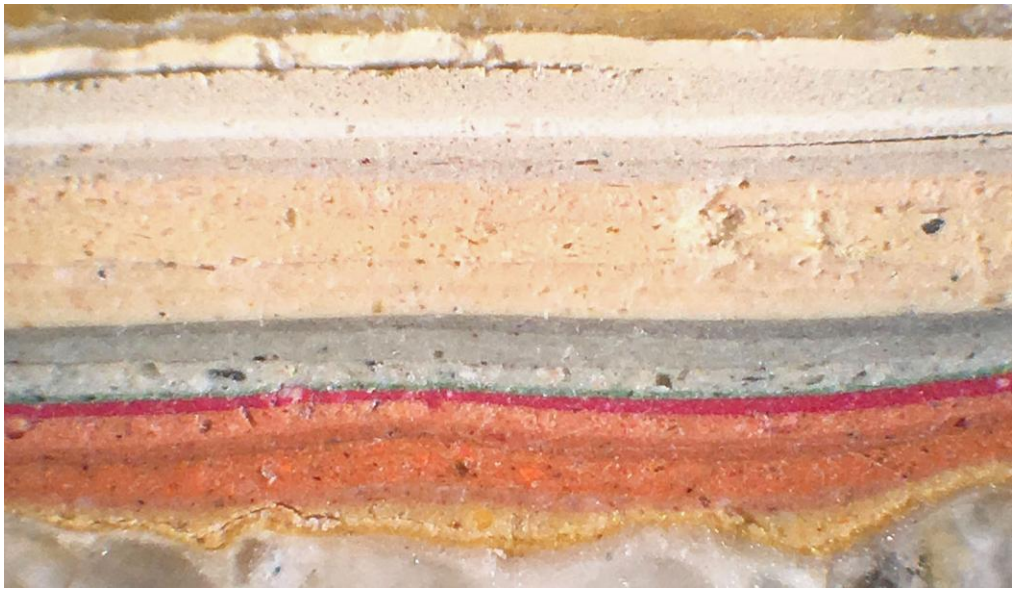
RESEARCHER'S GUIDE

to the

FRANK S. WELSH COLLECTION

Welsh Color & Conservation, Inc.

The Athenaeum of Philadelphia







Selected paint-layer cross-sections from projects represented in the collection

September 1, 2026

On the cover:

Top: Paint-layer cross-section photomicrograph, New Jersey State Capitol, Rotunda.

Lower left: Paint-layer cross-section photomicrograph, New Jersey State Capitol, Grand Staircase.

Lower right: Paint-layer cross-section photomicrograph, cast-iron door enframement, Senate Office Room S-312, U.S. Capitol.

TABLE OF CONTENTS

INTRODUCTORY STATEMENT 1

THE COLLECTION IN HISTORICAL CONTEXT 3

PURPOSE AND USE OF THIS GUIDE 6

OVERVIEW OF COLLECTION ORGANIZATION 7

HOW TO USE THIS COLLECTION: A PRACTICAL ORIENTATION FOR RESEARCHERS 8

1. BEGINNING WITH PROJECT REPORT FILES 8

2. PROJECT PAINT SAMPLES (PRIMARY MATERIAL EVIDENCE) 9

3. PIGMENT AND FIBER SAMPLES ON GLASS MICROSCOPE SLIDES 10

4. POLARIZED LIGHT MICROSCOPY (PLM) LABORATORY NOTEBOOKS 11

5. PHOTOGRAPHIC MATERIALS (VISUAL DOCUMENTATION) 11

6. RESEARCH FILES ON MATERIALS (PIGMENTS, FIBERS, ETC.) 11

7. PUBLICATIONS AND WRITTEN WORK 12

8. WORKING ACROSS MATERIAL TYPES 12

FINAL NOTE ON USE 13

PROJECT REPORTS AND PROJECT FILES 14

Overview 14

Two Forms of Project Documentation 14

1. Project Report Files (Working Files) 14

2. Project Reports (Separately Catalogued; Some Bound) 15

Organization of Project Files 16

Print and Digital Formats 16

Relationship to Other Components of the Collection 17

Using Project Files in Practice 18

Special Note on Variability 19

Concluding Note 20

PROJECT PAINT SAMPLES 21

Overview 21

Development of the Sample Collection 21

Physical Description of the Samples 22

Organization and Location 22

Examination of the Original Samples 23

Correct Identification and Distinction from Slides 23

Locating Project Paint Samples 24

Relationship to Project Files and Reports 24

Relationship to Pigment and Fiber Samples Mounted on Glass Microscope Slides 24

Concluding Note 25

PIGMENT AND FIBER SAMPLES MOUNTED ON GLASS MICROSCOPE SLIDES 26

Overview 26

Walter C. McCrone and the Development of Microscopical Analysis 26

Pigment and Fiber Research 27

The Peterson Fellowship and the Expansion of Pigment Research 28

Preparation and Purpose 29

Physical Description and Storage 29

Organization and Access 29

Relationship to Project Paint Samples 29

Relationship to PLM Laboratory Notebooks 30

Using the Microscope Slides in Practice 31

Concluding Note 31

POLARIZED LIGHT MICROSCOPY (PLM) LABORATORY AND SPECIALIZED ANALYSIS NOTEBOOKS 32

Overview 32

Physical Description and Types of Notebooks 32

Specialized Analysis Notebooks 32

Organization and Working Method 33

Relationship to Microscope Slides and Project Paint Samples 33

Using the Notebooks in Practice 34

Nature and Research Value of the Recorded Observations 34

Special Note on Accessibility 35

Concluding Note 35

PHOTOGRAPHIC MATERIALS 36

Overview 36

Photography as Part of the Investigative Process 36

Field and Project Photography 37

35mm Project Slides 37

Photomicrography and Paint Cross-Sections 38

Photography as Analytical Documentation 38

The Transition from Film to Digital Photography 39

Organization and Access 39

Relationship to Other Collection Components 40

Using Photographic Materials in Practice 40

Interpretive Value 41

Concluding Note 41

PUBLICATIONS, ARTICLES, LECTURES, AND WORKSHOPS 42

Overview 42

The Development of Writing and Publication 42

Publications as an Extension of Research 43

Finish Notes 44

The Development of Lecturing and Teaching 44

Professional and Academic Presentations 45

Lectures as a Means of Teaching Methodology 45

Workshops and Live Microscopy 46

From Lecture to Publication 46

Brown Zinc Paint at the United States Capitol 47

Professional Communication and the Development of the Field 48

Organization and Access 48

Special Note on Audiovisual Materials 49

Concluding Note 49

ADDITIONAL RESEARCH AND PROFESSIONAL MATERIALS 51

Overview 51

The Charles E. Peterson Research Fellowship 51

Research Files and Unfinished Lines of Inquiry 52

Project Profiles 53

Newspaper and Magazine Coverage 53

Using the Articles in Research 54

Professional and Promotional Materials 54

Digital Materials 54

Using the Finding Aid to Explore Beyond This Guide 55

Opportunities for Future Research and Access 55

A Living Context for the Collection 56

LOOKING FORWARD 57

INTRODUCTORY STATEMENT

A Personal Note from Frank S. Welsh

Every archival collection has a beginning. Some originate through an institution, a family, or the records of an organization. The Frank S. Welsh Collection began differently. For me, its origins can be traced to a single day during the summer of 1972, when a chance visit to Independence Hall unexpectedly altered the course of my life and, in time, contributed to the development of a new area of historic preservation.

Only days after returning from Spain, where I had studied as an undergraduate and had been searching for a clearer professional direction, I came home with interests that were unrelated to my college studies but were directly related to my life experiences and personal goals: old buildings, traditional paints, science, history, and in particular, writing. None suggested an obvious career, nor did such a profession yet exist. During a chance visit to Independence Hall on July 4, 1972, however, a National Park Service guide described how physical evidence preserved beneath successive layers of paint had been used to determine the building's original paint colors during its restoration. The realization that the history of a building could be recovered through the careful scientific examination of its paint layers proved transformative. Within months, I sought out the architects responsible for that work, Penelope H. Batcheler and Lee H. Nelson, and began what would become more than fifty years of research and publication devoted to the investigation and interpretation of historic architectural finishes.

From that single experience along with years of persistence and study, grew a body of work that eventually encompassed more than 1,750 projects, approximately 50,000 archived paint samples, laboratory notebooks, microscope slides, photographs, publications, and correspondence documenting the evolution of architectural paint research and analysis.

