Finishes Analysis in the Saloon, Fonthill

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FINISHES ANALYSIS IN THE SALOON, FONTHILL

Marianne Bernice Walsh

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Introduction

In 1912 Henry Chapman Mercer, archaeologist, historian and craftsman, moved into the large, reinforced concrete house which he had spent the previous four years constructing. His aim was to build an attractive, fire-proof residence which would also serve as a museum for his archaeological collections and a showplace for the tile he produced from his thriving business, the Moravian Pottery and Tile Works. Fonthill was the second of six reinforced concrete structures which Mercer built: a pottery kiln (1907), his residence (1908-1912), the Moravian Pottery and Tile Works (1912), the garage for Fonthill (Terrace Pavilion 1913), the springhouse at Fonthill (1913), and lastly the Mercer Museum (1913-1916). All are located within Doylestown. The design of the house was his, yet influenced by European castles and villas he visited in his youth. He decorated the interior with the fruits of those travels and business as well as applied finishes of paint and varnish. All in all, a triumph in imaginative invention.

This study proposes to examine the physical composition of the applied concrete finishes at Fonthill, specifically represented in the Saloon. Much has been written about the construction of Fonthill as well as the tiles contained within, but no interior analysis of the surfaces has been undertaken before. One preliminary study was performed, however, of the interior finishes of the Terrace Pavilion over the garage; this research has been taken into account while researching the present topic.

Mercer had always intended for Fonthill to be a showplace for his tiles and later on for his own collection of artifacts and ancient ceramics. The Saloon, a two story, beamed
ceiling room, was designed and built for the reception of visitors and potential clients alike as well as for entertaining friends and acquaintances. Mercer claimed that he conceptualized and planned the construction of the house during the year 1907. Of the Saloon, he wrote:

The first interior imagined and clearly seen was that of the west side of the Saloon seen when standing near the large window about eight feet from the door to the Library. The Saloon still clearly retains the appearance of these preliminary dreams, but the original fancies for nearly all of the other rooms were changed as we proceeded sometimes for the better and sometimes for the worse.¹

The 8-10 men employed for the construction at Fonthill were familiar with building in traditional materials but were unskilled in the relatively uncommon use of concrete and cement. Mercer was included in this group. He was a learned man with many connections, yet he had never designed or built any construction before. It was through his acquaintances, professional relationships and natural intelligence and curiosity that he was able to construct his Fonthill. Many concrete recipes, construction techniques and finishing applications were tried, discarded or used, but few formulations were recorded.

Surface finishes play a pivotal part in the overall presentation of a space to its occupants. Apart from any protective qualities a coating may possess, the color and texture of a finish can define or hide elements and provide a suitable environment for objects, furniture or other items. They can take center stage or they can be cast in supportive roles, but regardless of their purpose, the choice of a finish and its application are important matters and deserve analysis.
Knowledge of the physical make-up of the finishes would provide the basis for any possible conservation/restoration projects: film reattachment (flaking paint), film consolidation (powdering paint), in-painting (film loss) or over-painting. All of these issues are relevant at Fonthill. Questions to be answered include: are the pigments and binders chemically stable by themselves? together? on the concrete substrate?, if not, how have they changed? what were the possible sequence and reasons for application? Together with the physical information, historical information, in the form of Mercer's notebooks and contemporary literature, may provide answers to where Henry Mercer may or may not have received inspiration and where his work may fit within the field of architectural concrete finishes.

fig. 1. The Saloon. Photo courtesy the Bucks County Historical Society. 1997.

1 Henry C. Mercer "The Building of Fonthill at Doylestown." Copy of typewritten manuscript found among the papers of the late Dr. Henry Chapman Mercer Memorial Services for Henry Chapman Mercer. 1930. reprinted by The Bucks County Historical Society. 1932. p. 323.
fig. 2, Fonthill, Doylestown. All photos by the author except where noted. 1998.
Chapter One: Background

Henry Chapman Mercer was born in 1856 and died in 1930, living his entire life in Doylestown, Pennsylvania. His undergraduate studies in history, Latin and archaeology were undertaken at Harvard, in Boston. He studied Law at the University of Pennsylvania and passed the bar, but never practiced. He set off, instead on a series of journeys, traveling in Europe during the years of 1881-1889, traveling as a tourist as well as a scholar. Soon after he returned from his last trip, he began to pursue his love of archeology in The Yucatan as well as the eastern U.S. in hopes of proving the existence of pre-historic man in North America. He became curator of American and Prehistoric Archeology for the University of Pennsylvania Museum, filling the position from 1894 to 1897.\(^2\) *Hill Caves of the Yucatan, The Lenape Stone and Researches Upon the Antiquity of Man in the Delaware Valley and the Eastern United States* were published by Mercer during this time. After failing to provide evidence of early settlement in the Eastern U.S., ("...people were not interested in negative evidence." he once said.)\(^3\), Mercer turned to other scholarly pursuits. The year 1897 saw the last of his traditional archeological excursions as well as the beginning of what was to become his life's work.

It was 1897 that he began to collect the tools of the everyday craftsman and laborer. The resulting exhibit, "The Tools of the Nation Maker" was an show of these implements at the Bucks County Historical Society, showcasing all types of hand tools, of

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the current and recent past generations, linking each with its Old World origins and with the folklore associated with its use. As an archeologist and proponent of the Arts and Crafts philosophy, Mercer was aware of the cultural messages which were being discarded with the outmoded hand tools. This was his novel archeological approach of working backwards in time instead of trying to link objects from the past forward. *Ancient Carpenter's Tools* of 1929, was the written culmination of his research into the implements and objects of days gone by; a past which Mercer, along with other Arts & Crafts advocates, wished to revisit and integrate into contemporary life. He would later deposit these objects in the Bucks County Historical Society for safekeeping. This collection eventually became the nucleus for the Mercer Museum in 1916. *The Bible in Iron* was the monograph he published in 1914 on his research into stoveplates, produced by German Americans living in the Bucks County area. Several of these plates were cast in plaster and inserted into the ceiling of the Saloon in Fonthill. These will be discussed again later in the study.

Mercer embraced the philosophy of the Arts & Crafts movement during his years at Harvard under the tutelage of Charles Eliot Norton, a professor and early American proponent of the movement. Mercer’s sense of Romanticism and eclectic borrowing of various cultures and philosophies, traits shared by other followers of John Ruskin and William Morris, was the result of his early education and family influences.

The Arts & Crafts movement originated in England with the writings of John Ruskin and William Morris in the mid 1800’s. The view art as an accurate reflection of the prevailing ideas of an era and the effect that recent industrialization had on dehumanizing
people and art alike, was a new and fascinating concept to designers, intellectuals and artists in the 1870’s in America. Architects such as Henry Hobson Richardson and John LaFarge in the 1870’s and continuing with Frank Lloyd Wright and the Greene Brothers at the turn of the century, sought to integrate craft into unified buildings and residences. Mercer was a student at Harvard when Richardson built Trinity Church in Boston. The designs in stained glass and decorative wood and stone were hailed as revolutionary in the architectural profession and it is likely Mercer drew inspiration from its decoration philosophy.

Mercer was also exposed to the emerging intellectual environment in Boston in the 1870’s through the social and professional connections of his beloved aunt Elizabeth Bigelow Lawrence. She had donated the Lawrence Room in the Gothic Building at the Museum of Fine Arts in 1876 and was a close friend of Isabella Stewart Gardner, who would later commission a large job from Mercer. Attending the International Centennial Exposition in Philadelphia in 1876, Mercer was exposed to the latest technology and design, yet he was convinced of the unacceptable role of the machine in the manufacture of artistic crafts and decoration. After graduation he helped found the Bucks County Historical Society in 1880. This ideal later led him to found his pottery and tile business, helping to resuscitate the craft of hand-made tile-making.

Mercer became a member, first acquiring Craftsman status, then Master, of the Society of Arts & Crafts in Boston in 1901. Through his work as a master tile maker, he made the acquaintances of several architects and designers of the Arts & Crafts period.

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such as Wilson Eyre and William Price, both using Mercer's tiles extensively in many of their buildings.\textsuperscript{6,7} Using materials honestly, not as imitators of another building material, was an idea which was gaining popularity in some intellectual and artistic circles. American advocates of the Arts & Crafts such as William Price, wrote:

\begin{quote}
I have looked vainly among the cloying refinements of our large modern buildings for some vestige of self expression, some vital spirit, even for intelligent use of the old, their marble work is not even real marble work, let alone art. Our libraries, State and other public buildings have a core really built of brick and steel and concrete and are merely covered with a layer of unrelated marble. Our new forms of construction, steel and concrete, have scarcely been looked at as a possible medium for expressive beauty.\textsuperscript{8}
\end{quote}

Mercer was up to the challenge. Concrete construction was not uncommon at the turn of the century. Frank Lloyd Wright's Unity Temple in Oak Park, Illinois, was built in 1906, of poured reinforced concrete as well, but it couldn't have looked more different than Fonthill. Despite sharing many of the same ideals, Mercer's building took on a more organic, hand-made appearance, its design (not necessarily the materials or techniques) harkened back to the past while Unity Temple looked forward.\textsuperscript{9} Mercer agreed with Price and saw in concrete a means for the expression of his ideals. In true Arts & Crafts form he would later write of Fonthill:

\begin{quote}
In general the house, like old barns, anthracite coal breakers, old houses in the country before 1800, and, I believe, like many European castles, was built from the inside, that is to be used first and looked at afterwards. From first to last I tried to
\end{quote}

\textsuperscript{5} ibid. p. 31.
\textsuperscript{6} The University Museum in Philadelphia, designed by Wilson Eyre in 1910, showcases Mercer's tiles.
\textsuperscript{7} ibid. p. 109, 115. Examples include the Jacob Reed Clothing Store, Philadelphia, 1904, and the Marlborough-Blenheim Hotel, Atlantic City, NJ, 1905. Price & McLanahan Architects, Phila.
\textsuperscript{9} One visitor, Dr. Charles C. Abbott of Trenton NJ, even wrote a poem entitled "To H.C.M." published in Cement Age. vol. 8, no. 5. 1911. "Reincarnation of the storied past / skyward in majesty thy walls arise/"
follow the precept of the architect Pugin, 'Decorate construction but never construct decoration.' 10

Portland cement was introduced to this country in 1865 from England and came to the attention of the greater population (Henry included) through its exhibition at the Philadelphia Centennial Exposition of 1876. It was favored over natural cement where greater strength and reliability were essential. Many how-to handbooks for the handyman, by independent authors as well as cement manufacturers, were published at this time through the turn of the century and well into the 1940's and 50's. In addition to the professional advocation of cement, Henry also was familiar with its properties through the artistic works of his brother. William Mercer was a sculptor who made concrete casts of classical objects and decorations, recognizing its plastic potential, never disguising it as any other material and illustrating its artistic possibilities.11

Henry wrote on his own views in several articles, expounding on these ideas and adding a new dimension to the topic, the subject of color.12 Specifically he was referring to the use of colored clay or tile to relieve the grey surface of the concrete. He advocated the use of color for details such as lintels, medallions, corbels, bands, capitals and corners, while using his patented mosaic and brocade tiles for larger, flat areas of concrete. For these specific tiles, the plain grey of the concrete was desirable as a neutral background,
but he noted that the joints may be tinted darker shades for contrast.\footnote{Henry C. Mercer. "Where Concrete Stands For Concrete." \textit{Cement Age.} vol. 6. January. 1908. p. 14.} In an earlier article, Mercer mentions that he had experimented with coloring the joints red, blue, green, yellow and white but found them to be artistically injurious to the whole piece.\footnote{Henry C. Mercer. "The Decoration of Concrete with Colored Clays." 1905.} He also wrote:

> Just as in the leaded glass designs of a stained window, bands of lead holding together the glass units, form the pattern, so here the cement remaining visible around the circumference of each piece presents the outline of the picture. Thus you have a picture drawn in outlines of cement with clay colors set between the latter. I paint my pattern with clay paint. But I draw my outlines with your cement.\footnote{ibid. p. 3.}

In general, colors that agreed with the Arts & Crafts philosophy were earthy and subdued hues, that did not necessarily call attention to themselves but accentuated the structure and contributed to the overall integration of architecture and decoration.

And so, Henry Mercer finds in concrete an ideal medium in which to set his tile and a medium conducive to being manipulated for the benefit of the tile. By 1904, Mercer's tiles became an artistic and commercial success. The largest and most important commission to date was his installation of 16,000 square feet of mosaic tile in the Pennsylvania State Capitol building in Harrisburg. At the time of ground-breaking for Fonthill, at the age of fifty-one, Mercer was fairly conversant with the advantages of concrete for the expression of his ideals and who might help him in the execution of them physically.

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\footnote{Henry C. Mercer. "The Decoration of Concrete with Colored Clays." 1905.}
\footnote{ibid. p. 3.}
Chapter Two: Records, Receipts, and Recollections

The information gained from the building records took three forms: the construction notebooks which Mercer kept during the years of 1907-1910 and 1911-1913, (vol. 1 which was specifically for Fonthill and vol. 2 on the pottery and tile works with some notations regarding Fonthill from the years of 1911-1914, put in later as postscripts), were devoted to the construction of the building and the setting of the tiles: building techniques, room dimensions, which tiles would decorate what rooms and in what manner. Mercer embellished the notebook with many sketches of proposed designs and techniques and references to outside sources of information and advice. These books overall, provided the deepest insights into the surface finishes applied.

The second repository was found in the copious collection of receipts, payrolls and bills, which Mercer saved, pertaining to the construction of Fonthill. Specifically the receipts came from goods purchased from several local hardware and paint stores and chemical companies in and around Philadelphia. These detail the many goods bought, including construction materials: sand, cement and pigments. All of the papers are dated, but it can be assumed only to a point as to where Mercer was actually using these products, especially when the dates overlap during construction of the pottery works, Fonthill and the garage, (1913-1914).

The third source were written recollections left behind by Jacob Frank, Mercer’s main tile setter for Fonthill, and Henry’s own post-script to the building of his residence. Jacob Frank was interviewed on tape, recounting the time during construction of Fonthill, which was subsequently transcribed. “The Building of Fonthill”, a typed document found
in Henry's personal papers at the time of his death, in 1930. In his own words, Henry chronicled the building of Fonthill from top to bottom, including the finishing and decoration applied. The manuscript is not dated, but it is obvious that it was written after the completion of the building in 1912.

A second group of sources can also be discussed here. These are secondary sources of contemporary accounts of the construction written for journals and trade publications of the day. The impressions and opinions they record are interesting from a contemporary context point of view. The facts they observe about the construction, however, are more informative for this study.

The Notebooks and Recollections

The first volume of Mercer's construction notebooks detailed almost daily or weekly the planning and progress of the building of Fonthill. It spans the years from 1907, (the year in which Henry did most of the conceptualizing), to 1910, (when the building was complete enough to be considered sealed). The second volume is labeled as being from the building of the Pottery Works, but since he was indeed still working on Fonthill, primarily the finishing, during the initial phase at the tile works in 1911-1912, he made specific notes regarding Fonthill in this book.

