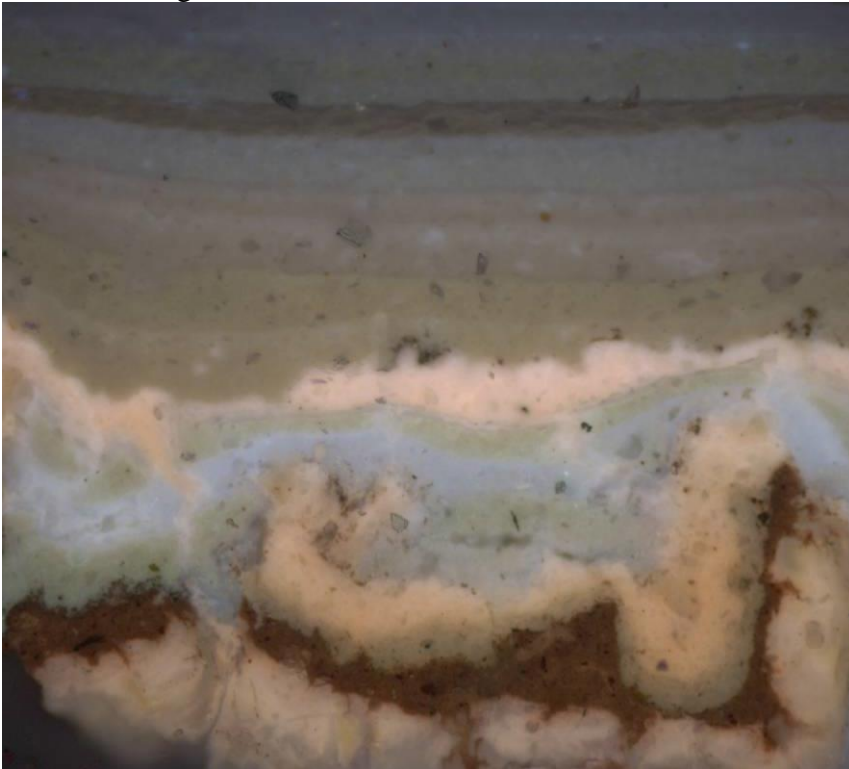


Visible Light 200X

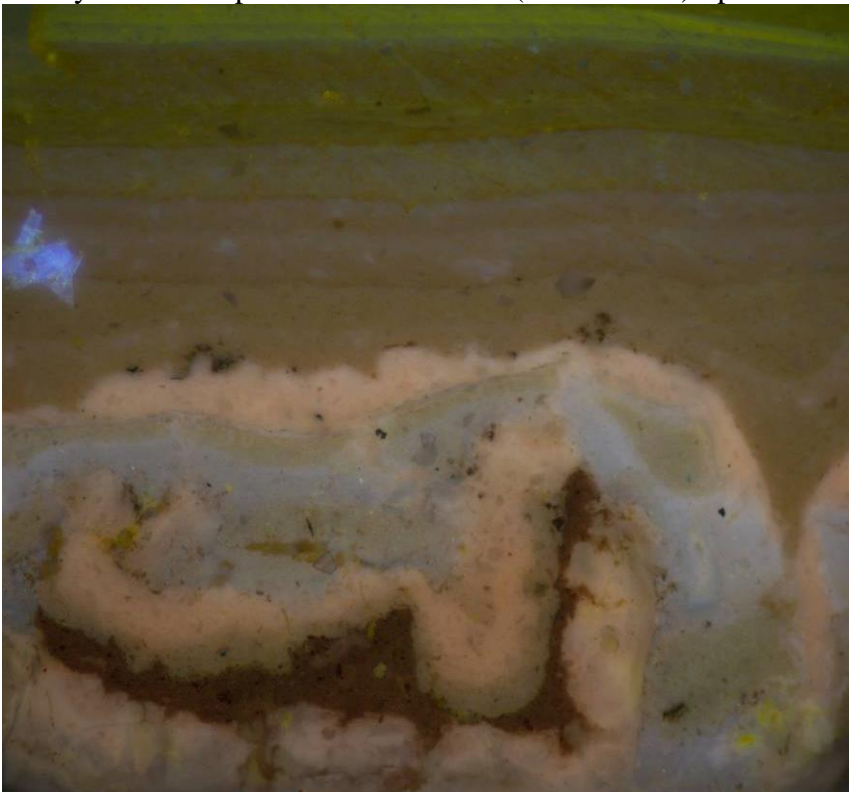


First fragmentary off-white layer resembles the first paint found on the front door in sample 1