This collection represents the documentary record of my entire professional career, spanning more than fifty years in the study, analysis, and conservation of historic architectural paints and finishes. The decision to preserve these materials at the Athenaeum of Philadelphia was itself the culmination of another long professional relationship. Roger W. Moss—architectural historian, preservation educator, author, and longtime Executive Director of the Athenaeum—was among my earliest clients after I established my consulting practice in 1974. Over many years he encouraged me to donate my reports and research materials to the Athenaeum, recognizing that the documentation generated through architectural paint research possessed enduring scholarly value and should be preserved for future study. His confidence in the long-term importance of this work gradually shaped my own thinking and ultimately led to my decision to donate my complete professional archive to the Athenaeum. It is my hope that these materials will continue to serve scholars, students, and preservation professionals seeking to better understand the history and practice of architectural paint analysis.

Much of the knowledge contained within this collection is not immediately apparent from the materials themselves. The relationships between project files, physical paint and wallpaper samples, microscope slide preparations, and laboratory notebooks were developed through

working methods refined over decades of practice. Without some guidance, these connections may not be readily understood.

The purpose of this *Researcher's Guide* is to provide you with the historical context for the collection, explain its organization, and assist researchers in understanding the relationships among its many components. More importantly, it seeks to preserve the working knowledge that accompanied the collection throughout its active life—knowledge that cannot always be conveyed by a **Finding Aid** alone. I sincerely hope that you find it useful.

THE COLLECTION IN HISTORICAL CONTEXT

The *Frank S. Welsh Collection* represents more than five decades of research devoted to the investigation, documentation, and interpretation of historic architectural paints and finishes. It chronicles not only the development of an individual career but also the emergence of architectural paint research and analysis as a recognized specialty within the broader field of historic preservation. The reports, paint samples, microscope slides, laboratory notebooks, photographs, publications, and correspondence preserved in the collection document the evolution of methods that helped transform the study of historic finishes from an emerging practice into an established component of preservation planning and restoration.

The origins of the collection can be traced to Welsh's early exposure to historic buildings, antiques, and traditional painted decoration. Growing up in the seventeenth-century house known as Castle Beith in Ardmore, Pennsylvania, he developed an appreciation for old buildings while assisting his mother, Suzanne Sagendorph Welsh, in the restoration and painted decoration of antique Pennsylvania furniture. Through these experiences he became familiar with traditional paints, varnishes, decorative finishes, and the careful observation required to understand historic craftsmanship—interests that would later form the foundation of his professional work.

The defining turning point occurred on July 4, 1972, during a fateful visit to Independence Hall as he recounted above. What began as a moment of personal discovery would eventually become the foundation for the collection now preserved at the Athenaeum of Philadelphia.

Equally important to understanding the collection is recognizing the influence of the many individuals who shaped its development. The earliest and most significant was Penny Batcheler whose pioneering work at Independence National Historical Park established many of the investigative procedures upon which later architectural paint research was built, making her influence fundamental both to Welsh's early development and to the evolution of the profession itself. She introduced Welsh to the investigation of historic buildings, the examination of paint samples under the stereomicroscope, color matching, and the study of historic documents and photographs as tools for understanding original finishes and subsequent alterations to historic buildings. Others included the early founders of historic preservation and education, especially Charles E. Peterson and James Marston Fitch who further broadened his foundation by encouraging his interest in historic preservation at a time when no university curriculum specifically addressed his stated interest in the scientific investigation of historic architectural finishes and colors.

As Welsh's endeavors expanded beyond the National Park Service after he established his business in 1974, additional mentors and professional colleagues contributed to the evolution of both his methods and the collection itself. Rick Kearns of Historic Annapolis and Charles Granquist of Monticello introduced opportunities that broadened the geographic and architectural scope of his work. Paint chemist Dick Fitch and Ed Stulb of Turco Paint and Varnish Company provided practical knowledge of modern paint manufacture and formulation.

A significant development in his work came in the early 1980s through his association with Dr. Walter C. McCrone of the McCrone Research Institute in Chicago. Under his influence, he incorporated polarized light microscopy (PLM) into the analysis of historic paint and wallpaper samples, allowing for the identification of pigments, binders, and fibers at a level of detail not previously applied in architectural preservation. In the 1990s Dr. Weecha Crawford, geologist and MacArthur Genius Award recipient from Bryn Mawr College strengthened Welsh's understanding of crystallography and microscopical analysis. Together, these professional relationships helped shape an investigative approach that combined architectural investigation, microscopy, chemistry, documentary research, and historical interpretation into a comprehensive methodology for studying historic finishes.

Another individual whose influence became inseparable from the history of the collection was Roger W. Moss. Welsh first met Moss during the early 1970s. Shortly after establishing his consulting practice, Welsh undertook one of his earliest professional commissions for the Athenaeum of Philadelphia, beginning a collaborative relationship that continued for more than five decades through research, publications, lectures, preservation projects, and countless professional conversations. Moss encouraged Welsh to apply for a Peterson Fellowship, which supported extensive research into the paints, pigments, and colors of eighteenth-century American buildings. The results of that research were later published as a chapter in *Paint in America*.

The collection also reflects the gradual development of terminology and methodology within the profession. During the early 1970s, investigations of historic finishes were commonly described as "paint studies." While preparing one of his earliest National Park Service reports, Welsh introduced the title "Paint Analysis," a term that more accurately reflected the investigative process and that gradually became widely adopted within the preservation field. Likewise, the collection documents the transition from simple visual examination of paint layers toward increasingly sophisticated methods that included pigment identification, microscopical cross-section analysis, color measurement, and laboratory documentation. These developments are preserved not only in published reports but also in the thousands of original paint samples, microscope slides, laboratory notebooks, and supporting research materials assembled over more than fifty years.

The projects represented within the collection span more than two centuries of American architecture and encompass work undertaken for the National Park Service, state and local governments, museums, historical societies, universities, architects, and private organizations throughout the United States and abroad. Although many of the buildings represented—including Independence Hall, Monticello, Colonial Williamsburg, the United States Capitol, and numerous National Historic Landmarks—are individually significant, the true value of the collection lies in the documentation of the investigative process itself.

One aspect of Welsh's professional career deserves special note. Equally important to his investigative work was his commitment to documenting and sharing the methods and discoveries that emerged from his research. From the beginning of his career, Lee H. Nelson encouraged him to publish his findings so that others in the preservation field could benefit not only from

successful outcomes but also from the lessons learned through careful investigation and practice. That encouragement established a principle Welsh followed throughout his career: research and publication were not separate pursuits, but complementary responsibilities of professional practice. His articles, book chapters, lectures, newsletters, and technical reports introduced new investigative methods, refined professional terminology, and encouraged the broader acceptance of architectural paint and wallpaper research within historic preservation. Welsh believed that discoveries achieved through research attained their greatest value when they were carefully documented and shared. Collectively, these writings form an integral part of the collection, documenting both the evolution of Welsh's own work and the development of professional practice over more than five decades.

For researchers, therefore, the collection should be understood not simply as an archive of completed projects or as an assembled body of paint and wallpaper samples, pigment and fiber preparations, reports, and scholarly publications, but as a comprehensive record of discovery. It reveals how historic architectural coatings were investigated, how conclusions were reached, and how methods evolved through experience, scientific inquiry, and the exchange of knowledge within the preservation community. Viewed in this way, the collection serves not merely as the record of one professional career, but as a resource for understanding the very beginnings of and the historical development of architectural paint research and analysis as a recognized discipline within historic preservation.

PURPOSE AND USE OF THIS GUIDE

This document is intended to serve as a supplement to the Athenaeum's official **Finding Aid**, not as a replacement for it.

The **Finding Aid** provides a structured overview of the collection and serves as the primary tool for locating materials within the Athenaeum's archival system. This guide, by contrast, is designed to:

- Explain how the collection is **organized in practice**
- Clarify relationships between different types of materials
- Provide insight into the **methods used to create and analyze the material**
- Assist researchers in **efficiently locating and interpreting relevant items**

In this sense, the guide functions as a **working companion** to the **Finding Aid**—offering context that may not be evident from a high-level description alone.

It may also serve as a practical reference for Athenaeum staff in responding to research inquiries, particularly where an understanding of the internal structure of the collection can assist in identifying relevant materials.