Volume one begins with a list of possible rooms in the house and the desired dimensions of width, length and ceiling heights that he had imagined for them. The ceiling in the Saloon is envisioned as 16 ft. above the floor and originally was to be vaulted: (the
fine layer of concrete was poured over everything, followed by the rougher concrete
which would form the body. After a period of time in which they thought the concrete was
set, the scaffolding was taken away and the earth heap crashed down. If clay was used, it
was pulled away from the tile and the job was generally complete.\textsuperscript{20}

It was in this fashion that the ceiling and beams of the Saloon were built. The
ceiling is not vaulted but flat with squared, beaded beams traversing it, being connected to
the 11 columns which support the ceiling of the Saloon and Alcove. Scaffolding was
erected as before, with a level, horizontal layer of earth and sand on top. Depressed into
this layer where long rolls of clay, forming the mold for the banding seen bordering each
ceiling field and the borders for each of the stoveplates. Loops of wire were then cut into
the clay, slid along its length, thereby slicing into it the negative curves of the band.\textsuperscript{21,22}
(see fig. 3). In the case of the smaller stoveplate pieces, a glazed tile in the form of a rope
was pressed into the clay.\textsuperscript{23} For the casts of the plates themselves, fields of clay were again
depressed into the sand and earth, the plates then pressed into the clay, creating the form.
Plaster of Paris was then poured only into these areas, allowed to set somewhat and the
rough concrete was poured on top.

Secured to the scaffolding, but hanging below the level of the intended ceiling
surface, were long boxes for the beams. Within these boxes, strips of wood were nailed to
the sides and bottom, containing the clay which would be sliced with a wire as above (only

\begin{itemize}
\item \textsuperscript{20} ibid. p. 100-102.
\item \textsuperscript{21} ibid. p. 112.
\item \textsuperscript{22} Henry C. Mercer. "The Building of Fonthill at Doylestown." p. 326-327.
\item \textsuperscript{23} Architectural Notebook. vol. 1., p. 111.
\end{itemize}
one loop, though), and as stops on which to guide the hand of the worker slicing.\textsuperscript{24} (see fig. 4). This corner became the bead for the beam. As for the decoration of the rest of the beam, wooden planks the size of the tile groups were nailed to the inside of the box form, left in place when the concrete was poured, creating an indented area in which the tile was set. Originally, casts of small stoveplates were to be inserted instead of tile depicting bible scenes. These stoveplates were installed only on the south faces of the beams connecting columns 9 & 10. Plaster of Paris casts of the small stoveplates were placed in the bottom or nailed to the sides of the form, the concrete was poured and an indented impression was left which was subsequently painted. The few stoveplates which were cast on the sides of the beams received a decorative cement border after the form was taken away and the concrete had set.\textsuperscript{25}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure3}
\caption{ Vault decoration technique.}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure4}
\caption{ Beam decoration technique.}
\end{figure}

In both methods, a wire loop cut the through the clay to form the mold.

In several of his notes, Mercer called for the pouring of “cement colors”, “colored concrete” or “colored clays” before the pouring of the rough body concrete for “mosaics

\textsuperscript{24} ibid. p. 110
\textsuperscript{25} ibid. p. 133.
cast into ceilings". While he doesn’t give the content of these pours. Mercer noted however, that unless given a sufficient amount of time was given to set, and a thickness of no more than 1/8” thickness, these colored layers would tear away from the underlying rough concrete when the clay slabs on which the colored cement was poured are removed.

This entire process refers not to the pouring of colored cement into forms or ceiling fields per se, but to two decorations which can be seen in the cellar below the Saloon. A cartoon drawn with charcoal on paper was laid upon the earthen mound of the future vault, joints of clay were laid along these lines and around the perimeter, thin colored cements were then poured into each “piece” of the mosaic. One design was the face of a King of Hearts playing card and the other was a reproduction of his tile mosaic “Woman Dipping Candles”. (see fig. 5). Apparently what he was attempting was a *painted* mosaic. The above directions or accounts seem to be written before the process was actually tried in other rooms because years later he wrote, “A method of casting designs or pictures upon ceilings in colored cements was twice tried successfully in the cellar of the Saloon, but not attempted later.” This inconsistency between his contemporary notes and his later recollection might be explained by the insertion of “…but not *successfully* attempted later”.

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26 ibid. p. 97, 105.
27 ibid. p. 105.
After initial pouring and construction, the wall surfaces and some of the columns were plastered. Mercer wrote in his recollections, "Some of the columns were plastered after construction with lime and sand mortar, others with cement. Some were left untouched and some slightly retouched." 29, and perhaps most importantly to this study:

"The interior walls were not furred. Sometimes they were plastered with lime and sand mortar or with cement and then shellacked with yellow shellac or tinted with a clay wash colored with dry paints." 30

29 ibid. p. 325.
30 ibid. p. 328
The finishes subsequently applied were variously overlaid a fine cement plaster, a lime based plaster or the rough concrete of the body. A different formulation of plaster or mastic was used on hidden wooden elements, the bed for tile floors and in the window surrounds than was used elsewhere. This was done for its tenacious adhering power. The recipe follows: “Litharge 10 parts, sand 10 parts, Plaster of Paris 10 parts, and rosin 1 part. Make plastic with sufficient boiled linseed oil. Very expensive but sticks to cement and wood.” Floors were polished with damp white pine sawdust and then slightly oiled with boiled linseed oil.

As stated before, Mercer was most concerned with the construction of the building and the subsequent setting of tiles. But related to the aesthetic appearance of the tiles was the color background in which they were sometimes set but always related to. He often used the words, “stained” or “tinted” to refer to the color which was applied, inferring that semi-transparent washes were what he always had in mind. Traditional painted surfaces may have been too opaque, would have hidden the concrete, and would have distracted from the tiles. Hence the majority of the notes written refer to concrete and tiles, but a few pages and references were devoted to the finishes. In fact, only three recipes for coloring paint were found in the notebooks. They are as follows:

Brocade tiles in ceiling of Saloon; Colour for the cement mortar background; paint on when plaster still soft.

Manganese dry powder 3 parts
Dark buff yellow (Raw Sienna dry powder) 3 parts
Raw Vulcanite cement 5 parts
Mixed with water; Less manganese and colour dried out much too light.
March, 1913. HCM.

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31 Architectural Notebook. vol. 2., p. 29.
33 Architectural Notebook. vol. 2., p. 93.
And:

Blue background for brocade tiles in Hall at Fonthill.
Parts
2 1/2 Blue powdered dry paint
1 Light buff (Raw Sienna)
14 cement
Mix dry and then wet and use as paint on surface of cement mortar.

Brown background on ceiling beams in Saloon and fireplace at pottery:
1 Manganese
1 Light buff (Raw Sienna)
5 cement

Generally Mercer separated the receipts for the construction of the Pottery Works from those for Fonthill. Receipts that may have been for the building of the garage are not labeled as such, and so any receipts kept from the year 1913, have to be considered as perhaps representative of items bought for the garage as well. This is reinforced by the analysis which will be discussed later of the finishes in the Saloon and those analyzed from the Terrace Pavilion. The majority of the supplies, including dry pigments, turpentine and brushes were bought locally from such hardware and paint dealers as James Barrett, located at the corner of Ashland Avenue and Main Street in Doylestown, and Charles Shive, located up the street at State and Main Streets. Other materials such as large quantities of alcohol and white gum shellac came from paint and chemical wholesaler Paul A. Davis, Jr., operating out of Philadelphia on North Water Street. A complete list of painting supplies from the years of 1908-1913 are listed in Appendix 2.

34 ibid. p. 65.
Contemporary Accounts

The journal *Cement Age* was launched in 1904, "a monthly magazine devoted to the uses of cement and concrete."\(^{36}\) Beginning in 1905, it featured articles by and about Henry Mercer. One of these, entitled, "A Concrete House", written by the editor, Robert Lesley, was published in 1908, barely a year after construction had started at Fonthill. To say that the author was impressed and enthusiastic with Mercer's accomplishment would be an understatement:

There is nothing forced or grotesque about this house. Every feature of it has an absolute and definite meaning, but always a dignified purpose. In considering his work... it is pertinent to say that architects have laid down many precepts that are not exemplified in the average structure, but which have been carried out in this house.\(^ {37}\)

In addition to describing the techniques of inserting collapsible boxes within the walls to create drainage cavities or the novel vault construction, the author also described the proposed plan for embellishment of the spaces. In particular, he wrote of the Saloon:

The ceiling will be decorated by an entirely novel method. Its striking feature will be designs produced in colored cement. Several experiments in this line have been entirely successful. Little dykes or boundaries of clay placed in the bottom of forms established the desired outline or design and into these the colored cement was poured, followed by the concrete forming the beam or floor slab, thus thoroughly bonding the colored cement designs with the concrete, the former resembling a beautiful effect in enamel.\(^ {38}\)

Clearly, the author is making reference to the painted "mosaics" which Mercer experimented with in the cellar beneath the Saloon and which were not repeated elsewhere. As the author notes with regard to illustrating the room in which the above plan is to be carried out, "...the main apartment or saloon was so filled with studding and

\(^{36}\) *Cement Age*, later *Cement Age-Concrete Engineering*, published by Cement Age. Co. 1904-1920.

timber that a picture could not be taken."

About the uncompleted house in general, he states:

While the photographs show texture and form they fail to convey an impression of the wonderful color effects to be found in this house. The background of a ceiling may range from dull ochre tints to cool light greys, with patches of red, yellow and blue here and there. These colors, it is important to note, are in the sands used in the top coat of the forms, and are thus embedded in the concrete. They do not in any sense give the effect of a stained or color-washed wall. The color resembles that in a building centuries old, tinted and mellowed by time. These tones are emphasized by the bands and clusters of glazed tiles which adorn capitals and arches in more pronounced color and form.

The subject of colored sands being the sole contributor to the appearance of the surfaces comes up again in 1913, after the house was completed. W.T. Taylor of Architectural Review writes:

"The [entrance] hall has a rich, warm hue, obtained by the use of brown sand for the concrete and reddish brown tiles for the floor."

and

"The variety of tone in the concrete walls, secured by the use of different sands, and the rich color of the tiles, give the whole interior a harmonious warmth."

and

"[In the Saloon], the large windows have cemented frames and admit a strong light, but by the use of dark sands the ceiling holds a curious air of mystery."

Mercer himself recorded that when erecting the scaffolding and earthen mounds for the vaulting and flat ceilings, a layer of "yellow Bucks County sand" was spread over the forms. This technique cannot account for all of the coloring; for example, blue sand does not exist, although crushed stone aggregate was available in a variety of colors

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38 ibid. p. 329.
39 ibid. p. 329.
40 ibid. p. 330.
including shades of blue or violet. It would also be difficult or impossible for one colored sand to be contained or separated from a different colored sand, which one sees as tinted fields or banding on the walls or columns. Perhaps the authors did not investigate deeply enough into the subject of color for the surface and when told that the colors were obtained from clay or cement washes, that in effect became part of the substrate after curing, assumed that this indicated the use of colored sands. Examination of the colored surfaces in the Saloon corroborate Mercer’s own description of the application of washes, as he noted in “The Building of Fonthill”. (see fig. 6).

fig. 6. Inscribed line delineating red area from general grey-green field.
Chapter Three: Contemporary Influences

Contemporary Concrete Finishes

At the time Mercer was building and decorating Fonthill, he had many options for the embellishment and protection of the concrete and cement surfaces.

Concrete could be colored in three ways: selected aggregates, integral pigments and applied finishes. Coloring concrete, cement and mortar, whether through the use of integral pigments or applying them to the surface, is as old as the use of these materials. The durability of the colors could not always be ensured however. Organic pigments could not be used with alkaline cement or concrete because of chemical incompatibility rendering the color impermanent. Mineral oxide and metallic colorants were found to be the best pigments for both painting and as additives. They tended to be lightfast, chemically stable, alkali resistant and did not weaken the concrete when used in the correct proportions. In addition, they were often fairly inexpensive, which was beneficial when considering the decoration of an entire building.

The types of surface finishes which could be used on concrete were and are still varied. Of the traditional systems used, cold water paints, which include distemper and casein paints, and oil paints were the most common. Distemper paints were made with dry pigment, water and glue, usually hide glue or gelatin as the binder, were mixed together. Casein paints were made the same way but with a milk protein plus a solubilizer such as ammonia, as the medium. Oil based paints could be used, although the application had to be postponed until it was certain that the concrete or cement had fully cured, therefore
leaving no free alkaline material at the surface. When wet or damp, the extreme alkalinity of the cement and concrete material would saponify and ruin the oil in the paint, causing it to fail. In fact it was common not only on cement but on traditional lime-based plasters to apply a coat of cold-water paint to not yet cured plaster in order to make it presentable right away, and then a year or so later, wash the coating off and apply the more durable and fashionable oil paint. This system required extra work however compared to one application of a finish. The advantages of a cold water paint was that it could be applied immediately, even when the surface was still wet or damp, insuring an even stronger bond between paint and substrate. Only well-weathered concrete could accept an oil paint, which was more durable than distemper or caseins in high-access areas. Because of their relative solubility in water, however, cold-water paints had to be used indoors.

To neutralize the surface and render the concrete harmless to oil paints, chemical solutions of zinc sulfate in water or magnesium fluorosilicate in water were sometimes used as pre-treatments. Acids in solution, such as muriatic or acetic, could be applied to neutralize the surface and were recommended for oil-based and water wash preparations alike. Records show that Mercer purchased muriatic acid, but only a quart. This could have been an experiment after the advice of Robert Lesley (editor of the magazine where an article suggests this procedure). One quart could obviously not have been enough for Fonthill, let alone the Saloon.

44 Yael Lowenberg. “Historic Concrete Finishes. 1900-WWII.” p. 59.
Other treatments for sealing or waterproofing cement was the application of mixtures of linseed oil, copal varnish, tung oil, acid resins, and china wood oil. These could be used as a final finish as well, leaving semi-glossy, stone-like surfaces.\(^4^7\) When linseed oil and acid copal resins were combined they produced a calcium resinate. One producer of cement fillers and paints and a subsequent patent holder at the time was the New York firm of Toch Brothers. Interestingly enough, found among Mercer’s papers was a brochure, bearing a stamp from the Girard Material Co., Philadelphia, printed by Toch Brothers, extolling their sanitary “cement floor paint”\(^4^8\)(see fig. 7.). Their patent of 1906 described a process which also produced a calcium resinate through the application of first a heated mixture of linseed oil and an acid resin, followed by a second coat consisting of the same mixture, but with a higher proportion of drying oil plus any pigment desired.\(^4^9\) The brochure found is not dated and there are no records of sale or receipt in Mercer’s papers.

Mineral paints were another alternative for surface finishing; developed in Germany in the mid 1800’s and refined by the Keim Company in Bavaria in 1878. The production of these paints and subsequently stone preservatives as well, would come to be dominated by companies in Germany, Austria and eastern Europe. These paints, consisting primarily of magnesium, potassium or sodium silicates and pigment, when deposited, penetrated into the substrate and dried to become essentially part of the concrete or cement. A tough, waterproof, permeable crystalline sub-surface was formed.

\(^4^7\) ibid. p. 60.
\(^4^8\) Personal Papers and Receipts of Henry Mercer. series 16, folder 41. Spruance Library. Doylestown. PA.
THE wear and tear to which Cement Floor Paints are subjected is a most severe test. We have succeeded in putting into Toch's Cement Filler and Cement Floor Paint the elasticity and durability which such materials must necessarily have, and they are being largely used in Power Houses, Hospitals, Garages, Storage Warehouses, Office Buildings, Residences, etc., to prevent the dusting and powdering of cement floors and to render such floors impervious to the action of water, oil or grease. The priming coat of CEMENT FILLER penetrates deeply into the pores of the concrete and, when dry, forms a suitable foundation for the finishing coat of CEMENT FLOOR PAINT, which dries with a gloss similar to a high-class enamel, and which is made in the beautiful shades shown on the opposite page or in any special color that may be desired.