Sample 4. Front façade, door architrave, right side, at joint of backband.  
Ultraviolet Light 100X



UV Light & DCF for the presence of saturated and unsaturated lipids 100X  
All layers reacted positive for saturated (cross-linked) lipids to varying degrees



**Conclusion:**

The most surprising finding from this modest paint analysis project was the original dull pink paint on the weatherboards, trim and cornice. This pink paint would have been relatively inexpensive and comparatively color-fast as it is composed of readily available, inexpensive, stable pigments. However, the pink color is quite unusual and it is interesting to imagine how it appeared in the rural setting in which the house was originally located. It is also unusual to find that the door was originally off-white, although the paint evidence in the door sample is more compromised and damaged than in the other cross-sections.

The palette of the exterior at the time of the study, with white trim and clapboards, and a dark green door, was appropriate for the date of the house, although traditional linseed oil and lead white-based exterior paints were somewhat warmer and creamier in color than modern titanium white-based paints. Color measurement and matching shows that the original pink was a distinctive color, and not one we expect to find on eighteenth-century houses in the Chesapeake region.

**Color Measurement Procedures:**

Uncast portions of the most intact samples are used for color matching. The cleanest, most representative areas of the original paints were revealed using a scalpel to scrape away the dirt and degraded portions of the surface of each target paint layer.

For the Bel-Mede exterior the exposed paint surfaces were measured with a Minolta Chroma Meter CR-241, a tristimulus color analyzer/microscope with color measurement area of 0.3mm. This instrument has an internal, 360-degree pulsed xenon arc lamp and provides an accurate color measurement in a choice of five different three-coordinate color systems.

The measurements were first generated in the Munsell color system (a color standard used in the architectural preservation field), and after the measurements were taken the closest Munsell color swatches from a standard Munsell Book of Color (gloss paint standards) were compared under 30X magnification to the actual samples. The measurements were also generated in the CIE L\*a\*b\* color space system, which is currently one of the most widely accepted industry color space measuring systems.

For early coatings too degraded or uneven to allow accurate color measurements the layers were matched by eye at 30X magnification under a color-controlled light source. Appropriate period colors were chosen for these elements from the Benjamin Moore Color Preview collection which can be used for reference if hand-ground custom-matched oil-based paints are desired.



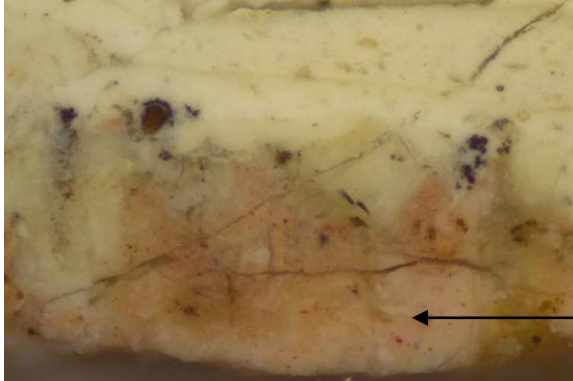
## Color Measurements – Original Pinkish Paint on Weatherboards and Trim

### Samples 2 and 3

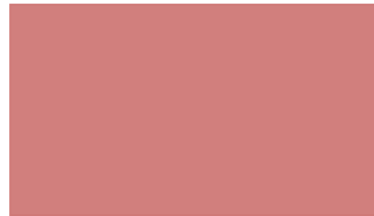
#### **Benjamin Moore #2172-50 “bouquet rose”**

Color System*		Coordinates	
Munsell	Hue	Value	Chroma
	5.5R	6.7	5.1
CIE L*a*b*	Black to White	Green to Red	Blue to Yellow
	L68.31	a+21.10	b+12.5

Sample 3. 100X



Simulated Color Match



The first pinkish paint on the weatherboards and door surround was matched by eye at 30X under a color-corrected light source as the earliest layers were too fragmentary and degraded for accurate color matching. The appearance of this unusual pink layer and the binding media reactions suggest it was originally moderately glossy.