OVERVIEW OF COLLECTION ORGANIZATION

The collection is composed of several interrelated groups of material, developed through the course of active professional work. These include:

- Project documentation (reports and working files)
- Physical paint samples and associated records
- Pigment and fiber samples mounted on glass microscope slides
- Polarized Light Microscopy (PLM) laboratory notebooks
- Photographic materials
- Research files on pigments, fibers, and materials
- Articles and lectures files
- Promotional materials
- Paintpamphlet
- Publications and printed matter
- Digital records and databases

Each of these components is described in detail in the sections that follow, with particular attention to how they relate to one another and how they may be used together in research.

HOW TO USE THIS COLLECTION: A PRACTICAL ORIENTATION FOR RESEARCHERS

The Frank S. Welsh Collection is best understood not as a set of independent materials, but as an integrated body of documentation and physical evidence developed through the process of professional investigation.

A typical research path through the collection will involve moving between several different components—most notably project files, physical paint samples, microscope slide preparations, and laboratory notebooks. Each of these serves a distinct purpose, but they are closely related and often most meaningful when used together.

The following overview is intended to help researchers understand how these materials connect and how they may be approached in practice.

Advance Requests for Materials

Some materials described in this Guide are maintained in off-site storage and require advance retrieval by Athenaeum staff. Researchers planning a visit should identify the materials they wish to consult and contact the Athenaeum in advance, allowing at least two days for retrieval from off-site storage.

1. BEGINNING WITH PROJECT REPORT FILES

Project Report Files and Project Reports (Bound)

For most research inquiries, the appropriate starting point is the **Collection Organization** section of the **Finding Aid**. Researchers should begin with the **Project Report Files** and, where available, the accompanying **Project Reports (bound)**.

The **Project Report Files** constitute the principal record of individual preservation projects. They contain documentation generated during the course of an investigation and may include correspondence, field notes, historical research, paint analysis, laboratory findings, photographs, color determinations, and related materials.

These files document specific buildings, sites, objects, or collections and may include:

1. historical background
2. descriptions of sampling locations
3. observations and interpretations of paint layers
4. color identifications and matching
5. laboratory and analytical findings
6. interpretive conclusions regarding original and subsequent finishes

The Project Report Files are generally organized alphabetically by state and then by project name. They provide the primary context for related materials elsewhere in the collection.

A complete list of projects is available through the Athenaeum's **Finding Aid**. Researchers should also be aware that a substantial group of reports donated separately over many years is catalogued individually in the Athenaeum's FIND catalogue under the author/contributor heading "Frank S. Welsh Collection (Athenaeum of Philadelphia)." The **Finding Aid** and FIND therefore serve complementary purposes and, for a thorough search, both should be consulted.

Researchers should first identify the project of interest and then request the corresponding **Project Report File** from Athenaeum staff for consultation. Many project files have associated paint sample envelopes, microscope slides, 35mm photographic slides, and other supporting materials located elsewhere in the collection. These related materials are discussed in the sections that follow.

Project Reports (Separately Catalogued; Some Bound)

A substantial body of formal Project Reports is catalogued separately in the Athenaeum's FIND catalogue. These reports complement the working Project Report Files and should be consulted whenever available. Their formats, historical significance, access, and relationship to the Project Report Files are described more fully in the later section, Project Reports and Project Files.

These separately catalogued Project Reports are maintained in off-site storage. Researchers wishing to consult them should identify the reports of interest through the Athenaeum's FIND catalogue and contact Athenaeum staff in advance, allowing at least two days for retrieval before their visit.

2. PROJECT PAINT SAMPLES (PRIMARY MATERIAL EVIDENCE)

Associated with many of the Project Report Files are **physical paint samples collected during field investigations**. These constitute the original material evidence upon which much of the subsequent examination, analysis, and interpretation was based.

A note on terminology: throughout this Guide, references to Project Paint Samples and sample envelopes should be understood to include, where applicable, small fragmentary wallpaper samples retained in the same type of paper or coin envelopes. Although these materials are not paint samples in the literal sense, they form part of the same body of project material evidence and may contain painted or printed decoration, pigments, fibers, and other constituents relevant to analysis.

The samples are typically:

1. housed in small envelopes
2. grouped and stored in boxes
3. identified by project name and sampling locations

Information identifying and locating the **Project Paint Samples** has been incorporated into the Athenaeum's **Finding Aid** as part of the rehousing and organization of the collection. The **Finding Aid** now serves as the principal means of determining whether paint samples associated with a particular project are present and where they are located within the collection.

After identifying the project of interest, researchers should consult the corresponding **Paint Sample Envelopes** entry in the **Finding Aid** to determine whether physical samples from that project survive and, if so, request the appropriate materials from Athenaeum staff for consultation.

The samples preserve direct physical evidence of the painted surfaces examined during an investigation. Depending upon their condition and character, they may permit examination of:

1. the sequence of paint applications
2. the number and relative thickness of layers
3. color relationships among successive finishes
4. primers, finish coats, and other components of a paint stratigraphy
5. evidence that may be compared with observations and conclusions recorded in the corresponding report.

Some of these samples were subsequently selected for further laboratory examination and analysis. Materials derived from them may therefore also be represented among the **microscope slides** and in the **PLM Laboratory Notebooks**, discussed in the sections that follow.

The Project Paint Samples thus provide an important physical link between the documentary record contained in the Project Report Files and the analytical materials preserved elsewhere in the collection.

3. PIGMENT AND FIBER SAMPLES ON GLASS MICROSCOPE SLIDES

In many cases, selected paint and wallpaper samples from projects after the early 1980s were further analyzed by extracting pigment particles or fibers and mounting them on glass slides for examination under a polarizing light microscope.

These slides are:

- stored in small white slide trays
- labeled alphabetically according to project groupings
- organized independently of the project files

Unlike the project paint samples, there is no single consolidated index linking each microscope slide directly to a specific project file. As a result, researchers should approach these materials in conjunction with the project files and laboratory notebooks.

These slides provide insight into:

- pigment or fiber composition
- particle characteristics
- material identification beyond visual observation

They represent a more advanced level of analysis and are particularly valuable for technical or scientific study.

4. POLARIZED LIGHT MICROSCOPY (PLM) LABORATORY NOTEBOOKS

The **PLM laboratory notebooks** document the analytical findings on pigment and fiber samples.

These notebooks:

1. record observations made during microscopical analysis
2. describe pigment or fiber physical and optical characteristics
3. include notes on identification techniques and findings

They are organized chronologically rather than by project, reflecting the working method by which analyses were conducted over time.

Because of this, researchers may need to:

1. identify a project of interest
2. determine the approximate date of analysis
3. consult the corresponding notebook entries

While this structure requires some interpretation, it also preserves the original analytical process and working sequence.

5. PHOTOGRAPHIC MATERIALS (VISUAL DOCUMENTATION)

The collection includes photographic materials in the form of 35mm slides and also printed and digital images of project sites, paint layer cross-sections and fibers. These are generally organized by project and may provide visual context for sampling locations and documentation of architectural features Photographs are particularly useful when used alongside project reports and physical samples.

6. RESEARCH FILES ON MATERIALS (PIGMENTS, FIBERS, ETC.)

Separate from project-specific documentation are research files devoted to:

1. pigment types (e.g., white, yellow, blue/green, extenders)
2. fiber identification (particularly for wallpaper analysis)

These files reflect broader investigative work and may be useful for:

1. comparative study
2. understanding material properties
3. supporting interpretation of findings in specific projects

7. PUBLICATIONS AND WRITTEN WORK

The collection includes:

1. published articles
2. lectures and workshop materials
3. newsletters (e.g., *Finish Notes*)
4. the *Paintpamphlet*

These materials document the development of methods and interpretations presented in the project work and often provide:

1. methodological explanations
2. case studies
3. broader context for specific findings

Researchers are encouraged to consult these in conjunction with project materials. They are identified in the **Finding Aid**.

Among these publications, the study of Brown Zinc Paint at the United States Capitol occupies a special place. It brought together decades of accumulated experience in historical research, microscopy, pigment analysis, documentary investigation, and technical writing into a single comprehensive study. More than any previous publication, it reflected the integration of the investigative, analytical, and interpretive methods that had evolved throughout Welsh's career.