On wooden floors, the priming coat of CEMENT FILLER should be omitted, but TWO coats of CEMENT FLOOR PAINT should be applied.

Ask for booklet pertaining to "Cement Filler" and "Cement Floor Paint (patented), which contains full directions for the application of these materials.

TOCH BROTHERS

Inventors and Manufacturers of
Technical and Scientific Paints
320 Fifth Ave., NEW YORK

STANDARD SHADES OF TOCH BROTHERS' Sanitary Cement Floor Paint (PATENTED)

LIGHT STONE

WARM GRAY

SPRUCE

DREB

TILE RED

DARK RED

ANTHUM BROWN

MEDIUM DARK STONE

DARK STONE

fig. 7 Toch Brothers brochure, c. 1906-1910. Courtesy Bucks County Historical Society. The original contains colored paint swatches: 'spruce', 'dark red', and 'drab', are colors similar to colors found in the Saloon.

Cement washes and whitewashes were probably the most common, cheapest and simplest finishes to apply. A whitewash is essentially a solution of thinned lime putty, water and pigment, if desired. Whitewashes were not very abrasion resistant, but formed a hard, translucent, protective surface, used primarily for exterior work. Cement washes, or Portland cement paints, on the other hand, consisting of water, cement powder and
sometimes sand and pigment, formed thin veneers on top of the concrete if applied after the substrate had dried and were considered more durable.\textsuperscript{50}

Finally, any number of organic varnishes, lacquers, waxes and bituminous coatings could be applied to concrete, rendering the surface quite impermeable. It was recommended that such treatments be protected from moisture from behind, because such a situation would cause the surface concrete to spall, due to entrapped liquid water and water vapor.

\textit{Outside Technical Influences}

By the middle of the nineteenth century, technology handbooks for the layman who wanted to paint, plaster or generally repair his own house, could do so with the help of these books. Towards the end of the century this was true for those wishing to build in concrete. Mercer, being a pragmatic man who would often write notes in the margins of the books he owned, would have, in all likelihood, consulted any and all sources which could have aided him in any aspect of construction and embellishment. Although Mercer owned over 6,000 books at the time of his death, only a handful were devoted to construction and fewer still to concrete or cement specifically.

It is now known, in fact, that Mercer did consult a publication published by The Atlas Portland Cement Company entitled \textit{Concrete Construction About the Home and on the Farm}, from 1905, for many techniques used at Fonthill. Several entries in his construction notebook were re-iterated word for word from the book, the physical

\textsuperscript{50} Yael Lowenberg, "Historic Concrete Finishes, 1900-WWII," p. 57.
evidence is so similar to methods suggested by Atlas or Mercer even refers to the book by name.

Regarding the concrete formulation for the Library floor and beams, Mercer wrote that the “Atlas book recommends 1 • 2 • 4 for the beams and floor slabs.”\textsuperscript{51} This refers directly to “Table for Designing Reinforced Concrete Beams and Slabs”,\textsuperscript{52} ‘1’ designating parts cement, ‘2’ designating parts sand and ‘4’ designating parts stone or gravel. The formation of cavities for condensation evaporation in the poured concrete walls by the use of collapsible boxes was suggested earlier in the handbook as well as a method of lifting off the concrete forms and resting their bottom bolts on the recently set concrete, ready for the next pour.\textsuperscript{53} Both methods were used by Mercer in the construction of Fonthill’s walls.\textsuperscript{54} Mercer stated that the boxes were “of his invention”\textsuperscript{55}, but one may replace the phrase with “of his design”, since the Atlas book gave construction details, but not of the exact dimensions which Mercer used. Finally, Mercer transcribed an instruction found in the Atlas book into his own notebook, “In general, sufficient water should be used to give a ‘mushy’ mixture just too soft to bear the weight of a man when in place.”\textsuperscript{56,57}

Mercer claimed that in building Fonthill he did not consult professional architects in the specific design and that he did not work from conventional drawings. This is true, but Henry did indeed consult professionals on technical matters and material issues.

\textsuperscript{51} Architectural Notebook, vol. 1., p. 30.
\textsuperscript{52} The Atlas Portland Cement Company. Concrete Construction About the Home and on the Farm. p. 18.
\textsuperscript{53} ibid. p. 41-42.
\textsuperscript{54} Architectural Notebook. vol. 1., p. 46.
\textsuperscript{56} Architectural Notebook, vol. 1., p. 48.
As mentioned earlier, because of concrete's growing popularity among trained architects and homeowners alike, the design and decoration of it were the subjects of many publications and the formation of several associations. Robert Lesley, editor of *Cement Age*, as well as Vice President of the Association for Testing Materials, had become a sort of advisor for Mercer by 1908 in the construction of Fonthill. Correspondence between the two has not been found, but based on the extensive coverage of the construction detailed in his magazine, as well as the mention of his name several times by Mercer in his notebooks, a relationship can be presumed.\(^58\),\(^59\)

Other acquaintances of Mercer's who undoubtedly counseled and advised during the construction of Fonthill included Albert Moyer, civil engineer and a writer for *Cement Age*, and associated with the Vulcanite Portland Cement Company. In an advertising folder from 1908 entitled *Concrete Surface Finishes*, Moyer illustrated Mercer's tiles as recommendations for concrete embellishment. The year before in 1907, he commissioned Mercer to decorate his re-inforced concrete home in East Orange New Jersey. George Elkins, a director of Vulcanite Portland Cement Company was also a board member of the Bucks County Historical Society, of which Mercer was a founding member and lifetime board member as well.

None of the above is given space here necessarily to "expose" Mercer as a fraud or plagiarist. On the contrary, it is recorded in order to set a precedent that because Henry was not a trained architect or engineer, he saw the futility in trying to build this structure without the advice of professionals and trade publications. It is also to show that although


it was not recorded as such, the formulation and application of the finishes that Mercer used had to have been strongly influenced from outside sources.

Among the diversity of subjects covered by the Atlas handbook, the topic of giving concrete and cement color is included. In it, the company prescribed mineral pigments to color Portland cement mortars. As discovered through analysis, Mercer employed several of these colors in his painted finishes. A table is included as the only reference made in the book for "Coloring for Concrete Finish":

colors given to Portland cement mortars containing two parts river sand to one cement:

<table>
<thead>
<tr>
<th>dry color</th>
<th>wt. of dry color to 100 lbs. cement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/2 lb. 1 lb. 2 lbs. 4 lbs.</td>
</tr>
<tr>
<td>lamp black</td>
<td>light slate light grey blue grey</td>
</tr>
<tr>
<td>prussian blue</td>
<td>light green light blue slate</td>
</tr>
<tr>
<td>ultramarine</td>
<td>slate</td>
</tr>
<tr>
<td>yellow ochre</td>
<td>light green light pink slate</td>
</tr>
<tr>
<td>burnt umber</td>
<td>slate</td>
</tr>
<tr>
<td>venetian red</td>
<td>light pink bright pink slate</td>
</tr>
<tr>
<td>red iron ore</td>
<td>pink slate dull pink terra cotta</td>
</tr>
</tbody>
</table>

Two other publications of note at the time of Fonthill's construction were the *Cyclopedia of Bricklaying, Stone Masonry, Concretes, Stuccos and Plasters* by Fred T. Hodgson in 1907, and *Cement and How to Use It* edited by William A. Radford in 1910.

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60 ibid. p. 86.
Both contain recommendations for pigment choice and proportions. Hodgson sites in *Cyclopedia*:

In coloring cement work the best results are obtained by the use of mineral pigments. They should be thoroughly mixed with the dry cement before making the mortar. For grey or black, use lampblack; for yellow or buff, use yellow ochre; for brown use umber; for red, use Venetian red; for blue use ultramarine.  

References thus far have only mentioned color in the context of cement mortar, not paint per se. Radford, however, wrote:

The color effects obtained with cement are many and are beautiful. Most of the effects are obtained, however, not as might be supposed, by mixing the dry colors in the cement, but by painting the cement after it has become dry and hard. There are two very good reasons for not mixing the colors in the cement. First, it is almost impossible to mix the mass so it will dry with an even or uniform color. Second, most coloring matters weaken the cement. No coloring matter containing acids or anything that will act upon the alkalis in the cement, can be used... in some localities a popular method of finish, as well as the cheapest, is to paint the surface with cement mortar.

The use of the phrase “paint with cement mortar” may imply that the mortar is so thinned that the only method of application can be with a paint brush. The following table is also included in the book:

<table>
<thead>
<tr>
<th>color</th>
<th>mineral</th>
<th>lbs. color to 100 lbs. cement</th>
</tr>
</thead>
<tbody>
<tr>
<td>gray</td>
<td>germantown lamp black</td>
<td>1/4-1/2</td>
</tr>
<tr>
<td>black</td>
<td>manganese dioxide</td>
<td>12</td>
</tr>
<tr>
<td>black</td>
<td>excelsior carbon black</td>
<td>2</td>
</tr>
<tr>
<td>blue</td>
<td>ultramarine</td>
<td>5-6</td>
</tr>
<tr>
<td>green</td>
<td>ultramarine green</td>
<td>6</td>
</tr>
<tr>
<td>red</td>
<td>iron oxide</td>
<td>6-10</td>
</tr>
<tr>
<td>bright red</td>
<td>english red</td>
<td>6</td>
</tr>
<tr>
<td>sandstone</td>
<td>red/purple iron oxide</td>
<td>6</td>
</tr>
</tbody>
</table>

By the turn of the century the pigments that could safely be used and available were in common use. Coloring the cement mortar or plaster seems to have been the most widely suggested choice for the method of applying color to concrete. References are few regarding any kind of painted surface, with an oil painted surface receiving the most note.\(^{63}\)

One last suggestion is pertinent. It was reported, in 1928, in *The Ferro-Concrete Style* by Francis Onderdonk that “Some German builders apply mineral or casein paints immediately on a concrete of fine-grain surface produced by a smooth mold. They consider glue colors preferable to oil paints for stuccoed surfaces.”\(^{64}\) This much has already been seen. However, they go further and record that “For interior work Mr. [W. Noble] Twelvetrees recommends waterpaints which can be used when the concrete is not perfectly dry.”\(^{65}\) What is interesting, however, is that analysis confirms that Mercer did indeed use some glue-based paints as well as water-based paints applied on still wet cement, as he instructed in his notebook.\(^{66}\)

After reviewing this information one may notice that all of the pigments Mercer used, with the exception of one, are included in Redford’s list and that his application of

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\(^{63}\) Yael Lowenberg. “Historic Concrete Finishes. 1900-WWII.” p. 57.

\(^{64}\) Onderdonk Jr., F.S. *The Ferro-Concrete Style. Reinforced Concrete in Modern Architecture*. 1928. p. 91.

\(^{65}\) ibid. p. 91.

\(^{66}\) Architectural Notebook. vol. 2. p. 93.
these colors is through painting and not by plastering as will be discussed later in the analysis. While Mercer obviously relied on the Atlas handbook, there were other sources which influenced him. A list of all the painting supplies for which Mercer kept receipts is included in Appendix 2.
Chapter Four: Description & Analysis

Sampling Strategy

At the outset of any analytical work involving the removal of samples from a site, a strategy for choosing must be made, based on the research agenda. This is done in no small part to ensure that representative material is taken. This includes samples of all locations and types as well as samples of any possible alterations and probable damage of the material from use, wear or decay. A plan is also necessary to mitigate any damage resulting from the removal of samples.

At the time of his death, Mercer bequeathed his home to the Bucks County Historical Society, to be used as a museum, but giving life rights to the building to Frank and Laura Swain. Frank died in 1954 and Laura in 1975. Since that time, the Society has been owner and manager. In looking through the copious receipts and notes left by Henry Mercer, it was evident that there were probably no further redecorating campaigns after the initial decoration during the years of construction after the building envelope had been secured, 1910-1912. House logs and receipts made during Laura’s tenure as head of the household do not record any modifications either.

The actual room construction and the integral use of Mercer’s tiles played a major role in establishing his design aesthetic. The fabrication of almost every architectural element in cast or poured concrete precludes the notion that these items could be moved or replaced easily. The profusion of original Moravian Tiles which decorate every room in the house are of colors influenced by the Arts and Crafts movement of the late 19th and

early 20th century. These glazed tiles set the scheme and palette for each room and their durability provide an important component to Mercer’s intentions for his interiors.

To what degree the existing finishes were original, how they participated in the overall interior aesthetic, and to what degree they had altered were the major research questions posited.

Because of the difficulties in sampling from the concrete substrate and the active functioning of the house as a museum open to the public, it was decided to take samples from already deteriorated, broken or spalled areas whenever possible and to limit the number taken. These also needed to be areas which were representative of particular colors and type of finish, architectural elements and conditions. Necessarily, there were areas where a good surface finish had to be sampled, but these were undertaken in locations closer to the ceiling or not casually seen. Additional samples were taken only as confirmation for previous analysis.

Since it was the objective of the study to identify the composition of the applied finishes and ascertain if any change had occurred over the past 80 years, the samples taken needed to reflect the various colors and surface characteristics as well as their placement in the room with regards to light exposure. Samples were also taken from visibly decayed areas, regardless of color or finish properties, as a secondary objective of the analysis. These were located primarily in the Alcove area and the stair to the Alcove. All samples are graphically located on the two location plans for the Saloon’s ceiling and the Saloon and Alcove walls and columns. (See Appendix 1).
Seven different colors, four different finish treatments and two major sources of light exposure were tentatively identified and sampled in varying combinations, keeping the previously noted conditions in mind. Within the Saloon, location of finishes with regard to areas which could have been previously altered, intentionally or accidentally, did not seem to be an issue. One exception was the wall, immediately right of the fireplace. According to oral tradition, this was the place where Mercer stacked firewood, being the most convenient location. Some areas under the North windows have also deteriorated, presumably from water infiltration. In the case of the firewood location, no repairs seem evident, whereas at the windows some patching was observed. Normally, areas which can be reached and therefore more easily modified, are suspect when sampling. With the above exceptions noted, no modifications could be seen (and they probably would be given the exacting nature of the substrate) and so this factor was not really a consideration. Deterioration in the Alcove and the stair to the Alcove was not limited to reachable areas, but again, no repairs were evident.

Light sources were taken into consideration because of the change possible in certain pigments and binders when subjected to certain amounts of ultra-violet light. These changes can manifest themselves as loss of binder, pigment de-coloration or discoloration, binder discoloration or even film failure. Pigments and media were identified for replication and possible conservation purposes. Knowledge of a film's pigment and binder content also helps in understanding a film's characteristics, both beneficial and detrimental.
Twenty-five samples were taken and analyzed for pigment and media content. An additional seventeen were taken to verify or compare with earlier samples or particular references in the records.

*Analytical Techniques*

**Microscopy**

Visible light microscopy is normally used as the initial examination technique. When viewing a prepared paint cross-section at 20x or 50x or higher magnification in reflected light, one may gain information regarding first the stratigraphy of paint layers, the general nature of those layers, layer thicknesses and any other distinguishing macro features.