8. WORKING ACROSS MATERIAL TYPES

The most effective use of the collection often involves moving between multiple components. A typical workflow might include:

1. Identifying a project through the **Finding Aid**
2. Consulting the project file for context and interpretation
3. Locating associated paint samples using the **Finding Aid**
4. Examining physical samples to understand layer structure
5. Reviewing microscope slides (if available) for pigment analysis
6. Consulting PLM notebooks for analytical details
7. Referencing publications for broader interpretation

This layered approach reflects the original working method by which the material was created.

FINAL NOTE ON USE

Because the collection reflects an active professional practice rather than a system designed solely for archival description, some relationships between materials are implicit rather than formally documented.

This guide is intended to assist in navigating those relationships. Researchers are encouraged to approach the collection with flexibility and to consult Athenaeum staff as needed when locating materials.

PROJECT REPORTS AND PROJECT FILES

Primary Documentation of Individual Projects

Overview

The Project Reports and Project Files form the **core of the collection**, documenting individual buildings, sites, objects, and collections investigated over the course of professional work from the early 1970s through 2024.

Each project represents a discrete study and typically includes a combination of written documentation, field observations, laboratory findings, photographs, color determinations, and references to associated physical samples and analytical work.

These materials should be regarded as the **primary point of entry** for research into specific buildings, projects, objects, collections, or case studies.

Two Forms of Project Documentation

Project documentation exists in two principal forms:

1. Project Report Files (Working Files)

The **Project Report Files** constitute the principal record of individual preservation projects and, for most research inquiries, should be the first materials consulted.

These files may include:

1. historical background
2. descriptions of sampling locations
3. field notes and preliminary observations
4. observations and interpretation of paint layers
5. color identifications and matching
6. laboratory findings
7. correspondence
8. draft materials
9. photographs
10. reference materials related to the project
11. interpretive conclusions regarding original and subsequent finishes

The contents of individual files vary considerably. In some cases, particularly in earlier work, the project file may constitute the **only surviving documentation** for a given project. In others, it

supplements a formal bound report and may preserve field observations, correspondence, analytical records, and other working materials not included in the final report.

2. Project Reports (Separately Catalogued; Some Bound)

The Athenaeum's FIND catalogue identifies 114 separately catalogued paint-analysis and related reports donated by Frank S. Welsh over many years. These represent only a small fraction of the projects completed during his career, but they are an important body of formal project documentation. They are not all physically identical: some were originally bound, some were submitted in binders or unbound, and some unbound reports were subsequently bound by the Athenaeum. A representative group of the earlier bound reports holds special significance because those reports formed the nucleus of what eventually became the Frank S. Welsh / Welsh Color & Conservation, Inc. Collection at the Athenaeum of Philadelphia.

Many years before Welsh's retirement, Roger W. Moss, then Executive Director of the Athenaeum, encouraged him to donate a representative group of his bound project reports to the library. These reports became the foundation—the "seeds"—from which the much larger collection ultimately grew. Following Welsh's retirement, the remainder of his professional archives, laboratory materials, research files, and related materials were donated, expanding the collection into its present form.

These separately catalogued reports are formal, finalized reports prepared for clients and institutions. They typically include:

1. historical background of the building, site, object, or collection
2. description of investigative and analytical methods
3. identification and interpretation of paint layers
4. color determinations and physical color samples (either Munsell or paint company)
5. conclusions and recommendations
6. supporting photographs and illustrations

These reports represent the **completed presentation of findings** and are often the most direct source of the conclusions reached during an investigation.

The separately catalogued Project Reports are housed in off-site storage and may be requested from Athenaeum staff for consultation. Researchers wishing to consult these reports should contact the Athenaeum in advance and allow at least two days for retrieval. Whenever a separately catalogued report is available, it should be consulted together with the corresponding Project Report File, since the two forms of documentation frequently complement one another.

Direct access: Project Reports - Search the Athenaeum FIND Catalogue. This prepared search brings together the separately catalogued reports associated with the collection under the subject heading paint analysis.

Organization of Project Files

The Project Report Files are organized:

1. **alphabetically by state**
2. and then **alphabetically by project name within each state**

This organizational system reflects the working structure used throughout the course of the practice and is consistent across both physical and, where applicable, digital records.

A complete list of projects is available in the Athenaeum's **Finding Aid**, which should be the principal starting point for project-based research. Researchers should also consult the Athenaeum's FIND catalogue for reports that were donated and catalogued separately over the years. Searching FIND under the author/contributor heading "Frank S. Welsh Collection (Athenaeum of Philadelphia)" brings together the catalogued materials associated with the collection. The original printed project list and Microsoft Access database remain part of the historical record of how the working archive was managed, but they should not be relied upon as current location tools.

Researchers should begin by identifying a project of interest through the **Finding Aid** or one of these additional resources. The corresponding project file may then be requested from Athenaeum staff for consultation.

Many project files have associated paint sample envelopes, microscope pigment slides, photographic slides, and other supporting materials located elsewhere in the collection. These related materials are discussed in the sections that follow.

Print and Digital Formats

It is important to note the distinction between **hard-copy and digital records** within the collection.

1. Projects completed **prior to the early 1990s** exist almost entirely in printed form.
2. Projects completed **from the early-to-mid 1990s onward** may exist in both printed and digital formats.

Digital files may include:

1. project reports
2. project photographs
3. correspondence and publications
4. related documentation

Because of this transition, researchers may encounter projects documented only in physical files, projects documented in both physical and digital formats, or, in some cases, digital materials that expand upon the printed record.

The presence or absence of digital material is therefore largely a function of the period in which the work was conducted and reflects the gradual transition from paper-based to digital documentation.

Relationship to Other Components of the Collection

The Project Reports and Project Report Files serve as the **central reference point** for related materials throughout the collection.

In particular, they may be directly related to:

Project Paint Samples

Physical samples collected from buildings, sites, objects, or collections during field investigations. Sampling locations are typically identified or described in the corresponding project report or file.

Microscope Slides

Selected materials prepared for microscopical examination and, in many cases, further analysis of individual pigments, fibers or other constituents.

PLM Laboratory Notebooks

Records of analytical observations made during polarized light microscopy and related laboratory examination of materials associated with specific projects.

Photographic Slides

Photographic documentation of projects, including buildings, sites, architectural features, sampling locations, paint exposures, and photomicrographs.

Because relationships among these materials are not always explicitly cross-referenced, researchers should approach the project file as the starting point and then move outward to associated materials using contextual information such as:

1. project name
2. location
3. date or approximate date of analysis
4. sample numbers or designations
5. references contained within reports or laboratory records

Using Project Files in Practice

For most research inquiries, the appropriate starting point is the **Collection Organization** section of the Athenaeum's **Finding Aid**.

A typical approach to using the collection may include:

1. Identify the building, site, object, collection, or project of interest through the Athenaeum's **Finding Aid** and, where appropriate, search the Athenaeum's FIND catalogue for separately catalogued reports.
2. Request the corresponding **Project Report File** from Athenaeum staff.
3. Determine whether a separately catalogued Project Report also exists and, if so, request it for consultation.
4. Review the project documentation for:
    1. scope of work
    2. historical background
    3. sampling locations
    4. analytical methods
    5. key findings and interpretations
5. Note references to:
    1. paint sample envelopes
    2. microscopic slides
    3. PLM laboratory analysis
    4. photographic documentation

6. Use this information to locate related materials elsewhere in the collection.

This process reflects the way in which the materials were originally created and used and provides the most effective means of understanding the full scope of a particular project.

Special Note on Variability

Because the collection spans more than five decades of professional work, the format, character, and completeness of project documentation vary.

Earlier projects may include:

1. more limited written documentation
2. fewer formal reports
3. greater reliance on physical samples, handwritten observations, and laboratory notebooks

Later projects are more likely to include:

1. comprehensive written reports
2. digital documentation

3. integrated photographic records
4. more extensive laboratory documentation

The format of the reports themselves also evolved over the course of the practice. In later years, laboratory data sheets were increasingly used to record analytical observations during examination. These working records then provided the basis for the narrative analytical sections of the final reports. The reports consequently range considerably in length and form—from extensive formal reports documenting complex investigations to relatively brief reports or letters prepared when only one or two samples were submitted for analysis.

This variability reflects the evolution of professional practice, analytical methodology, recordkeeping, and available technology over the course of Welsh's career.