Fluorescence microscopy involves the use of ultraviolet radiation to identify specific components, organic and inorganic, based on their response to UV light. This is primarily done to identify the media or binder in a paint sample. Certain materials will produce their own intrinsic fluorescence called autofluorescence, which can only be seen when viewed under this radiation. Paint media such as natural resins exhibit well this reaction to UV light. Identification by UV fluorescence can be extended to other materials with the help of staining chemicals called fluorochromes. Proteins in the form of distemper or casein paints and lipids as drying oils are often identified this way. The fluorochromes used in this study were Fluorescein Isothiocynate (FITC) and Texas Red Isothiocynate (TRITC) for the identification of proteins, Dichlorofluorescein (DCF) for lipids and Triphenyltetrazolium chloride (TTC) for carbohydrates.68

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Through the use of polarized light microscopy (PLM), crystalline materials may easily be identified and is especially useful for pigments. The identity of a sample can be found or at least narrowed by the various visual properties which are inherent to that sample.

**Microchemical Testing**

Micro-chemical testing involves the application of various chemicals to crushed and dispersed quantities of paint to establish the identity of the pigments used. The methods and materials may be found in Appendix 3.

**On Site Solubility Testing**

Preliminary solubility tests were performed on site to suggest possible binding media. Ethyl alcohol (EtOH) was used to determine the possible use of spirit varnishes and natural resins, such as shellac. Saliva was used to determine the possible presence of water-soluble media such as glue in a distemper. Acetone alone was used to help determine oil-based media. Zip-Strip®, a methylene chloride based paint stripper, cleared with acetone was used to help determine possible oil-based or more tenacious non-aqueous miscellaneous media.

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Instrumental Analysis

Two additional techniques were used sparingly for the identification of possible binders and pigments. The necessity of a trained technician for the performance of these tests made the cost of applying them to more samples prohibitive.

Fourier Transform Infrared Spectrometry (FTIR) is employed primarily in the characterization of binding materials, but can also be used for identifying inorganic materials such as pigments. As the name suggests, infrared radiation is employed. The radiation is split into two beams with the sample being analyzed placed in the path on one. The radiation which passes through the sample is then caused to be out of phase with the second beam, is recombined with the second beam and produces a intensity/frequency spectrum which is characteristic of the matter which is being studied. The data is then computer-matched with known samples from an established database and possible matches are generated. This testing was performed at the Philadelphia Museum of Art’s Conservation Department Analytical Laboratory.

Energy dispersive x-ray spectrometry (EDS), was performed at the Laboratory for the Study and Research of Matter at the University of Pennsylvania. The procedure involves the bombardment of a sample with electrons. This forces the sample to emit x-rays whose energy signatures are collected, analyzed through a computer data-base, and possible matches are made. Both FTIR and EDS results are expressed as spectrums.

ibid. p. 19.
Description & Interpretation of Data

Conclusions were drawn from a variety of sources which included primary documents (notebooks, receipts and first-hand recollections), secondary sources (journals, books and second-hand observations), and site examination and physical analysis of actual materials. The first two categories already have been discussed in the first chapters of this report. The majority of the physical evidence, however, was obtained through physical analysis. Data of those tests can be found in Appendix 4.

The observations and conclusions of the findings from the Saloon and Alcove areas will be divided into two general categories: 1. walls, columns and the entire Alcove and 2. beams and ceiling. The first category employed a simple color scheme and was broken down into colored fields. The second category turned out to be slightly more complex involving more architectural elements, more paint layers and possibly more complex interpretation.

Walls and Columns

Grey/Green

The general wall and column color and finish for the house, including the Saloon, is a light green/grey film, semi-matte and lightly textured from the trowelling of the cement plaster underneath.(see fig. 8). Under UV light, two different resinous zones can be observed in sample 13.(see fig. 9). When analyzed with FTIR, the individual resins could not be identified because of the difficulty in physically separating them into samples. However, wax was identified as a material in the sample. Waxes were often employed as
waterproofing agents in applied concrete finishes; Mercer may have been over-compensating in order to protect the interior of Fonthill. Both zones are pigmented with green earth, some form of black pigment such as manganese or lamp black, and white Portland cement as a filler and as the white in the mix. This is all seen in cross-section in Sample 13. This grey/green finish appears to have been painted first followed by subsequent colored fields such as the blue band and the red field on the Saloon entrance wall. (see fig. 10.) It is clear here that the under coat of resin has discolored as indicated by the contrast visible from the protection it was afforded by a framed print. Second, the discoloring continues in the blue area as well. Thirdly, the cross section of sample 1 shows two distinct colors of red and green/grey, slightly mixing as if the red was applied while the other was still wet. Red and blue are the only wall colors, aside from the grey/green finish in the Saloon.

fig. 8. Plastered and painted column: body concrete is light grey spot, cement-lime plaster is buff area, grey green paint exhibiting trowelling texture. 1998.
The finish in general is in excellent shape, no powdering, flaking or loss. Despite the fact that the media is a natural resin, determined through fluorescence microscopy, it is unaffected by most solvents and is only affected when a high alkaline stripper is applied.

fig. 9. Sample 13, showing two distinct zones of autofluorescence. Cross-section, 50x, UV light, BV-1A filter.

The blanching that occurs is the result of the alkali degrading the resins and/or the wax in the finish. It appears that the original application was fairly thin because of the relatively uniform thinness of the film over the entire room, not just at abrasion points and because the color is somewhat non-uniform as well. This also suggests a free hand in the mixing and application on the part of the painter. An overall mottled appearance is achieved.
Vertical Surface Varnishes

On some of the walls or columns which did not receive a coat of either lime/cement plaster or cement plaster, and the concrete body is exposed, a coat of yellow shellac or what appears to be pigmented shellac is applied. In UV light these films autofluoresce strongly. These areas include columns 1 & 2, the stair wall to the Alcove and the proper right wall adjacent to the fireplace. Columns 5,8,9 & 10 received other color treatments, but were not plastered or coated with the grey/green paint. The pigments used appear to be earth minerals and owing to the golden brown appearance could be raw sienna or yellow ochre. Because of the film’s durability even when treated with solvents, this could not be confirmed, but the particles can be seen in visible light microscopy. The finish is not soluble in saliva, but readily thinned and removed with ethanol. The use of a natural resin is confirmed by Mercer’s account of the finishing of the house which he recounted in “The Building of Fonthill” and by the great amount of shellac and turpentine which he purchased. Again, it appears that the thinning and application was done freely, giving the surfaces an uneven, mottled appearance. Examples include samples 7,11 & 14.

Reds

The reds in the room are found on the bottom third of column 10 and the Alcove wall as a wainscot, the entrance door wall and on the beads of the beams. The description of the beads will be included in the later section devoted to the ceiling and Saloon beams. As discussed above, the red field on the entrance door wall appears to have been applied over the grey/green coating, at least in some areas. It is clear that from overall observation that the shellac and grey/green coatings were applied liberally and somewhat
indiscriminately in terms of delineation. Sample 1, which was chosen to represent the red portion of this wall, was taken from an area near to the uncovered grey/green area. It is probable that the field color was applied all over, stopping generally where the red was to be applied, a line was inscribed to delineate where the bolder, more noticeable red field would stop (see fig. 7.) and the red was applied, in some spots covering the grey/green. The overall appearance of the red field does not have the appearance of being overtop another film; it seems too thin and regular as the grey/green area. No medium was identified under UV light and the film was not soluble in anything except methylene chloride, which blanched the color. The film appears to be a thin wash of cement, pigmented with raw sienna and red iron oxide, thinned with water. This red brick color can also be found in the Terrace Pavilion, but was identified as being a distemper, as were all the finishes found there.74

A similar application sequence seems to have been repeated on column 10, with the exception being that the red was applied overtop a thin coat of natural resin. The cross-section from sample 12 and in situ examination shows a fairly continuous matte red surface finish. The cross-section also shows a thin layer of natural resin only in spots underneath the red finish. This resin is applied alone to other parts of the upper column, freely and very thinly. (see fig. 10). It appears that the whole column was finished with the resin, albeit spottily, and subsequently finished with a red field at the bottom and a blue band at the capital. As with the other red field, the film appears to be a thin wash of cement, pigmented with raw sienna and red iron oxide, thinned with water. No media was

detected with UV light and staining, nor was the finish soluble in anything except methylene chloride, which blanched the color. Signs of abrasion are evident, however, at the base of the column where furniture and feet could abrade the hard yet thin finish (see fig. 10).

![Fig. 10. Column 10. Signs of abrasion are evident at the base. 1998.](image)

The last red to be examined was located in the Alcove, on the elevator shaft wall. This is illustrated by sample 6. The pigments identified were also red iron oxide, small amounts of other earth pigments and black pigment. The first solvent to be tested was
saliva, which immediately lifted the red color off the surface. Additional solvents were not used for fear of complete removal of the finish. The smoothness and fineness of the film in situ as well as the ease in which it comes off with water, presents the possibility that this finishes either a distemper or a poorly adhered cement wash. In cross-section, however, the absence of any crystalline cement material, points to the probability that it is glue-bound. The film tested negative for any protein with fluorescence staining, but the quantity used, originally could have been small and subsequently deteriorated. This may also explain its condition.

The painted wall surfaces, including the red area, in the Alcove are all suffering from extreme flaking below the paint/plaster interface and great loss (over 50%). Instead of the normal rougher cement/lime plaster which is evident in many areas of the Saloon, the majority of the Alcove is plastered with what appears to be a finer, weaker cement lime plaster or a straight lime plaster (this can be seen plainly in cross-section versus the plaster seen in sample 19). Samples 4, 5, 6, 7, 8 & 14, as well as other rooms in the house which are treated with this plaster, all exhibit the same or similar flaking and loss problems. (see fig. 11).

It is possible that the flaking is occurring at the plaster layer due to the inability of the plaster to accept any applied film because varnishes as well as paints have been applied to the plaster and most or all are exhibiting the same symptoms. The cause and subsequent treatment proposal could not be explored within this study because of time constraints. Preliminary recommendations can be found in the Recommendations section later in the report.
Blue areas of the Saloon and Alcove include the banding at the tops of all the columns, banding at the stair to the Alcove, two concrete bookcases, one side of the Alcove beam, the baluster arch in the Alcove and banding on the upper portion of the

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*fig. 11. Elevator shaft wall, exhibiting flaking and loss of paint. 1998.*
elevator shaft wall. There are also moderate to large amounts of blue finish still evident on various stoveplates.

Through micro-chemical testing and PLM, ultramarine was found to be the main colorant in samples 19 & 20, found on columns 6 & 7 respectively. This was also confirmed for the blue on the baluster arch and the elevator shaft wall. Plain visible light microscopy was used to confirm the same on the other areas, except the bookcase which was not sampled. FTIR also confirmed the presence of cerrusite in sample 19, the ionic component of white lead. Late in the decoration of Fonthill and during the initial painting of the Terrace Pavilion, receipts show the purchase of 12 1/2 pounds of white lead. These white, opaque particles can be seen in cross-section. (see fig. 12.)

*fig. 12. Sample 19. Cross-section illustrating finish composition. 50x magnification.*
Further FTIR analysis performed on sample 19 confirmed the presence of glue, presumably as the binding media as well as wax. The wax is similar to the wax found in sample 13, suggesting that either wax was added to the blue finish or to the concrete before the blue. Because of the inconclusive evidence gained from fluorochrome staining and the strong similarity in appearance and texture among all the blue samples with the exception of the Alcove beam and column, it may be assumed that the other blue finishes are distemper as well. The solubility in water of these finishes also points to glue as the binder. In fact as seen in fig. 13, some liquid had once spilled from the balcony, over the side, slightly staining the blue finish, as seen in the small streams running all the way down the wall. The Alcove samples however, did not come off with saliva, but required methylene chloride to have any effect. Like previous samples, the color was blanched, suggesting a resinous binder and/or a wax component.

Fig 13. Staircase wall illustrating staining on surface.
An interesting comparison may be made at this point concerning the blue samples taken from the Saloon and the sample taken from the entrance hall, which was not included in this study. This was done because there exists a specific recipe for the blue found as the background color of the brocade tiles in the entry space (see Chapter 2, p. 19). The recipe specified mixing dry pigment with dry cement powder and water, applying the mix onto the still wet plaster. The tiles were then placed onto the wall. (see fig. 14). In cross-section, it is confirmed that the paint was applied when the surface was still wet because of the mixing of material from the plaster into the finish. (see sample 42). The entry way sample is thicker and contains more filler (cement). The finishes of the Saloon samples, particularly 19, seem to be less cohesive and contain more pigment. (see sample 19, 20).

The description of the different shades of blue seen on eight stoveplates in the ceiling will be discussed in conjunction with the remainder of the samples from the ceiling and not divided into colors, but rather as a decorative whole.

Finally, there are two bookcases and a stove which can be included in this category. Both are poured concrete. The first bookcase is cast into the wall and floor and is plastered with a cement/lime coat. The other is moveable, exhibiting no intermediate plaster. The sample taken from the Russian stove is from the yellow field on the front.

The cast bookcase is green and is illustrated through sample 2. Pigments identified through EDS include white lead and an earth pigment, probably green earth. These results contradict the findings from the microchemical tests and PLM, however, which identified chrome green. Records show that Mercer did indeed buy a pigment called chrome green during the time which Fonthill was being decorated, but because of the subjectivity on the part of the examiner, it is more probable that the EDS results are correct. The surface is not affected by any solvents except methylene chloride, which again, blanches the finish. Under this green finish is a resinous which autofluoresces under UV light. The sample was taken from an upper corner front of the bookcase and “spill-over” from any resin applied to the wall would not have affected the stratigraphy. It would seem that Mercer had some or all of the case sealed with a natural resin, probably the yellow shellac found in the records, then coated with a very thin coat of cementitious green wash. This is the only floor level element that is painted green.

The other bookcase is of a dull orange color. In several areas the coating is flaking, detaching at the paint/substrate interface. There are also a few areas where there is a
white, crystalline substance, forming round spots on the surface. These do not necessarily correspond with the flaking or with any other noticeable feature. (see fig. 15). Through EDS and microchemical testing, red lead is identified as the main colorant but the medium is not so easy to identify. The smooth texture, even application and the darkened region of concrete just below the film may suggest an oil binder. The presence of a lipid (oil binder) was not detected, however, with fluorochrome stains. It is possible that the bookcase was a later addition to the room (it is moveable and in a somewhat awkward location for accessing the books), after the form had time to set and partially cure. It may have been painted right before it was set in the room.

![fig. 15. Orange bookcase, showing flaking and white spots. 1998.](image)

Finally, the yellow field on the Russian stove appears to be pigmented within its substrate as well as having a thin layer of color on top. The yellow sand within also contributes to the appearance. The surface is generally rougher than other areas analyzed.
thus far. Yellow ochre and raw sienna were the pigments identified and again, no binding media was confirmed through fluorochrome stains. A large majority of the sample dissolves when treated with acid, including the so-called painted area. The colorant comes off on a saliva-wetted cotton swab, but is not necessarily powdery when abraded. When seen in cross-section, there appears to be no film per se, just a finer region at the surface. This may imply that the substrate was intentionally colored followed by a pigmented wash.

**Ceiling and Saloon Beams**

Samples were taken from the beams mainly for stratigraphic information. Microchemical tests for pigments were not performed, but solubility tests were conducted.

The red beads on the beams appear to be cement washes of red iron oxide, black pigment and water. This was applied over a layer of red lead primarily, which in turn appears to be a cement wash also. This coloring sequence is clearly applied and was not integrated into the clay form (see fig. 16). In fact most beads are treated in this way, but two beads which border the alcove are not coated at all, but left with a raw concrete surface. The color was not affected by any solvents with the exception again of methylene chloride which blanched the color.

As for the coloring of the beams themselves, the cross-section seems to corroborate the recipe which Mercer specified for its decoration (see Chapter 2, p. 19.). Light and medium brown particles, presumably raw sienna and manganese dioxide as well as light and medium grey particles, presumably the cement, were observed. The beam is grey/brown in color, unplastered (the grain from the wooden forms can still be seen). The
written recipe does not direct how the mix was to be applied, but it would seem that the colorant is actually included in the concrete mixture because of the lack of a superficial

\[\text{fig. 16. Red bead on Saloon beam illustrating the application of the red finish. 1998.}\]

paint layer. It is probable that a layer of colored mortar was trowelled into the form first followed by the concrete body. This is demonstrated by the appearance of portions of the colored surface with craquelure, as if when the concrete was applied, it split and exposed the material underneath (see fig. 17)

The ceiling proper is comprised of many different elements: the ceiling fields themselves, the decorative borders around the fields, the stoveplates, both large and small and the decorative banding around them.
The ceiling fields all exhibit the same appearance and coloring. The colorants identified were yellow ochre, black pigment and raw sienna. When tested with solvents, a saliva-wetted cotton swab picked off some color. However, when tested for a binder, none could be identified. In fact, in cross-section, there is no distinct paint layer to be seen. When sampled, the area exposed underneath is of a much lighter material, not pigmented. (see sample 23). Recollections of Mercer, as well as other laborers state that, “Having heard of serious condensation of moisture in a recently built house in Canada, we decided to cast a very porous undercrust on all further [after the library] ceilings.”

It would seem that during construction of the ceiling a layer of colored concrete could have been included in this undercrust, rendering the color rather permanent as well as labor-

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saving. In addition, it was known that yellow sand was used as the bed on which the concrete was poured, thus imparting an additional hue.

As described earlier, rolls of clay were impressed into the layer of sand and were then sliced into with wire loops, creating the negative space for the ceiling borders and most of the stoveplate banding. The ceiling borders are made up of multiple bands running the entire length of a side. In most of the fields the outer-most band closest to the beam was painted with a green matte paint. In fact, in other samples, this green is part of the stratigraphy but not on the surface. Through EDS, this green was identified as chrome green and the type of paint as either a weak distemper or cement wash. This was based on the negative staining results, and the ease in which the color was removed with saliva.

The bands which run in the center of the border group were considered highlights because of their raised position. Samples taken from these areas revealed a layer of bronze paint covered with a slightly pigmented coating of a natural resin, which autofluoresces under UV light. These bands appear dark brown in color with a light sheen, not necessarily metallic.(see fig. 18). This upper layer of resin was cleaned fairly easily with acetone, but could be removed with more vigorous rubbing or with methylene chloride. The only ceiling field border which did not exhibit any bronze paint was for “I”, which is the central field of the room.

In some cases, such as sample 26, this bronzing treatment seems to have intentionally been applied over layers of green or orange. In situ, these colors can be seen “peeking” through between bands in the border. Other bands, not necessarily sampled, simply appear to have been shellacked over the coloring, although the colors are not
immediately apparent, but brown-looking. This may be explained by the possible
discoloration of the resin, or that it was pigmented in the first place, perhaps to tone the
undercolor.

fig. 18. Ceiling field “C” border with bronze powder finish. 1998.

Much of the banding around the small ceiling and beam inserts appear to be similar
in sheen and color, however only one band was sampled (see sample 38.) This showed
again a thin layer of bronzing powder bound with a resin or perhaps oil. The surface was
be cleaned or removed with solvents just as the decorative highlights above. Speculation
on the film’s binder was based not on UV fluorescence results (it was not tested), but on
the purported method of preparing bronze paint. It is known that ‘banana oil’, or amyl
acetate, was usually mixed with bronze powder, along with other organic solvents, to form a film.\textsuperscript{76} Plain banana oil as well as bronzing liquid was purchased by Mercer during his decoration of Fonthill. It seems only a relatively small amount may have been used in the Saloon, judging by the samples taken, but it is clear as one walks around the house that he also used bronze paint as highlighting on many pieces of furniture.

The borders around the large stoveplates seem to follow the same pattern as the borders around the ceiling fields. Some bands are painted first with either an orange or green paint, and subsequently bronzed, others seem to have just a resin coating on top of a painted surface or in the case of sample 37, directly over the plaster surface.

The last ceiling element to be studied were the stoveplates. From Mercer’s records, the inserts were cement patterns of the plates placed in the wooden forms of the beams and in the concrete crust of the ceiling.\textsuperscript{77} When sampled, however, it was not possible to cut all the way down to the supposed concrete substrate because the fine plaster on top of it was too thick. In short, this plaster appears to have been the casting material; the relief of the original stoveplate is clearly seen.(see fig. 19).

The casts were then painted in various colors and as several cross-sections show, treated with bronze paint. The samples taken, 27 & 30, reveal this treatment on the highlights of the pictorial relief. The colored areas are somewhat powdery and are removed with a saliva-wetted cotton swab. The highlighted areas appear dark brown in situ, perhaps from bronze corrosion products in the film. These areas were not tested for solubility because of the overall friability of the surfaces.

\textsuperscript{77} Architectural Notebook. vol. 1., p. 133.
The condition of most of the casts appears to be chalky and flaky. When seen up close, some of the plates which appear white or off-white in color are actually losing the blue or orange paint which once was there and the under-plaster is being exposed. The purpose of this condition can only be speculated at, pending further analysis.

Chapter Five: Conclusions and Recommendations

It can be stated with a high degree of certainty that the finishes present in the Saloon today are the original coatings applied during the construction of Fonthill. It appears that there has been no re-painting or in-painting to correct, brighten or redecorate the color scheme.

The decoration of the ceiling took the form of fairly brightly painted stoveplates inserted into subdued ochre fields. The plates were painted blue, green, white and red-orange - colors observed on the glazed tiles - and often highlighted with bronze powder. The borders are painted as well, some bands glazed with a pigmented resin, other bands highlighted with bronzing paint and also glazed, and others still simply left with the matte paint appearance.

The coloring for the walls, columns and floor elements does not need much interpretation. There are no hidden layers save for the occasional resin layer which seems to have been applied more for its sealing and priming properties than for its decorative value, since it was subsequently covered.

It can also be said with a high degree of certainty that the original appearance of all these finishes would not have been much different than the appearance it has today. The pigments used were known at the time to be highly alkali resistant as well as extremely lightfast. Red iron oxide, raw sienna, yellow ochre and ultramarine, the most common pigments found are not prone to photo-degradation. Further, the majority of the colored finishes (with the exception of the grey/green) did not employ an organic binder which

could yellow or degrade, but used cement powder to form the film. This cement mixture was applied secco: wet cement wash applied to a dry cement substrate. This was common. The grey/green wall color, however, as determined from UV fluorescence examination, appears to have been resin, oil or wax based, or a combination of the three. It is possible that Mercer loosely followed the methods patented by the Toch Brothers or even used their product, but there is no confirmation of this.79

Exposed areas of color compared with areas concealed from the light or abrasion are quite similar in appearance, but the incredible thinness of the application, makes one wonder if the cement wash was indeed intentionally that thin.

The exceptions to this statement are the blue striping on the columns in the middle of the room, 6 & 7, the striping at the staircase and to a certain extent portions of the grey/green background wall color. The other exception is the staircase wall at the entrance of the Saloon. When prints hanging on the wall were taken away, it was clear that either the resin/oil underneath had discolored or the surrounding wall area had lightened in comparison. Resin oils, which were tentatively identified as binders within the grey/green undercoat, usually darken over time and oxidize and yellow when concealed.(see fig. 20).

All of the blues in the Saloon and the Alcove, with the exceptions of the bookcases and the Alcove beam, appear to be distemper paints. The blues mentioned above are in locations which receive sunlight almost all day long and appear to have faded, probably due to glue blanching. In contrast, blue banding of the same paint type found in areas

receiving little natural radiation, for example the Alcove or banding at the tops of the Saloon wall, are darker and richer in color and even a little thicker on the surface.

fig. 20. Saloon entrance wall showing area previously concealed by a print. 1998.

Overall, the colors in the Saloon would have been slightly darker and more saturated, perhaps more like those found in the Alcove. Because of the inherent idiosyncrasy of the mixture, the mixing, the application and perhaps of the number of laborers doing the job, it is highly unlikely that any of the colored areas, including the shellacked areas, would have been uniform in texture and shade. To ignore the eccentricity of the structure, of the handling of surface plaster and paint elsewhere in the house, by assuming that the colored fields were blocks or stripes of solid, un-mottled color would be a misunderstanding. Indeed, the room could be described as polychrome, but in non-primary hues, using a liberal and artistic hand. The bronzing paint, when used by itself
anywhere else, can often be quite bright and distracting. Through analysis, it was discovered that a pigmented natural resin or a colored shellac was used to tone the bronze down but retaining what would have been a metallic sheen and subtle highlight. Mercer described the paints used as “washes”, implying that they were not necessarily opaque, but allowing the texture and character of the cement and concrete to be seen. Contemporary accounts tell of, “The color resembles that in a building centuries old, tinted and mellowed by time. These tones are emphasized by the bands and clusters of glazed tiles which adorn capitals and arches in more pronounced color and form.”

In comparison, the restoration in the Terrace Pavilion in 1997 appears to have respected the bold color scheme set forth by the tiles which are installed within. (see fig. 22). These tiles were designed and produced by Mercer later in his design career than those found in the Saloon, which are more subtle. Again, it would be a misunderstanding to restore the finishes in the Saloon based on a visual comparison with the Terrace Pavilion, rather than following the aesthetic clues already present.

Any intervention within this space should be limited to the reattachment or consolidation of failing paint or cement, followed by in-painting in areas of loss. The re-integration of texture and color to areas of great loss would bring visual unity back to the site. Where the new and the old join, however, it should be clear that two paint campaigns meet. Over-painting or removal of finishes would obliterate original material and compromise the identity of the interiors. It would also be unnecessary because the vast majority of the finishes are sound and visually intact. Areas which have been treated with

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bronze paint should be cleaned with an appropriate solvent to brighten the finish, bringing back a soft highlight to those elements.

Fonthill was always intended to be a museum for the exhibition of his own work and the ceramic art of other cultures, at the same time fulfilling his vision of the celebration of materials. One notices the structure first, the tiles second and the finishes third, and that is the way Mercer intended it to be. To his credit as an untrained designer, the finishes present are of such subdued tone and low sheen as to provide a suitable backdrop for the tiles as well as the organic nature of the concrete forms. The whole is a success of his vision of structural and decorative unity.
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Bibliography


“Memories of Jacob Frank.” Transcription of oral history tape made in the 1960’s. Deposited at Fonthill, Doylestown.

__________. “Where Concrete Stands For Concrete.” Cement Age. vol. 6. January, 1908.


Personal Papers and Receipts of Henry Mercer. Spruance Library, Doylestown, PA.


Appendix One

Saloon Plans and Sample Locations
Sample List

1: dispersed and cross-sectioned; red area at entrance door; proper right; 60" above floor.
2: dispersed and cross-sectioned; green bookcase, west wall; proper right; 77" above floor.
3: dispersed and cross-sectioned; yellow field on Russian stove, north wall; center; 81" above floor.
4: dispersed and cross-sectioned; yellow/brown area; alcove, elevator shaft south facing wall; proper left of wooden elevator door; 50" above floor.
5: dispersed and cross-sectioned; blue area, alcove, elevator shaft south facing wall; proper upper left of wooden elevator door; 84" above floor.
6: dispersed and cross-sectioned; red area, alcove, elevator shaft south facing wall; proper right of wooden elevator door; 24" above floor.
7: dispersed and cross-sectioned; yellow/brown varnished area; staircase to alcove, elevator shaft west facing wall; 90" above main riser.
8: dispersed and cross-sectioned; brown area, staircase to alcove, ceiling beam between columns 2 & 3; east face; 90" above alcove floor.
9: dispersed and cross-sectioned; orange bookcase, top shelf, south face; 60" above floor.
10: dispersed and cross-sectioned; orange bookcase, top shelf, south face, “bleached” finish; 60" above floor.
11: dispersed and cross-sectioned; brown area fireplace wall; proper right of fireplace; 24" above floor.
12: dispersed and cross-sectioned; red area, column 10, north face; 37" above floor.
13: dispersed and cross-sectioned; green-gray wall corner, at library/saloon portal; proper right; 76" above floor.
14: dispersed and cross-sectioned; yellow-brown area, staircase to alcove; 20" above main riser.
15: dispersed and cross-sectioned; plaster from behind yellow-brown area, staircase to alcove; 20" above main riser.
16: dispersed and cross-sectioned; yellow baluster arch; alcove; proper right; 24" above floor.
17: dispersed and cross-sectioned; red ballister arch; alcove; proper right; 24" above floor.
18: dispersed and cross-sectioned; blue ballister arch; alcove; proper right; 24" above floor.
19: dispersed and cross-sectioned; blue stripe at capital, column 6, south face; 14’ above floor.
20: dispersed and cross-sectioned; blue stripe at capital, column 7, south face; 14’ above floor.
21: dispersed and cross-sectioned; green band, ceiling field “C” border, nearest to beam connecting columns 6 & 7; 15’ above floor.
Sample List (con’t.)