Concluding Note

The Project Reports and Project Report Files provide the essential framework for understanding the collection as a whole. They document not only the results of individual investigations, but also the methods and evolving practices that shaped Frank S. Welsh's approach to historic paint and materials analysis over more than five decades.

Researchers are encouraged to begin here and to use these records as the foundation for further exploration of the collection's physical samples, microscope preparations, laboratory notebooks, photographs, and other analytical materials.

PROJECT PAINT SAMPLES

Primary Material Evidence of Historic Paint Layers

Overview

The Project Paint Samples constitute one of the most significant and distinctive components of the collection. These samples represent the **original material evidence** collected from buildings, structures, objects, and other subjects during field investigations and form the foundation for much of the analytical and interpretive work documented in the project files and reports.

Each sample preserves a physical record of the paint layers as they existed at the time of collection. Depending upon the nature and condition of the sample, examination may reveal:

1. sequences of successive paint layers;
2. relationships among colors and finishes;
3. evidence of earlier decorative treatments;
4. changes in coatings and application over time; and
5. physical evidence that can be compared directly with observations, analyses, and conclusions recorded in the corresponding project documentation.

As such, the samples should be regarded as **primary source material** rather than simply as supporting documentation. They are the surviving physical evidence upon which many of the findings contained in the project reports were based and are essential to understanding both individual projects and the broader development and practice of historic paint analysis represented by the collection.

Development of the Sample Collection

Not every project represented in the collection has associated paint samples. This is particularly true of projects undertaken during the mid- and late 1970s.

During the early years of Frank S. Welsh's practice, the original sample envelopes were commonly placed in plastic 35mm slide-storage sheets and incorporated into the back of the bound reports prepared for clients. The samples therefore remained with the reports rather than being retained as a separate archival collection.

By approximately 1980, Welsh had begun to recognize the long-term value of retaining the original samples himself. Client copies of reports were sometimes misplaced or lost, and with them the samples that had been incorporated into those reports. He therefore changed his practice and began systematically retaining and archiving the paint samples from his projects.

As the number of projects increased, Welsh developed a Microsoft Access database to document and locate the samples. Entries included such information as project name, state or foreign country, city, date of completion of the report, and the numbered archive box in which the

samples were stored. The projects were arranged alphabetically by state or foreign country, and the samples were housed in twenty-two numbered banker's boxes.

It should also be noted that samples from several major projects were subsequently returned to the institutions responsible for the properties and therefore are not included in the collection at the Athenaeum. These include samples from **Independence Hall and the Second Bank of the United States**, which were returned to the National Park Service at Independence National Historical Park; the **United States Capitol**, returned to the Curator of the Architect of the Capitol; and **Monticello**, returned to the Thomas Jefferson Foundation. Although the associated project documentation remains represented in the collection, researchers should be aware that the original paint samples from these projects are held by their respective institutions.

Following transfer of the collection to the Athenaeum, the samples were rehoused in new archival boxes and assigned new storage locations. Consequently, the original box numbers recorded in Welsh's Microsoft Access database no longer correspond to the samples' present physical locations. Researchers should therefore use the **Athenaeum's current Finding Aid** to identify and request project paint samples. The **Finding Aid** retains the basic geographical organization of the original collection, arranging projects alphabetically by state or foreign country.

Physical Description of the Samples

Samples personally collected by Welsh during field investigations are generally contained in **2-inch white coin envelopes**. Individual envelopes may contain one or more fragments removed from a particular location on a building, structure, object, or other subject under investigation.

Samples collected and submitted by clients, architects, conservators, or others using instructions provided in Welsh's *Paintpamphlet* may appear in a considerably greater variety of containers. These include small manila envelopes, plastic zip bags, and other small plastic bags. Examples of the methods used for collecting, labeling, and submitting such samples are illustrated throughout the *Paintpamphlet* itself.

The physical material within the envelopes also varies according to the substrate from which it was removed. Samples may consist of fragments of painted wood, plaster, metal, wallpaper or other materials and may range from substantial chips retaining numerous paint layers to very small fragments requiring magnification for meaningful examination.

Organization and Location

The Project Paint Samples are grouped by project and arranged geographically, generally alphabetically by state or foreign country and then by project name.

Because the Athenaeum rehoused the collection after its acquisition, researchers should not rely upon the original archive box numbers recorded in Welsh's Microsoft Access database when

requesting samples. Current locations and identifiers are provided in the Athenaeum's **Finding Aid**.

Researchers should first identify the project of interest through the **Finding Aid** and consult the corresponding **Project Report File** whenever one exists. The project file provides the documentary context necessary for understanding where samples were taken, the questions being investigated, and the conclusions derived from their examination.

Examination of the Original Samples

One of the particular research opportunities provided by the collection is the ability to examine the **original paint samples themselves**.

Subject to Athenaeum policies and the availability of appropriate equipment, researchers may request permission to inspect the contents of individual sample envelopes under staff supervision. When a stereomicroscope and suitable handling materials are available, samples may be carefully emptied from their envelopes onto a preparation card so that individual fragments can be viewed and gently manipulated under magnification. No material may be removed, altered, scraped, cut, mounted, sampled, or otherwise subjected to destructive analysis. Following examination, all fragments must be returned to their original envelope under staff supervision.

This permits a researcher to observe the physical evidence directly—including paint stratigraphy, layer relationships, surface characteristics, and other features that may not be fully conveyed through written descriptions or photographs.

Used in conjunction with the corresponding Project Report File, project report, photographs, analytical notes, and other related materials in the collection, examination of the original samples offers researchers a unique opportunity to return to the physical evidence upon which the original investigation and interpretation were based.

These samples were collected systematically during fieldwork and reflect careful selection of locations that would yield meaningful information about original and subsequent finishes.

Correct Identification and Distinction from Slides

It is important to distinguish the Project Paint Samples from both the photographic slides and the pigment samples mounted on glass microscope slides found elsewhere in the collection.

The Project Paint and Wallpaper Samples are **original physical specimens removed from architectural surfaces, objects, or other materials during field investigations or submitted for analysis**. They may consist of fragments of painted wood, plaster, metal, or other substrates retaining one or more layers of paint.

They are therefore fundamentally different from the photographic slides, which provide visual documentation of projects, and from the glass microscope slides, which contain small amounts of material selectively removed and prepared for microscopical pigment analysis.

This distinction is important because each type of material preserves a different form of evidence and was created or retained for a different purpose.

Locating Project Paint Samples

The Athenaeum has rehoused the Project Paint Samples and incorporated their current locations and identifying information into the **Finding Aid**. Researchers should therefore use the **Finding Aid**, rather than Welsh's original Project Paint Sample database, to identify and request samples. Although the original database no longer provides accurate information for physically locating them it remains part of the collection as a record of the original organization and management of the Project Paint Sample archive and is available upon request.

Relationship to Project Files and Reports

The Project Paint Samples should whenever possible be examined in conjunction with the corresponding **Project Report File** and **Project Report**. These materials provide the documentary and interpretive context necessary for understanding the physical evidence preserved in the sample envelopes.

Researchers should begin by identifying the project of interest in the **Finding Aid** and determining what related materials survive in the collection. The Project Report File may contain field notes, sample location information, correspondence, photographs, color observations, analytical records, and other documentation useful in establishing the context in which the samples were collected and examined. The Project Report records the findings and interpretations that resulted from that investigation.

Taken together, the project documentation and the surviving physical samples allow the researcher to compare the original material evidence with the observations and conclusions made at the time of the investigation.

Relationship to Pigment and Fiber Samples Mounted on Glass Microscope Slides

In some projects, minute portions of material were removed from selected Project Paint Samples and prepared for more specialized microscopical analysis. These materials are preserved separately in the collection as Project Paint and Wallpaper Pigment Samples Mounted on Glass Microscope Slides.

The distinction between the two is fundamental:

1. the **Project Paint Sample** is the original physical specimen collected from a building, structure, object, or other subject under investigation;

2. the sample mounted on a glass microscope slide is a small quantity of material selectively removed from that specimen and prepared for microscopical analysis.

The two collections are therefore related, but they are not interchangeable. The original paint sample preserves the physical sequence and relationship of paint layers, while the prepared microscope slide preserves selected material intended for a particular type of analytical examination.

Researchers interested in the microscopical identification of pigments or fibers should consult the separate section of this Guide together with the associated PLM Laboratory Analysis Notebooks.

Concluding Note

The Project Paint Samples form the **material core of the collection**. The project files and reports preserve the documentary record of an investigation and the interpretations that resulted from it; the samples preserve the physical evidence upon which many of those interpretations were based.

Their continued preservation makes it possible for researchers not only to study what was observed and concluded at the time of the original investigation, but also to return to the surviving material evidence itself and examine it in light of new questions, methods, and areas of research.

Researchers are encouraged to make use of these materials in conjunction with project documentation and, where applicable, microscopical analysis, in order to gain a fuller understanding of both individual projects and the methods used in their investigation.

PIGMENT AND FIBER SAMPLES MOUNTED ON GLASS MICROSCOPE SLIDES

Analytical Materials for Microscopical Examination

Overview

The pigment and fiber preparations mounted on glass microscope slides represent one of the most scientifically significant components of the Frank S. Welsh Collection. They document the expansion of Welsh's work beyond the examination and interpretation of paint-layer sequences into the identification and study of the individual materials from which historic paints, wallpapers, and other finishes were made.

Where the **Project Paint Samples** preserve the physical stratigraphy of successive paint layers and finishes, the **glass microscope slides** contain minute particles or fibers isolated and prepared for more detailed microscopical examination. In this respect, the two collections are closely related but serve different purposes. The paint samples provide evidence of a finish's physical and chronological history; the microscope preparations provide evidence concerning its material composition.

The development of this aspect of Welsh's work began in the early 1980s and grew from his desire to extend architectural paint research beyond the identification of colors and layer sequences. He increasingly came to regard the identification of the constituent pigments and other materials within those layers as an essential part of what he considered a more complete form of **paint analysis**.

Walter C. McCrone and the Development of Microscopical Analysis

A major turning point came when Welsh began studying with Dr. Walter C. McCrone, chemical microscopist and founder of the McCrone Research Institute in Chicago. Welsh first studied with McCrone in a week-long course in Polarized Light Microscopy (PLM) offered through the Institute at New York University. He subsequently repeated the course for three consecutive years and continued his studies through numerous additional courses at the McCrone Research Institute in Chicago.

Over approximately two decades, Welsh made frequent trips to Chicago not only for formal instruction but also to work directly with McCrone on analytical problems arising from individual preservation projects. What began as instruction developed into a long and particularly important professional mentorship. McCrone's approach to microscopy—grounded in careful observation, extensive practical experience, and the identification of very small particles through their physical and optical properties—had a profound influence on Welsh's analytical methods.

McCrone frequently emphasized that mastery of microscopy was ultimately self-taught: formal instruction could establish principles and techniques, but proficiency depended upon countless hours spent at the microscope examining known and unknown materials. Welsh adopted that philosophy enthusiastically. Considerable time was devoted in his Bryn Mawr laboratory to studying pigments, minerals, extenders, fibers, and other materials; consulting reference literature; comparing unknown particles with known specimens; and gradually building the practical experience required for identification.

Contemporary evidence documents the extent of that development. In a March 1992 letter supporting Welsh's application for a Charles E. Peterson Research Fellowship, McCrone recalled that he had initially helped Welsh learn to make analyses using the polarizing light microscope but that, in time, he was "simply confirming his results." He described Welsh as having become expert in identifying pigments and media and specifically noted the thoroughness with which he documented and reported his findings. The letter provides a useful contemporary assessment of the analytical proficiency and recordkeeping practices represented by the slides, notebooks, reports, and research materials preserved in the collection.

Related archival materials provide additional context for this period of study and mentorship. The collection includes a separate file containing certificates of course completion received by Welsh for courses taken through the McCrone Research Institute, as well as a separate file devoted to Walter C. McCrone. Researchers interested in the development of Welsh's microscopical work and his relationship with McCrone should consult these materials in conjunction with the slides, notebooks, correspondence, and publications described here.

This became one of the most personally rewarding and intellectually important aspects of Welsh's career. At a time when architectural paint analysis was itself still an emerging specialty within historic preservation, the systematic use of polarized light microscopy for identifying the constituent pigments of historic architectural paints was not a routine component of the field. Welsh pursued it because he believed that determining **what a paint was made from**, as well as establishing its color and position within a sequence of finishes, could provide a deeper understanding of historic materials and their chronology.

Pigment and Fiber Research

As Welsh's experience with PLM increased, pigment identification became an increasingly important component of his project work and independent research. The range of materials encountered was extensive. Historic paints could contain numerous natural and manufactured pigments and extenders whose composition, date of introduction, optical properties, and methods of manufacture could provide important evidence for interpreting a finish.

The same microscopical methods were also applied to historic wallpapers. Analysis could include not only identification of the pigments used to create printed or painted patterns but also examination and identification of the fibers from which the paper itself was manufactured. These investigations extended the usefulness of microscopy beyond architectural paints and into the broader study of historic decorative materials.

Research arising from this work frequently led to publication. One of Welsh's earliest studies of an individual historic pigment concerned **Prussian blue**, and subsequent articles addressed additional pigments, paints, fibers, and related materials encountered through project investigations. In this way, laboratory analysis, historical research, and publication became closely connected: discoveries made through individual projects often became the basis for broader studies intended to share new information with the preservation community.

The microscope slides preserved in the collection are therefore more than laboratory specimens. They constitute a physical record of this developing body of research and of the analytical process underlying numerous project reports and publications.

The Peterson Fellowship and the Expansion of Pigment Research

An important culmination of this developing analytical work came through the **1992–1993 Charles E. Peterson Research Fellowship**, administered by the Athenaeum of Philadelphia. Roger W. Moss encouraged Welsh to apply for the Fellowship, which provided an opportunity to bring together two decades of accumulated project experience with the increasingly sophisticated pigment-identification methods he had developed through his study of polarized light microscopy.

For the resulting study, *Early American Paints—Their Colors and the Pigments Used to Make Them*, Welsh selected 54 Colonial-period sites in nine states from 175 sites on which he had worked during the preceding twenty years. The research encompassed 140 historic colors, 95 of which were analyzed for pigment composition, resulting in the identification of 17 pigments.

The project represented a particularly important stage in Welsh's development of pigment analysis. He described it at the time as the culmination of the decade of study in polarized light microscopy that had begun with his first course with Dr. Walter C. McCrone in 1981. By then, PLM had become an integral part of his approach to architectural paint analysis, extending the investigation beyond the identification and matching of historic colors to the determination of the pigments from which those colors had been made.

Many of the pigment preparations preserved on glass microscope slides throughout the collection should be understood within this larger development. They are not simply specimens retained after individual analyses, but part of an accumulated body of comparative material through which Welsh studied historic pigments across projects, buildings, regions, and periods.

The original Peterson Fellowship research survives within the collection and is discussed more fully under **Additional Research and Professional Materials** later in this Guide. Researchers interested in the development and application of PLM, pigment identification, and comparative research into early American architectural paints are particularly encouraged to consult it.

Preparation and Purpose

Microscope preparations were made by removing minute particles from selected paint layers or other materials and mounting them on standard glass microscope slides for examination. Depending upon the material and analytical objective, preparations could include individual pigment particles, extenders, fibers, or other microscopic constituents.

Examination by polarized light microscopy permitted observation of characteristics such as particle size and morphology, color and pleochroism, refractive properties, birefringence and interference colors, crystal form and optical behavior, and other diagnostic characteristics useful in distinguishing one material from another.

Identification often required comparison with known reference materials, published descriptions, and accumulated experience at the microscope. The resulting conclusions could then be considered alongside paint stratigraphy, documentary evidence, architectural history, and other information developed during the investigation.

Physical Description and Storage

The preparations are mounted on standard glass microscope slides and stored in small white slide trays originally obtained from McCrone Associates in Chicago. The trays are housed in boxes identified by alphabetical ranges and generally arranged according to project names or related alphabetical groupings.

The slides accumulated gradually as analyses were undertaken. Rather than being assembled retrospectively as a teaching collection, they represent working laboratory preparations that Welsh retained after completing individual analyses. As a result, they preserve physical evidence of analytical investigations conducted over many years and across numerous projects.

Organization and Access

Unlike the Project Paint Samples, the microscope slides are not yet comprehensively indexed in a single consolidated resource directly linking every preparation to its corresponding project file.