22: dispersed and cross-sectioned; brown band, ceiling field “C” border, nearest to beam connecting columns 6 & 7; 15’ above floor.
23: dispersed and cross-sectioned; yellow-brown ceiling field “C”; 15’ above floor.
24: dispersed and cross-sectioned; white/cream area, stove plate on ceiling field “I”; north 1/3; 15’ above floor.
25: dispersed; orange/red area, stove plate on ceiling field “I”; 15’ above floor.
26: cross-sectioned; brown highlight band, ceiling field border “J”; nearest to beam connecting columns 6 & 7; 15’ above floor.
27: cross-sectioned; green stoveplate, ceiling field “J”; 15’ above floor.
28: cross-sectioned; brown highlight band, green stoveplate border, ceiling field “J”; 15’ above floor.
29: cross-sectioned; yellow-brown ceiling field “J”; 15’ above floor.
30: cross-sectioned; blue stoveplate, ceiling field “J”; 15’ above floor.
31: cross-sectioned; orange and brown highlight band, blue stoveplate border, ceiling field “J”; 15’ above floor.
32: cross-sectioned; brown highlight band, ceiling field border “I”; nearest to beam connecting columns 6 & 7; 15’ above floor.
33: cross-sectioned; blue highlight area, white stoveplate, ceiling field “F”; 15’ above floor.
34: cross-sectioned; green band, ceiling field border “F”; nearest to beam connecting column 4 & fireplace; 15’ above floor.
35: cross-sectioned; brown highlight band, ceiling field border “F”; nearest to beam connecting column 4 & fireplace; 15’ above floor.
36: cross-sectioned; brown highlight band, white stoveplate border, ceiling field “F”; 15’ above floor.
37: cross-sectioned; tan band, white stoveplate border, ceiling field “F”; 15’ above floor.
38: cross-sectioned; small stoveplate inset border, ceiling field “C”; 15’ above floor.
39: cross-sectioned; green band, white stoveplate border, ceiling field “I”; 15’ above floor.
40: cross-sectioned; red band, white stoveplate border, ceiling field “I”; 15’ above floor.
41: cross-sectioned; grey/green area, west face, beam connecting columns 7 & 10; 15’ above floor.
42: cross-sectioned; blue background, brocade tiles, entrance hall, north wall; 24” above floor.
Floor Plan, The Saloon
Wall & Column Sample Locations

Columns lettered 1-11

scale in feet
Ceiling Plan, The Saloon

Ceiling, Beam & Stoveplate Sample Locations
## Appendix Two

### Painting Supplies from Receipts, 1908-1913

#### Ready-Mixed
- 35 gallons of paint
- 1 gallon white paint
- 2 Gallons Enamel

#### Additives
- 1/100 keg litharge*
- 3 1/2 quarts japan dryer

#### Media
- 130 lbs. white gum shellac*  
- 4 boxes shellac  
- 8 1/2 gals. shellac  
- 2 gal. orange shellac  
- 7 pints banana oil*

- 33 1/4 gals boiled linseed oil
- 2 1/2 gals varnish
- 10 lbs. powdered rosin
- 8 lbs. glue

#### Solvents
- 20 gallons, 3 pints turpentine*
- 105 gals. alcohol*
- 1 qt. muriatic acid

#### Pigments/Colors

##### Ground
- 7 lbs. venetian red in oil
- 1 lb. chrome yellow in oil
- 1 lb. drop black in oil

- 5 bottles bronze*  
- 1 box bronze  
- 3 lbs. gold bronze  
- 9 cans liquid bronze

##### Metallic
- 1 can aluminum
- 4 leafs aluminum
- 17 leafs german silver
- 1 lb. gold

##### Dry
- 11 lbs. raw sienna*
- 6 lbs. ochre*
- 1 lb. chrome yellow*
- 12 1/2 lbs. Leurs white lead*

- 3 1/4 lbs. ultramarine*
- 78 lbs. red iron oxide*
- 2 lbs. black*
- 1 lb. chrome green*

#### Other
- 1 lb. graining color
- 1 pt. ground color

* indicates the item was identified, or used in conjunction with an identified material, in the decoration of the Saloon.
Appendix Three

Microchemical Testing Methods and Materials

Blues

_Ultramarine_

dilute or concentrated hydrochloric acid (HCl)-the pigment becomes white then dissolves completely, the smell of sulfur accompanies this as well as effervescence of hydrogen sulfide (H₂S).

Greens

_Green Earth_

dilute HCl- to give a green solution
dilute nitric acid (HNO₃)- giving a reddish solution
to confirm the presence of Fe³⁺ (iron)- after HCl, addition of potassium ferrocyanide, gives off Prussian Blue.

_Chrome Green_

dilute HCl- to give a white precipitate and Prussian Blue
dilute sodium hydroxide (NaOH)-gives a orange brown precipitate and sample becomes brown/yellow.
dilute HNO₃ -turns sample yellow brown, no precipitate
dilute sulfuric acid (H₂SO₄) plus silver nitrate (AgNa₃)- brick-red precipitate indicates a chromate

Reds

_Red Lead_

dilute HCl- dissolves sample with a white precipitate
dilute HCl plus potassium iodide (KI)- gives a yellow precipitate

_Iron Oxide Reds_

dilute HCl- gives a yellow solution
dilute HCl plus potassium ferrocyanide- gives a precipitate of Prussian Blue (this test is applicable for all pigments containing iron).
Yellows

Yellow Ochre

dilute HCl- gives a yellow solution
dilute HNO₃ - gives a yellow solution
dilute HCl plus potassium ferrocyanide- gives a precipitate of Prussian Blue (this test is applicable for all pigments containing iron).

Chrome Yellow

dilute HCl- gives a white precipitate and an orange solution
dilute sulfuric acid (H₂SO₄) plus silver nitrate (AgNa₃)- brick-red precipitate indicates a chromate

Browns

Raw Sienna

hot HCl- gives a yellow solution
dilute HCl plus potassium ferrocyanide- gives a precipitate of Prussian Blue (this test is applicable for all pigments containing iron).

Raw Umber

hot HCl- gives a yellow solution
dilute HCl plus potassium ferrocyanide- gives a precipitate of Prussian Blue (this test is applicable for all pigments containing iron).
Appendix Four

Sample Data Sheets
Sample Data

Sample Number: 1
Sample Location: East wall, door from Entry Hall into Saloon, proper right, top hinge. 60" above floor

Date Removed: 1/5/98

Cross Section Sample

Substrate: rough plaster on concrete

Stratigraphy
1. 0.065-0.26mm, Munsell notation 2.5 YR 3/4 for medium-brown in situ.
2. 10R 3/6, brightest spots. thin dirt layer on surface.

Fluorescence Microscopy
auto: negative secondary: TTC, FITC, DCF negative

General Comments: at 100x magnification, light and medium red, green and transparent particles comprising the finish; entire layer appears to be fairly crystalline, with most particles measuring 0.013-0.026mm; finish is thickest at dips in substrate and thinnest at high points.

Dispersed Sample

Microchemical Testing: tested positive for red iron oxide, raw sienna, negative for lead
Polarized Light Microscopy (PLM): at 400x, particles are (from most to least) quartz, calcite, iron oxide red, yellow ochre, raw sienna, black pigment
Energy Dispersive X-ray Spectrometry (EDS): not performed
Fourier Transform Infrared (FT-IR): not performed

General Comments: generally there are small amounts of all iron earth pigments mixed in with each other; carbon black pigments are opaque in PLM and fairly amorphous in shape; the type could not be distinguished; it is assumed that the “black” pigment used is manganese dioxide or lamp black, both of which appear in Mercer’s records

On Site

Solubility Testing: after 1 minute, methylene chloride-based stripper cleared with acetone, removed red color, leaving a blanched-looking spot; did not necessarily remove down to substrate, other solvents had no effect

General Comments: dirt layer appears to dull the color at a macroscopic scale (as it does on every sample to follow); finish is flat in appearance in situ.

Marianne Walsh
University of Pennsylvania

Master’s Thesis
1997/1998
### Sample Data

**Sample Number:** 1  
**Date Removed:** 1/5/98  
**Sample Location:** East wall, door from Entry Hall into Saloon, proper right, top hinge, 60" above floor

---

**Cross section. 50x magnification. Reflected light. Quartz halogen. Kodak Gold film ASA 100.**

---

**Sample Location**
### Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 2</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: west wall, bookcase, top shelf, proper right, 77° above floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

**Substrate:** concrete  
**Stratigraphy:**  
1. 0.0065-0.0195mm: light brown, almost transparent  
2. 0.026-0.065mm: Munsell notation 7.5 GY 3/2, in situ grey-green.  
   7.5 GY 3/4, brightest spots, thin dirt layer on surface  

**Fluorescence Microscopy**  
- auto: 1. positive  
  secondary: 1. TTC positive  
- 2. negative  
  2. FITC, DCF, TTC negative  

**General Comments:** light and medium green and transparent particles comprising the finish; entire layer appears to be fairly homogeneous and smooth with several red, orange and black particles included within; finish is thickest at dips in substrate and thinnest at high points

### Dispersed Sample

**Microchemical Testing:** positive for chrome green, negative for copper and iron

**Polarized Light Microscopy (PLM):** quartz, calcite, chrome yellow, ultramarine, yellow ochre, black  
**Energy Dispersive X-Ray Spectrometry (EDS):** positive for earth oxides (green earth pigment), lead, and substrate materials such as silica, and calcium carbonate  
**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:** the contradiction of test results is not entirely understood; the microchemical results may have been mistaken for chrome; it is assumed that the EDS data is correct.

### On Site

**Solubility Testing:** Zip-Strip after 1 minute and acetone dissolved color well, to leave a blanched-looking spot: acetone alone plus rubbing worked medium-well; other solvents had no effect

**General Comments:** dirt layer appears to dull the color at a macroscopic scale; finish is flat in appearance
Sample Data

Sample Number: 2
Sample Location: west wall, bookcase, top shelf, proper right, 77" above floor

Energy Dispersive X-ray Spectrometry

X-RAY: 0 - 20 keV
Window: Be
Live: 45s Preset: 100s Remaining: 87s
Real: 64s 30% Dead

Elements identified within Sample 2:
- Si - Silicon
- Mg - Magnesium
- Fe - Iron
- Al - Aluminum
- Na - Sodium
- K - Potassium
- Ca - Calcium
- Pb - Lead
- Zn - Zinc
- Cl - Chlorine
## Sample Data

**Sample Number:** 3  
**Sample Location:** yellow field, Russian stove, north wall, 81" above floor  
**Date Removed:** 1/5/98

## Cross Section Sample

**Substrate:** concrete  
**Stratigraphy:**  
1. 0.0065-0.013mm. Munsell notation 2.5 Y 7/6. in situ yellow.  
2. 10 YR 8/8. brightest spots; substantial dirt layer on surface  

**Fluorescence Microscopy:**  
**auto:** negative  
**secondary:** TTC, FITC, DCF negative

**General Comments:** only about 25% of the sample's surface displays this layer; substrate appears to be of a different color than substrates in other samples. Appears to be pigmented with yellow to produce a soft yellow-buff color

## Dispersed Sample

**Microchemical Testing:** both substrate and film positive for iron, negative for chrome and lead  
**Polarized Light Microscopy (PLM):** quartz, calcite, yellow ochre, raw sienna  
**Energy Dispersive X-ray Spectrometry (EDS):** test not performed  
**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:** while not evident in cross-sectioned sample, resinous patches could be seen in dispersed sample

## On Site

**Solubility Testing:** after 1 minute, methylene chloride-based stripper cleared with acetone. Removed yellow color, leaving a blanched-looking spot. Did not necessarily remove down to substrate; other solvents had no effect

**General Comments:** finish is flat in appearance

---

Marianne Walsh  
University of Pennsylvania  
**Master's Thesis**  
1997/1998
Sample Data

Sample Number: 3
Sample Location: yellow field, Russian stove, north wall, 81" above floor

Date Removed: 1/5/98

### Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 4</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: alcove, elevator shaft north wall, proper left of elevator door, 50&quot; above floor</td>
<td></td>
</tr>
</tbody>
</table>

### Cross Section Sample

**Substrate:** plaster on concrete  
**Stratigraphy:**  
1. 0.221-0.351mm, Munsell notation 10 YR 6/4, in situ warm grey-tan, rather homogeneous, smooth layer; fairly crystalline in nature, with; inclusions in the mix  
**Fluorescence Microscopy:**  
auto: negative  
secondary: FITC positive  
TTC, DCF negative  
**Finish Layer(s):** 1  
**General Comments:** finish comprised of particles (including visible black and red ones) averaging 0.026mm across; concrete substrate is not included in sample because of detachment within the plaster

### Dispersed Sample

**Microchemical Testing:** both plaster and film positive for iron  
**Polarized Light Microscopy (PLM):** quartz (very fine particles), calcite, yellow ochre, raw sienna  
**Energy Dispersive X-ray Spectrometry (EDS):** test not performed  
**Fourier Transform Infrared (FT-IR):** test not performed  
**General Comments:** the plaster may or may not be pigmented intentionally, the positive result could be from impurities in the plaster mix

### On Site

**Solubility Testing:** saliva soluble, other solvents not tested  
**General Comments:** finish is semi-flat in appearance; samples 4 through 8 and 14, all exhibit presumed failure of the plaster on which they are situated, resulting in flaking and loss, despite the normal appearance of the plaster.

---

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University of Pennsylvania  
Master's Thesis  
1997/1998
Sample Data

Sample Number: 4  
Sample Location: alcove, elevator shaft north wall, proper left of elevator door, 50" above floor

Date Removed: 1/5/98

Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 5</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: alcove, elevator shaft, north wall, proper left of elevator door, 84&quot; above floor</td>
<td></td>
</tr>
</tbody>
</table>

Cross Section Sample

<table>
<thead>
<tr>
<th>Substrate: plaster on concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish Layer(s): 1</td>
</tr>
</tbody>
</table>

Stratigraphy:
- 1. 0.00 -0.019mm blue. Munsell notation. 5B 3/1 blue in situ.
- 5B 3/2, brightest: light and dark blue and transparent particles present in layer; color is homogeneous and fairly bright

Fluorescence Microscopy
- auto: negative
- secondary: DCF, TTC negative
- FITC positive

General Comments: concrete substrate was not removed with sample due to detachment problems occurring within the plaster layer; secondary fluorescence was faint and scattered.

Dispersed Sample

<table>
<thead>
<tr>
<th>Microchemical Testing: positive for ultramarine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polarized Light Microscopy (PLM): quartz, calcite, ultramarine, yellow ochre, black</td>
</tr>
<tr>
<td>Energy Dispersive X-ray Spectrometry (EDS): test not performed</td>
</tr>
<tr>
<td>Fourier Transform Infrared (FT-IR): test not performed</td>
</tr>
</tbody>
</table>

General Comments: quartz found in this sample is presumed to have come from the plaster layer.

On Site

| Solubility Testing: saliva soluble, other solvents not tested |

General Comments: finish is semi-flat in appearance, when wetted appears slightly purple
Sample Data

Sample Number: 5
Sample Location: alcove, elevator shaft, north wall, proper left of elevator door, 84" above floor

Date Removed: 1/5/98

### Sample Data

**Sample Number:** 6  
**Date Removed:** 1/5/98  
**Sample Location:** alcove, elevator shaft, north wall, proper right of elevator door, 24” above floor

### Cross Section Sample

**Substrate:** plaster on concrete  
**Stratigraphy:**  
1. 0.0065-0.026mm; Munsell notation, 5YR 4/4 red in situ.  
2. 5YR 3/8, brightest spots  
**Fluorescence Microscopy:**  
- **auto:** negative  
- **secondary:** TTC, DCF, FITC negative

**General Comments:** when viewed for auto-fluorescence, paint film disappears and blends with plaster; concrete substrate was not removed with sample due to detachment problems occurring within the plaster layer

### Dispersed Sample

**Microchemical Testing:** positive for iron oxide red and raw sienna, negative for red lead  
**Polarized Light Microscopy (PLM):** quartz, calcite, iron oxide red, raw sienna, yellow ochre, bone black  
**Energy Dispersive X-ray Spectrometry (EDS):** test not performed  
**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:**

### On Site

**Solubility Testing:** saliva soluble with repeated rubbing, other solvents not tested

**General Comments:** finish is semi-flat in appearance; this color field in situ exhibits a lesser degree of detachment

---

**Marianne Walsh**  
**University of Pennsylvania**  
**Master's Thesis**  
**1997/1998**
Sample Number: 6
Sample Location: alcove, elevator shaft, north wall, proper right of elevator door, 24" above floor

Date Removed: 1/5/98

## Sample Data

**Sample Number:** 7  
**Sample Location:** steps to alcove, elevator shaft, proper left, west facing wall 90" above main riser

### Cross Section Sample

**Substrate:** plaster on concrete  
**Stratigraphy**
- 1. average 0.026mm; Munsell notation 5YR 5/8 and 5YR 4/6 mottled orange-brown, homogeneous; thin dirt layer on top

**Fluorescence Microscopy**
- auto: positive  
- secondary: DCF, FITC negative

TTC positive

**General Comments:** concrete substrate was not removed with sample due to detachment problems occurring within the plaster layer

### Dispersed Sample

**Microchemical Testing:** negative for lead and iron

**Polarized Light Microscopy (PLM):** resinous patches, some yellow ochre, raw sienna, calcite

**Energy Dispersive X-ray Spectrometry (EDS):** test not performed

**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:** the discrepancy between chemical and PLM findings could possibly be explained by the dissolution of plaster by HCl, and by retention resin layer with pigments: pigments were freed when sample was pulverized.