Researchers should therefore approach these materials by identifying the project or subject of interest, determining its likely alphabetical grouping among the slide boxes, locating potentially corresponding microscope preparations, and consulting related project files, reports, and laboratory notebooks for analytical context.

Because these materials originated as working laboratory preparations, interpretation may require cross-referencing several parts of the collection.

Relationship to Project Paint Samples

Many of the microscope preparations are analytical derivatives of the **Project Paint Samples**.

A typical sequence might begin with a paint sample collected from a building during field investigation. After examination of its sequence of layers, a minute portion of a selected layer could be removed, dispersed, and mounted on a glass slide so that its constituent pigment particles could be examined by microscopical methods.

The glass slides should therefore be understood as **analytical extensions of the original physical samples**, not as substitutes for them or as independent project materials.

One important exception should be noted. At least one slide tray contains reference preparations made from known pigments, fibers, and other materials rather than from Project Paint Samples. These reference slides were used for comparison with unknown materials encountered during analysis and are therefore an important part of the analytical collection in their own right. Of particular significance are reference preparations of Prussian blue, including a specimen from the well-known Forbes Collection and a specimen prepared by Bernard Keisch at the Mellon Institute according to an eighteenth-century recipe and sent to Welsh by conservation scientist Robert L. Feller. These materials were important comparative references in Welsh's published research on the particle characteristics of historic Prussian blue. The reference-slide tray may not yet be separately identified in the **Finding Aid**; researchers interested in pigment identification and comparative reference materials should therefore ask Athenaeum staff about its location and contents.

This distinction is particularly important within the collection. The term **paint sample** refers to the physical fragments collected from buildings and retained principally in paper envelopes. The term **microscope slide** refers to a deliberately prepared glass mount created for microscopical analysis. Maintaining this terminology helps preserve the relationship between the original architectural evidence and the analytical preparations derived from it.

Relationship to PLM Laboratory Notebooks

The most important contextual companions to the microscope slides are the **PLM Laboratory and Specialized Analysis Notebooks**, discussed in the following section of this Guide.

These notebooks may contain observations made during examination, descriptions of optical characteristics, pigment or fiber identifications, comparisons with reference materials, and analytical conclusions. Depending upon the period and project, related information may also appear in laboratory data sheets, project files, reports, or published studies.

Because a microscope slide alone may contain little interpretive information, researchers should consult the corresponding laboratory documentation whenever possible. The greatest research value often comes not from any one component in isolation, but from reconstructing the relationship among the original paint sample, microscope preparation, laboratory observations, project report, and, in some instances, subsequent publication.

Using the Microscope Slides in Practice

The preparations were created principally for examination with a **polarizing light microscope (PLM)** and are best understood through that method by researchers familiar with microscopical identification techniques.

Access to appropriate polarizing light microscopy equipment may vary. Researchers possessing suitable expertise should consult Athenaeum staff regarding current policies and possible arrangements for examining the preparations. Even when direct microscopical examination is not available, the slides may be studied in conjunction with the laboratory notebooks, project documentation, photomicrographs, and published findings.

Should suitable polarizing light microscopy equipment become available for onsite research in the future, these preparations offer considerable potential for renewed examination, teaching, comparison, and independent verification. Advances in analytical techniques may also permit future researchers to ask questions of these materials that could not have been anticipated when the preparations were originally made.

Concluding Note

The pigment and fiber preparations mounted on glass microscope slides constitute a significant body of physical analytical evidence within the collection. Created during the course of project investigations and independent research, they preserve materials that may be reexamined, compared with the original Project Paint Samples, and interpreted in conjunction with laboratory records, reports, and publications.

Their value therefore extends beyond the analyses for which they were originally prepared. They remain a resource for future study and may allow researchers, using established or evolving analytical methods, to revisit earlier findings and pursue questions that could not have been anticipated when the slides were created.

POLARIZED LIGHT MICROSCOPY (PLM) LABORATORY AND SPECIALIZED ANALYSIS NOTEBOOKS

Working Records of Microscopical Examination and Material Identification

Overview

The PLM Laboratory and Specialized Analysis Notebooks preserve the working record of much of the microscopical research described in the preceding section. Closely associated with the pigment and fiber preparations mounted on glass microscope slides, they document observations, identifications, comparisons, and conclusions recorded during the course of active laboratory investigation.

Their importance lies in the distinction between **evidence and interpretation**. The glass microscope slides preserve the physical preparations that were examined; the notebooks frequently preserve what Welsh observed and concluded from their examination.

Project Reports generally present the resulting findings in a more formal and interpretive form. The notebooks, by contrast, provide access to the analytical process that preceded those conclusions. They may therefore be especially valuable to researchers seeking to understand how particular pigment or fiber identifications were made and how Welsh's analytical methods developed over time.

Physical Description and Types of Notebooks

The collection includes a chronological series of PLM laboratory notebooks as well as several notebooks devoted to specialized analytical methods and subjects.

These include:

PLM Laboratory Notebooks

1. 1982–1983
2. mid-1980s, continuing sequence
3. 1992–2004
4. beginning 2005

Specialized Analysis Notebooks

1. Photomicrography and Microchemical Testing
2. Dispersion Staining
3. Small Particle Identification
4. Fibers Microscopy

Entries may include handwritten observations, descriptions of particles and optical characteristics, pigment or fiber identifications, sketches, analytical conclusions, references to projects, and comparisons with known or reference materials.

Because these were working laboratory records rather than documents prepared for publication, the character and level of detail of individual entries vary considerably.

Organization and Working Method

The PLM notebooks are organized primarily **chronologically rather than by project**. This reflects the way the laboratory work was actually conducted. Samples from different projects might be examined successively as they arrived or as individual investigations progressed, with observations entered into the notebook then in use.

Consequently, a single notebook may contain analytical work relating to numerous unrelated projects, and the PLM Laboratory Notebooks are not yet comprehensively indexed to link every notebook entry directly to a Project Report File, Project Paint Sample, or microscope slide preparation.

This chronological arrangement is itself useful evidence of the working laboratory process, but researchers may need to consult several components of the collection to reconstruct a particular analysis.

Relationship to Microscope Slides and Project Paint Samples

The notebooks should be understood as one part of an interconnected analytical record that may extend across several archival series.

For a particular investigation, that record may include:

Project Paint Sample → Microscope Slide Preparation → PLM Laboratory Notebook → Project Report → Published Research

Not every project will contain every element in this sequence, and the degree of surviving documentation varies. Where several components do survive, however, they may allow a researcher to follow an investigation from the original material collected from a building through laboratory examination and interpretation to the conclusions ultimately reported to the client or, in some cases, developed further through scholarly publication.

The relationship between the notebooks and the glass microscope slides is particularly important. A slide preserves the actual material prepared for examination, while its corresponding notebook entry may preserve the observations necessary to understand what was seen and how an identification was reached.

Using the Notebooks in Practice

A researcher seeking analytical information for a particular project should generally begin with the **Project Report File** and related **Project Paint Samples**, using dates and other documentation to establish when the laboratory investigation was likely undertaken.

The researcher may then:

1. determine the approximate date of the analysis;
2. consult the PLM notebook covering that period;
3. look for references to the project, sample designation, pigment, fiber, or other material under investigation;
4. locate any corresponding glass microscope preparations; and
5. compare the laboratory observations with conclusions recorded in the Project Report or related publication.

Because terminology, abbreviations, and the amount of recorded information may vary over time, successful use of the notebooks may require some interpretation and cross-referencing.

Nature and Research Value of the Recorded Observations

The notebooks document analytical work as it occurred. Entries may record pigment identifications based upon optical properties, particle morphology, comparisons with known reference materials, observations under plane- and polarized-light conditions, results of specialized microscopical procedures, and, in some instances, observations concerning other constituents of historic materials.

The specialized notebooks extend this record beyond routine pigment examination. Of particular interest are those documenting photomicrography, microchemical testing, dispersion staining, small-particle identification, and fiber microscopy. The latter is especially relevant to Welsh's research on historic wallpapers, where microscopical examination was used not only to investigate pigments employed in printed or painted decoration but also to identify fibers present in the paper itself.

These notebooks are significant because they preserve something that may not survive elsewhere in the collection: **the original analytical reasoning behind a finding**. They can provide evidence supporting conclusions presented in Project Reports, reveal observations omitted from final reports, and document the development of analytical techniques through decades of practical application.