### On Site

**Solubility Testing:** ethanol soluble, highly soluble in methylene chloride-based stripper and acetone.

**General Comments:** finish is semi-glossy in appearance; film does not powder or flake when small sample is broken in half
Sample Number: 7  
Sample Location: steps to alcove, elevator shaft, proper left, west facing wall 90" above main riser  

Date Removed: 1/5/98  

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Number:</strong> 8</td>
<td><strong>Date Removed:</strong> 1/5/98</td>
</tr>
<tr>
<td><strong>Sample Location:</strong> beam connecting columns 1 &amp; 2, facing east and elevator shaft, 90” above alcove floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

*Substrate:* plaster on concrete

*Stratigraphy*

1. 0.39-0.52mm: Munsell notation 10YR 6/4 grey-tan in situ; homogeneous in nature.
   - similar to sample 4; thin dirt layer on top

*Fluorescence Microscopy (UV)*

- auto: negative
- secondary: TTC, DCF negative
- FITC weakly positive

*General Comments:* the concrete substrate was not included in the sample because of detachment problems

**Dispersed Sample**

*Microchemical Testing:* positive for raw sienna and possibly yellow ochre

*Polarized Light Microscopy (PLM):* raw sienna, yellow ochre, black, quartz, calcite

*Energy Dispersive X-ray Spectrometry (EDS):* test not performed

*Fourier Transform Infrared (FT-IR):* test not performed

*General Comments:*

**On Site**

*Solubility Testing:* saliva soluble, no other solvents tested

*General Comments:* finish is semi-flat in appearance

---

Marianne Walsh
University of Pennsylvania

Master's Thesis
1997/1998
Sample Number: 8
Sample Location: beam connecting columns 1 & 2, facing east and elevator shaft, 90" above alcove floor

Date Removed: 1/5/98

Sample Location: beam connecting columns 1 & 2, facing east and elevator shaft, 90" above alcove floor

## Sample Data

<table>
<thead>
<tr>
<th>Cross Section Sample</th>
<th>Finish Layer(s): 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Substrate:</strong> concrete, grey, a darkened region of substrate extends under entire length of finish layer</td>
<td></td>
</tr>
<tr>
<td><strong>Stratigraphy</strong></td>
<td></td>
</tr>
<tr>
<td>1. 0.039-0.065 mm: Munsell notation 5YR 5/6 orange in situ, 5YR 6/10 brightest spots: very well mixed, smooth looking and fairly even in thickness;</td>
<td></td>
</tr>
<tr>
<td><strong>Fluorescence Microscopy</strong></td>
<td></td>
</tr>
<tr>
<td>auto: inconclusive</td>
<td>secondary: FITC, TTC negative, DCF positive</td>
</tr>
<tr>
<td><strong>General Comments:</strong> the finish is flaking away from the substrate in several places on the bookcase: in other areas there are spots of a white-crystalline material sitting on top (see photo).</td>
<td></td>
</tr>
</tbody>
</table>

## Dispersed Sample

| Microchemical Testing: negative for chrome yellow, vermilion; positive for yellow ochre and red lead (orange was dissolved with HCl with a white precipitate, leaving yellow) | |
| Polarized Light Microscopy: yellow ochre, quartz, calcite, inconclusive for red lead | |
| Energy Dispersive X-ray Spectrometry (EDS): positive for lead (red lead pigment) | |
| Fourier Transform Infrared (FT-IR): test not performed | |
| **General Comments:** upon heating the acid treated sample, a yellow solution appeared, evaporated and left a resinous substance | |

## On Site

| Solubility Testing: saliva and acetone clean and brighten the color but leave a white tide-line; methylene chloride-based stripper removes the finish after approximately 3 minutes, also leaving a white tide-line | |
| **General Comments:** exhibits flat finish in situ | |
Sample Data

Sample Number: 9 & 10
Sample Location: top shelf, bookcase facing south windows, 60” above floor

Date Removed: 1/5/98

Energy Dispersive X-ray Spectrometry

X-RAY: 0 - 20 keV
Window: Be
Live: 168s Preset: 100s Remaining: 32s
Real: 205s 18% Dead

Elements identified within Samples 9 & 10:
- Si - Silicon
- Mg - Magnesium
- Fe - Iron
- Al - Aluminum
- Na - Sodium
- K - Potassium
- Ca - Calcium
- Pb - Lead
- Zn - Zinc
- Cl - Chlorine
### Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 11</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: northwest wall, proper right of fireplace, 24&quot; above floor</td>
<td></td>
</tr>
</tbody>
</table>

### Cross Section Sample

**Substrate:** plaster on concrete

**Stratigraphy**

1. 0.065-0.195mm: grey, crystalline
2. 0.013-0.13mm: Munsell notation 2.5YR 2/2-2/4 brick red; black, red and brown particles contained in a medium brown layer, appears resinous; dirt layer on top

**Fluorescence Microscopy**

- auto: weakly positive
- secondary: FITC negative
- TTC, DCF weakly positive

**General Comments:** this particular wall and adjacent floor area was used by Mercer for piling logs for the nearby fireplace, hence the flaking and loss seen in situ

### Dispersed Sample

**Microchemical Testing:** positive for iron, inconclusive for which pigment

**Polarized Light Microscopy (PLM):** raw sienna, yellow ochre, iron oxide red

**Energy Dispersive X-ray Spectrometry (EDS):** test not performed

**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:** the discrepancy between chemical and PLM findings could possibly be explained by the dissolution of plaster by HCl, and by retention resin layer with pigments: pigments were freed when sample was pulverized.

### On Site

**Solubility Testing:** methylene chloride-based stripper soluble after 1:30 min leaving a blanched-looking spot; did not necessarily remove down to substrate, other solvents had no effect

**General Comments:** finish is semi-glossy where film is intact: does not exhibit a uniform color or opacity over the area of the wall

---

**Marianne Walsh**

**Master's Thesis**

**University of Pennsylvania**

**1997/1998**
Sample Data

Sample Number: 11
Sample Location: northwest wall, proper right of fireplace. 24” above floor

Date Removed: 1/5/98

Finish

Substrate

### Sample Data

**Sample Number:** 12

**Sample Location:** column 10, north face, 37” above floor

**Date Removed:** 1/5/98

### Cross Section Sample

**Substrate:** concrete

**Finish Layer(s):** 1 & 2

**Stratigraphy**

1. 0.065-0.013mm; Munsell notation 10YR 7/10 orange-brown, resinous
2. 0.013-0.039mm; Munsell notation 5YR 4/5 red in situ, 2.5YR 3/6 brightest spots; thin dirt layer on

**Fluorescence Microscopy**

- auto: negative
- secondary: FITC, DCF negative
- TTC weakly positive

**General Comments:** sample is a small knob of concrete, exhibiting 3 surfaces, where layer 1 is evident alone as well as under layer 2

### Dispersed Sample

**Microchemical Testing:** positive of iron oxide red and other iron containing pigments

**Polarized Light Microscopy (PLM):** quartz, calcite, iron oxide red, raw sienna

**Energy Dispersive X-ray Spectrometry (EDS):** test not performed

**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:**

### On Site

**Solubility Testing:** methylene chloride-based stripper soluble after approximately 1:30 min leaving a blanched-looking spot; did not necessarily remove finish down to substrate, other solvents had no effect

**General Comments:** finish is flat in appearance in situ

---

Marianne Walsh

University of Pennsylvania

Master's Thesis

1997/1998
<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Number:</strong> 12</td>
<td><strong>Date Removed:</strong> 1/5/98</td>
</tr>
<tr>
<td><strong>Sample Location:</strong> column 10, north face, 37&quot; above floor</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Number:</strong> 13</td>
<td><strong>Date Removed:</strong> 1/5/98</td>
</tr>
<tr>
<td><strong>Sample Location:</strong> doorway between library &amp; saloon, proper right, 76” above floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

- **Substrate:** rough plaster on concrete  
- **Stratigraphy:**
  1. 0.026-0.39mm; Munsell notation 5Y 4/2 grey-green; highly crystalline, particles are dark grey-green, medium brown and transparent in color and average 0.039mm in diameter
- **Fluorescence Microscopy**
  - auto: negative
  - secondary: TTC, FITC negative  
  - DCF weakly positive in finish and plaster

**General Comments:**

**Dispersed Sample**

- **Microchemical Testing:** positive for iron containing pigments
- **Polarized Light Microscopy (PLM):** quartz, calcite, green earth, yellow ochre, black
- **Energy Dispersive X-ray Spectrometry (EDS):** test not performed
- **Fourier Transmission Infrared (FTIR):** positive for wax, (from finish) calcite and gypsum (from substrate)

**General Comments:** HCl alters the green sample, turning it an orange tan with a yellow solution; substrate tests positive for iron as well

**On Site**

- **Solubility Testing:** methylene chloride-based stripper soluble after approximately 2 min leaving a blanched-looking spot; did not necessarily remove down to substrate, other solvents had no effect

**General Comments:** finish is semi-flat in appearance in situ; this particular color/finish is the most prevalent in the room, acting as the background color to everything else

Marianne Walsh  
University of Pennsylvania  

Master’s Thesis  
1997/1998
Sample Number: 13
Sample Location: doorway between library & saloon, proper right. 76" above floor

Date Removed: 1/5/98

The first, second and last spectra represent the total of Sample 13. Wax, gypsum and calcite are materials identified within the sample.
<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number: 14, 15</td>
<td>Date Removed: 1/5/98</td>
</tr>
<tr>
<td>Sample Location: stair to alcove, elevator shaft west facing wall, 20” above second to top riser</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

*Substrate:* plaster on concrete, crystalline buff/pink in color

*Stratigraphy*
- 1. 0.026-0.039mm: Munsell notation 10YR 5/8; yellow-brown, resinous

*Fluorescence Microscopy*
- auto: positive for natural resins
- secondary: DCF positive for plaster, negative for film, TTC positive for film

*General Comments:* the concrete substrate was not included in the sample because of detachment problems

**Dispersed Sample**

*Microchemical Testing:* positive for raw sienna, yellow ochre, possibly iron oxide red

*Polarized Light Microscopy (PLM):* quartz, calcite, yellow ochre, raw sienna

*Energy Dispersive X-ray Spectrometry (EDS):* test not performed

*Fourier Transform Infrared (FT-IR):* test not performed

*General Comments:* the calcite and quartz found are presumed to have come from the plaster layer beneath.

**On Site**

*Solubility Testing:* partly saliva soluble; ethanol completely soluble; methylene chloride-based stripper completely soluble (almost run-away)

*General Comments:* finish is semi-flat in appearance; the finish layer and a thin layer of plaster are flaking away from the wall, but the rough plaster left behind is not powdery or efflorescing
Sample Data

Sample Number: 14 & 15
Sample Location: stair to alcove, elevator shaft west facing wall, 20” above second to top riser

Date Removed: 1/5/98

## Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 16</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: alcove baluster arch closest to stair to third floor, 24” above alcove floor</td>
<td></td>
</tr>
</tbody>
</table>

### Cross Section Sample

**Substrate:** plaster on concrete, appears to be colored red in some areas fairly un-crystalline and smooth. 0.026-0.039mm. found on 3 surfaces of sample, dirt layer on top

**Stratigraphy**

1. lump of color approximately 0.039 in diameter, slightly crystalline. Munsell notation 10YR 5/6, tan-yellow

**Fluorescence Microscopy**

- auto: negative
- secondary: DCF, FITC, TTC negative

**General Comments:** the sample's unusual stratigraphy is due to the fact that it was taken from a rough surface of the baluster arch

### Dispersed Sample

**Microchemical Testing:** positive for iron containing pigments in both the film and the plaster

**Polarized Light Microscopy (PLM):** quartz, calcite, raw sienna, yellow ochre, traces of iron oxide red and resinous patches

**Energy Dispersive X-ray Spectrometry (EDS):** test not performed

**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:**

### On Site

**Solubility Testing:** saliva soluble, other solvents not tested

**General Comments:** finish is flat in appearance

---

Marianne Walsh  
University of Pennsylvania

Master's Thesis  
1997/1998
Sample Data

Sample Number: 16
Sample Location: alcove baluster arch closest to stair to third floor. 24" above alcove floor

Date Removed: 1/5/98

## Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 17</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: alcove baluster middle arch, 24&quot; above alcove floor</td>
<td></td>
</tr>
</tbody>
</table>

## Cross Section Sample

**Substrate:** plaster on concrete

**Stratigraphy**

1. 0.65mm; Munsell notation 10YR 5/6 tan-yellow,
2. none -0.039mm. Munsell notation 5YR 5/4, brick red. 2.5YR 3/6 brightest spots,
   slightly crystalline

**Fluorescence Microscopy**

- *auto:* negative
- *secondary:* DCF, FITC negative

**General Comments:**

## Dispersed Sample

**Microchemical Testing:** positive for iron containing pigments

**Polarized Light Microscopy (PLM):** quartz, calcite, yellow ochre, traces of iron oxide red and raw sienna.

**Bone black**

**Energy Dispersive X-ray Spectrometry (EDS):** test not performed

**Fourier Transform Infrared (FT-IR):** test not performed

**General Comments:**

## On Site

**Solubility Testing:** saliva soluble. other solvents not tested

**General Comments:** finish is flat in appearance

---

Marianne Walsh
University of Pennsylvania

Master’s Thesis
1997/1998
Sample Number: 17
Sample Location: alcove baluster middle arch, 24" above alcove floor

Date Removed: 1/5/98

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Number:</strong> 18</td>
<td><strong>Date Removed:</strong> 1/5/98</td>
</tr>
<tr>
<td><strong>Sample Location:</strong> alcove baluster arch closest to stair to saloon, 24&quot; above alcove floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

*Substrate:* plaster on concrete

*Stratigraphy*

1. 0.13-1.3mm, Munsell notation 10YR 5/6, tan-yellow
2. from 0.0065-0.026mm; Munsell notation 2.5PB 4/4 overall, light and medium blue particles within film

*Fluorescence Microscopy*

auto: 1. positive for natural resins  
2. negative

*Finish Layer(s):* 2

**Dispersed Sample**

*Microchemical Testing:* negative for copper, whiting, positive for ultramarine

*Polarized Light Microscopy (PLM):* ultramarine, quartz, calcite, yellow ochre, raw sienna

*Energy Dispersive X-ray Spectrometry (EDS):* test not performed

*Fourier Transform Infrared (FT-IR):* test not performed

*General Comments:* the yellow ochre, raw sienna quartz and calcite listed above most probably came from the underlying plaster and not the blue film

**On Site**

*Solubility Testing:* saliva soluble, other solvents not tested

*General Comments:* finish is flat in appearance

---

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Master’s Thesis  
1997/1998
Sample Data

Sample Number: 18
Sample Location: alcove baluster arch closest to stair to saloon. 24" above alcove floor

Date Removed: 1/5/98

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number: 19</td>
<td>Date Removed: 1/5/98</td>
</tr>
<tr>
<td>Sample Location: column 6, south face, blue stripe, 14' above floor</td>
<td></td>
</tr>
<tr>
<td>Cross Section Sample</td>
<td></td>
</tr>
<tr>
<td>Substrate: rough plaster on concrete</td>
<td>Finish Layer(s): 2</td>
</tr>
<tr>
<td>Stratigraphy</td>
<td></td>
</tr>
<tr>
<td>1. 0.039-0.65mm, orange-brown, resinous found in deeper spots.</td>
<td></td>
</tr>
<tr>
<td>2. none -0.039mm; Munsell notation 2.5PB 2/4 blue, light and dark blue, white and transparent particles within the film, dirt layer on top</td>
<td></td>
</tr>
<tr>
<td>Fluorescence Microscopy</td>
<td></td>
</tr>
<tr>
<td>auto: 1. positive for natural resins</td>
<td>secondary: FITC. TTC negative for both layers</td>
</tr>
<tr>
<td>2. negative</td>
<td>DCF weakly positive for second layer and plaster</td>
</tr>
<tr>
<td>General Comments</td>
<td></td>
</tr>
<tr>
<td>Dispersed Sample</td>
<td></td>
</tr>
<tr>
<td>Microchemical Testing: positive for ultramarine</td>
<td></td>
</tr>
<tr>
<td>Polarized Light Microscopy (PLM): quartz, ultramarine</td>
<td></td>
</tr>
<tr>
<td>Energy Dispersive X-ray Spectrometry (EDS): test not performed</td>
<td></td>
</tr>
<tr>
<td>Fourier Transform Infrared (FT-IR): blue layer positive for animal glue and barite or cerrusite; resin layer positive for seedlac or orange shellac</td>
<td></td>
</tr>
<tr>
<td>General Comments</td>
<td>after HCl treatment, only resinous layer one remained intact</td>
</tr>
<tr>
<td>On Site</td>
<td></td>
</tr>
<tr>
<td>Solubility Testing: saliva soluble, other solvents not tested</td>
<td></td>
</tr>
<tr>
<td>General Comments</td>
<td>finish is flat in appearance; it is decidedly lighter in color than the blue stripe found on the adjacent column 7, sample 20</td>
</tr>
</tbody>
</table>

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University of Pennsylvania

Master's Thesis
1997/1998
Sample Data

Sample Number: 19
Sample Location: column 6, south face, blue stripe, 14' above floor

Date Removed: 1/5/98


Finish

Substrate

Sample Location
Fourier Transform Infrared Spectrometry

Date: Wed Mar 18 11:02:57 1998
Scans: 200
Resolution: 4,000

PMAI1836 FONTHILL SALOON SAM #19 SCRAPINGS/COATING ON BLUE PAINT LAYER

TRANSLUCENT SOFT SOILDS NEAT ON DC

PHILADELPHIA MUSEUM OF ART CONSERVATION DEPARTMENT ANALYTICAL LA

The first spectrum represents the total of Sample 19.
Orange shellac is an identified material within the sample.
The first spectrum represents the total of Sample 19. Hide glue is an identified material within the sample.
Fourier Transform Infrared Spectrometry

The first spectrum represents the total of Sample 19. Cerussite is an identified material within the sample.
The first and second spectra represent the total of Sample 19. Both beeswax and carnauba wax, both natural materials, are matches for a material identified within the sample.
Sample Data

Sample Number: 20
Sample Location: column 7, south face, blue stripe, 14' above floor

Date Removed: 1/5/98

Cross Section Sample
Substrate: rough plaster on concrete
Stratigraphy:
1. none - 0.65, orange-brown, resinous.
2. from 0.0065 - 0.065mm. Munsell notation 2.5PB 4/2 blue-grey, medium blue and transparent particles within film; dirt layer on top

Finish Layer(s): 2

Fluorescence Microscopy
auto: 1. weakly negative
    2. negative
secondary: FITC. TTC negative
            DCF weakly positive for layer 2

General Comments: blue film similar in make-up as sample 19

Dispersed Sample
Microchemical Testing: positive for ultramarine
Polarized Light Microscopy (PLM): quartz, ultramarine, traces of yellow ochre (possibly from plaster)
Energy Dispersive X-ray Spectrometry (EDS): test not performed
Fourier Transform Infrared (FT-IR): test not performed

General Comments:

On Site
Solubility Testing: saliva soluble, other solvents not tested

General Comments: finish is flat in appearance and a fairly darker blue than found on column 6

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Master's Thesis
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<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number: 20</td>
<td>Date Removed: 1/5/98</td>
</tr>
<tr>
<td>Sample Location: column 7, south face, blue stripe. 14' above floor</td>
<td></td>
</tr>
</tbody>
</table>

### Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 21</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: ceiling field C, decorative extrusion nearest to 6-7 beam, 15' above floor</td>
<td></td>
</tr>
</tbody>
</table>

### Cross Section Sample

**Substrate:** concrete  
**Stratigraphy:**  
1. 0.0065-0.026mm: bright medium green, fine textured.  
2. 0.065-0.13mm: medium brown in color, slightly resinous, even textured, with olive green upper region  
3. light green, 0.026 to 0.13 mm in thickness:  
4. 0.0065-0.013mm: Munsell notation 5Y 4/4 to 7.5Y 3/2 to 7.5Y 2/2, grey-green, resinous, containing red and green particles; dirt layer on top  
**Fluorescence Microscopy**  
auto: 1,2 &3: negative  
4. positive  
**General Comments:** layer 2 appears to be very similar to other layers found on samples 4-8 and

### Dispersed Sample

**Microchemical Testing:** first green layer negative for copper, positive for iron  
**Polarized Light Microscopy (PLM):** yellow ochre, quartz, green earth, calcite, chrome yellow  
**Energy Dispersive X-ray Spectrometry (EDS):** test not performed  
**Fourier Transform Infrared (FT-IR):** test not performed  
**General Comments:** what appears to be green earth and chrome yellow was scraped from lower-most layer; yellow ochre and calcite appear to be from the plaster-like layer in the middle.

### On Site

**Solubility Testing:** green layer is saliva soluble; upper-most surface is slightly acetone soluble, highly soluble in methylene chloride  
**General Comments:** finish is semi-flat in appearance; finish is flaking away from substrate in only a few areas along curve-flat juncture

---

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University of Pennsylvania  
1997/1998
Sample Data

Sample Number: 21
Sample Location: ceiling field C. decorative extrusion nearest to 6-7 beam. 15' above floor

Date Removed: 1/5/98

**Sample Data**

<table>
<thead>
<tr>
<th>Sample Number: 22</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: ceiling field C, ceiling field border, brown highlight. nearest to 6-7 beam, 15' above floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

*Substrate*: concrete

*Stratigraphy*
1. 0.0065-0.065mm; yellow metallic film.
2. 0.026-0.039mm; Munsell notation 7.5Y 2/2; light tan to transparent in color.
   - resinos. some red and green particles within dirt layer on top.

*Fluorescence Microscopy*
- auto: 1. negative
- secondary: both layers DCF, TTC negative
- 2. positive

**General Comments:**

**Dispersed Sample**

*Microchemical Testing (MC)*: material below metallic layer positive for iron; upper layer remains intact when treated with dilute hydrochloric acid

*Polarized Light Microscopy (PLM)*: quartz, calcite, yellow ochre, bronze or gold powder

*Energy Dispersive X-ray Spectrometry (EDS)*: test not performed

*Fourier Transform Infrared (FT-IR)*: test not performed

**General Comments**: quartz and yellow ochre taken from the substrate; in a dispersed state layer 1 is identified as a yellow metal (bronze powder)

**On Site**

*Solubility Testing*: slightly soluble in acetone, very soluble in methylene chloride

**General Comments**: finish semi flat and dark brown-green in appearance
Sample Data

Finishes Analysis, The Saloon, Fonthill, Doylestown

Sample Number: 22  Date Removed: 1/5/98
Sample Location: ceiling field C. decorative extrusion nearest to 6-7 beam. 15' above floor

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Finishes Analysis, The Saloon, Fonthill, Doylestown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Number: 23</td>
<td>Date Removed: 1/5/98</td>
</tr>
<tr>
<td>Sample Location: ceiling field “C”, 24” from 6-7 beam, 15' above floor</td>
<td></td>
</tr>
<tr>
<td><strong>Cross Section Sample</strong></td>
<td></td>
</tr>
<tr>
<td>Substrate: concrete</td>
<td>Finish Layer(s): 1</td>
</tr>
<tr>
<td>Stratigraphy</td>
<td></td>
</tr>
<tr>
<td>1. tan-yellow 2.5Y 4/4 overall, not really a “layer” but a colored region at the edge of the yellow/buff substrate</td>
<td></td>
</tr>
<tr>
<td><strong>Fluorescence Microscopy</strong></td>
<td></td>
</tr>
<tr>
<td>auto: negative</td>
<td>secondary: FITC, DCF, TTC negative</td>
</tr>
<tr>
<td><strong>Dispersed Sample</strong></td>
<td></td>
</tr>
<tr>
<td>Microchemical Testing: negative for red lead, positive for iron</td>
<td></td>
</tr>
<tr>
<td>Polarized Light Microscopy (PLM): quartz, yellow ochre, raw sienna, drop black or manganese dioxide</td>
<td></td>
</tr>
<tr>
<td>Energy Dispersive X-ray Spectrometry (EDS): test not performed</td>
<td></td>
</tr>
<tr>
<td>Fourier Transform Infrared (FT-IR): test not performed</td>
<td></td>
</tr>
<tr>
<td><strong>General Comments:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>On Site</strong></td>
<td></td>
</tr>
<tr>
<td>Solubility Testing: saliva soluble</td>
<td></td>
</tr>
<tr>
<td><strong>General Comments:</strong> finish is flat in appearance; substrate is very rough</td>
<td></td>
</tr>
</tbody>
</table>

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1997/1998
Sample Number: 23
Sample Location: ceiling field C, 24" from 6-7 beam, 15' above floor

Date Removed: 1/5/98

**Sample Data**

<table>
<thead>
<tr>
<th>Sample Number: 24 &amp; 25</th>
<th>Date Removed: 1/5/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: ceiling field &quot;I&quot;, stove plate nearest 6-beam, 15' above floor</td>
<td></td>
</tr>
</tbody>
</table>

**Cross Section Sample**

*Substrate: concrete*  
*Finish Layer(s): 2-3*

*Stratigraphy*
1. 0.065-1.3mm; off-white film (plaster), fairly crystalline, homogeneous;
2. 0.065-0.13mm; Munsell notation 2.5Y 4/6, dark buff at surface, dark brown high spots semi-resinous with red and yellow particles within
3. (sample 25) 0.026mm; Munsell notation 2.5YR 6/16, bright orange-red, present in only in several spots on top of dark buff

*Fluorescence Microscopy*
- auto: negative
- secondary: FITC, DCF, TTC negative

*General Comments:* substrate is not included in sample because of detachment problems within paint/plaster layers; bright orange appears merely deposited on surface

**Dispersed Sample**

*Microchemical Testing:* positive for lead, gypsum

*Polarized Light Microscopy (PLM):* gypsum, calcite, red lead, yellow ochre or raw sienna

*Energy Dispersive X-ray Spectrometry (EDS):* positive for lead, calcite, silica, chrome, copper, iron

*Fourier Transform Infrared (FT-IR):* test not performed

*General Comments:* EDS data reflect the presence of lead (presumably the orange-red spots—once painted with red lead?): chrome and copper may be remnants of a past green finish; iron may have been present in the plaster.

**On Site**

*Solubility Testing: saliva soluble*

*General Comments:* overall finish is flat and powdery in appearance

---

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University of Pennsylvania  
1997/1998
Sample Data

Sample Number: 24 & 25
Sample Location: ceiling field “I”, stove plate nearest 6- beam, 15’ above floor

Date Removed: 1/5/98


Substrate

Finish

Sample Location
Energy Dispersive X-ray Spectrometry

Elements identified within Sample 24:
- Si - Silicon
- Mg - Magnesium
- Fe - Iron
- Al - Aluminum
- Na - Sodium
- K - Potassium
- Ca - Calcium
- Pb - Lead
- Ti - Titanium
- Cl - Chlorine
- Cr - Chromium
Sample Number: 26
Sample Location: ceiling field border "J", brown highlight band, nearest to beam connecting columns 7&10, 15' above floor

Date Removed: 3/7/98

Sample Location: 150

Sample Number: 27
Sample Location: ceiling field "J", green stoveplate, 15' above floor

Date Removed: 3/7/98

Energy Dispersive X-ray Spectrometry

X-RAY: 0 - 20 keV
Window: Be
Live: 100s Preset: 100s Remaining: 0s
Real: 121s 17% Dead

MEM1: sample 27

Elements identified within Sample 27:
- Cr - Chromium
- Mg - Magnesium
- Al - Aluminum
- S - Sulfur
- K - Potassium
- Ca - Calcium
- Ti - Titanium
- Si - Silicon
- Fe - Iron
- Cu - Copper
### Sample Data

**Sample Number:** 28  
**Date Removed:** 3/7/98  
**Sample Location:** ceiling field “J”, green stoveplate border, brown highlight band, 15’ above floor

<table>
<thead>
<tr>
<th>Finish</th>
<th>Substrate</th>
</tr>
</thead>
</table>

Sample Data

Sample Number: 29
Sample Location: ceiling field “J”, 15’ above floor

Date Removed: 3/7/98

Sample Data

Finishes Analysis, The Saloon, Foothill, Doylestown

Sample Number: 30
Sample Location: ceiling field “J”, blue stoveplate, 15' above floor

Date Removed: 3/7/98

Sample Data

<table>
<thead>
<tr>
<th>Sample Number: 31</th>
<th>Date Removed: 3/7/98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Location: ceiling field “J”, blue stoveplate border, orange and brown highlight, 15’ above floor</td>
<td></td>
</tr>
</tbody>
</table>

Sample Number: 32  
Sample Location: ceiling field border "I", brown highlight, nearest to beam connecting columns 6&7, 15' above floor

Date Removed: 3/7/98

Sample Data

Finishes Analysis, The Saloon, Fonthill, Doylestown

Sample Number: 33
Sample Location: ceiling field “F”. white stoveplate. blue highlight. 15’ above floor

Date Removed: 3/7/98

Sample Data

Sample Number: 34
Sample Location: ceiling field border “F”, green band, nearest to beam connecting column 4 & fireplace. 15’ above floor

Date Removed: 3/7/98

Sample Data

Sample Number: 35
Sample Location: ceiling field border "F", brown highlight, nearest to beam connecting column 4 & fireplace. 15' above floor

Date Removed: 3/7/98

Sample Number: 36
Sample Location: ceiling field “F”, white stoveplate, brown highlight border, 15’ above floor

Date Removed: 3/7/98

Sample Data

Sample Number: 37
Sample Location: ceiling field “F”, white stoveplate, brown border, 15’ above floor

Date Removed: 3/7/98

Finish

Substrate


Sample Location
Sample Number: 38
Sample Location: ceiling field “C”, small stoveplate, brown border, 15’ above floor

Date Removed: 3/7/98

Sample Location: ceiling field “C”, small stoveplate, brown border, 15’ above floor

Sample Number: 39  
Sample Location: ceiling field "I", white stoveplate, green border, 15' above floor  
Date Removed: 3/7/98

<table>
<thead>
<tr>
<th>Sample Data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Number:</strong> 40</td>
</tr>
<tr>
<td><strong>Sample Location:</strong> ceiling field “I”, white stoveplate, red border, 15’ above floor</td>
</tr>
</tbody>
</table>

Sample Data

Sample Number: 41
Sample Location: grey/green background, west face, beam connecting columns 7 & 10, 15’ above floor

Date Removed: 3/7/98

Sample Number: 42  
Sample Location: Brocade tiles background, Entry hall, north wall, 24" above floor.

Finish  
Substrate