For researchers concerned with the history of architectural paint analysis, material identification, or the development of Welsh's methodology, the notebooks should therefore be considered primary research materials in their own right rather than merely supplementary documentation.

Special Note on Accessibility

The notebooks were created as **working laboratory records**, not as formal publications or reference tools. Consequently, their organization and level of detail reflect the needs of active analytical work rather than those of later researchers. They:

1. do not follow a standardized indexing system;
2. vary in the amount and type of information recorded;
3. may require interpretation of abbreviations, terminology, and working notes; and
4. are most effectively used in conjunction with related Project Report Files, Project Paint Samples, microscope slide preparations, and published findings.

These characteristics should not be regarded as limitations, but rather as part of the notebooks' value as original working records. They preserve observations and analytical reasoning in the form in which they were recorded during the course of investigation.

Concluding Note

The PLM Laboratory and Specialized Analysis Notebooks provide a direct record of the analytical process underlying an important part of the collection. They preserve observations, identifications, comparisons, and working conclusions that may not appear in the final Project Reports or publications.

For researchers, their particular value lies in the opportunity to follow an investigation beyond its final conclusions and, where sufficient documentation survives, to reconstruct the path from **physical sample to microscope preparation, laboratory observation, interpretation, and final report or publication**.

Researchers are therefore encouraged to approach these notebooks not simply as sources of analytical data, but as records of an evolving investigative practice developed through decades of research and experience.

PHOTOGRAPHIC MATERIALS

Visual Documentation of Projects, Architectural Features, and Analytical Evidence

Overview

Photography was an integral part of Frank S. Welsh's investigative and analytical work throughout his career. The photographic materials within the collection provide visual documentation that complements the written, physical, and analytical records preserved elsewhere in the archive.

The materials include:

1. 35mm photographic slides;
2. project photographs;
3. images of architectural exteriors, interiors, and details;
4. documentation of sampling locations and exposed historic finishes;
5. photographs and photomicrographs of paint samples and polished cross-sections; and
6. later digital project and analytical photography.

These materials served two closely related purposes. Field and architectural photography recorded the buildings, finishes, and physical conditions under investigation, while laboratory photography and photomicrography recorded the microscopical evidence upon which many analytical conclusions were based.

The photographic materials should therefore be understood not simply as illustrations accompanying the collection, but as an important component of its documentary and analytical record.

Photography as Part of the Investigative Process

Welsh developed an early interest in photography and subsequently refined his photographic skills through his association with professional photographers. Particularly influential was architectural photographer **Tom Crane**, with whom Welsh shared office space during the early years of his practice in Bryn Mawr, Pennsylvania.

From Crane, Welsh gained a greater appreciation for composition, lighting, selection of viewpoint, and the careful presentation of a subject. These principles were readily applicable to the photography of historic buildings and interiors, but they became particularly important in Welsh's development of **photomicrography**.

Photography consequently became more than a means of recording that an investigation had taken place. It was used deliberately to select and preserve visual evidence that could clarify an observation, support an analytical conclusion, and communicate findings effectively in project reports, lectures, and professional publications.

Field and Project Photography

Throughout individual projects, photography was used to document:

1. architectural exteriors and interiors;
2. decorative features and finishes;
3. locations from which paint samples were collected;
4. conditions encountered during investigation;
5. exposed early paint surfaces and decorative schemes;
6. areas prior to restoration or treatment; and
7. other physical evidence relevant to interpretation.

In many instances these photographs preserve information that supplements or clarifies written descriptions in the Project Report Files and final reports.

They may also record conditions that subsequently changed or disappeared during restoration. For this reason, some project photographs have significance as historical records independent of the paint investigation for which they were originally taken.

35mm Project Slides

Before the advent of digital photography, much of Welsh's project documentation was made using 35mm transparency film. The collection includes photographic slides stored in wooden slide trays and generally organized by state and project.

These slides document buildings and interiors, architectural details, decorative finishes, field conditions, exposed paint layers, and other visual evidence encountered during investigations.

The 35mm slides also served an important second purpose. Selected images were used extensively in professional lectures and educational presentations through which Welsh communicated project findings and analytical methods to preservation professionals, students, and other audiences.

Researchers should therefore consider these slides both as **project documentation** and as part of the record of how the findings represented within the collection were communicated to the preservation field.

Photomicrography and Paint Cross-Sections

Photomicrography became an increasingly important part of Welsh's laboratory practice. A properly prepared and photographed paint cross-section could make the stratigraphy of a sample immediately understandable by visually recording successive paint layers, primers, varnishes, glazes, accumulated dirt, pigment particles, and other characteristics.

Welsh placed particular emphasis on the **selection and preparation of the specimen before it was photographed**. A representative paint fragment first had to be chosen, oriented so that its layer sequence would be clearly visible, embedded securely, and carefully polished to expose a clean cross-sectional surface. Lighting, magnification, exposure, focus, and composition were then considered in producing the final image.

The objective was not simply to obtain a microscope photograph, but to create an accurate and visually intelligible record of the evidence.

Welsh eventually developed a rapid method for embedding and polishing multilayered paint samples specifically for cross-sectional examination and photomicrography. He published the technique in 1997 in *The Microscope* as **"A Polished Paint Layer Crosssection in 30 Minutes."** The article described a method that allowed a specimen to be prepared in approximately thirty minutes rather than requiring the substantially longer preparation associated with conventional embedding methods. A color photomicrograph of one of Welsh's prepared cross-sections was selected for the cover of that issue.

The article itself emphasized the value of cross-section photomicrographs as dependable visual documentation for verifying analytical findings presented in reports. The illustrated specimens demonstrated paint sequences from several different buildings and periods, showing the variety of stratigraphic evidence that could be preserved photographically.

Photography as Analytical Documentation

Photomicrography also became an important means of recording evidence obtained through polarized light microscopy and other microanalytical techniques.

Depending upon the investigation, photographs could record:

1. individual pigment particles;
2. particle morphology and optical characteristics;
3. dispersion-staining colors;
4. interference figures;
5. microchemical reactions;
6. wallpaper and other fibers; and
7. other microscopical evidence used in material identification.

The breadth of this photographic application is illustrated particularly well in Welsh's later article **"The Microanalysis of Historic Paints and Wallpapers."** There, photomicrographs were used to demonstrate the identification and interpretation of materials ranging from orpiment and tremolite to mica, Prussian blue, and cotton and flax wallpaper fibers.

These images demonstrate an important characteristic of the photographic record within the collection: **the photograph could itself become part of the analytical evidence.** A photomicrograph could preserve an optical or chemical phenomenon observed at the microscope

and allow that observation to be incorporated into a report, lecture, or publication where the original microscopic preparation could not be directly examined.

The Transition from Film to Digital Photography

For much of Welsh's career, photographic documentation and photomicrography depended upon film, particularly 35mm transparency film. Images had to be composed and exposed without the immediate visual confirmation that later became possible with digital cameras.

The transition to digital photography significantly changed this process. Images could be reviewed immediately, exposure and lighting adjusted more readily, and multiple views made efficiently. Digital photography also simplified the incorporation of photographic evidence directly into reports, presentations, and publications.

The collection therefore documents not only changes in analytical methods but also the technological transition from film-based documentation to digital imaging over the course of Welsh's career.

Organization and Access

The photographic materials exist in several forms and locations within the collection.

The 35mm project slides are generally organized by:

1. state; and
2. project name.

This arrangement corresponds broadly with the organization of the Project Report Files.

Additional photographs may be encountered as prints within individual project files and reports, while later photographic documentation may exist as digital files associated with reports, project directories, or digital project folders.

Researchers should therefore not assume that all photographic documentation for a project will necessarily be found in a single location.

A particularly important example is the Charles E. Peterson Research Fellowship Study. Approximately 22 original 35mm slides associated with the Fellowship are preserved within the larger photographic slide collection. These include photographs of historic sites represented in the study as well as photomicrographs of pigments taken from paint samples whose sample envelopes are preserved elsewhere in the collection. Among the sites represented are Monticello, Brice House, Cliveden, Woodford, Trent, Trinity Church, and others. Welsh made duplicate slides from these originals for inclusion with his Fellowship submission. Researchers consulting the Fellowship materials should therefore also refer to both the Photographic Materials and Project Paint Samples described in this Guide.

Relationship to Other Collection Components

Photographic materials are most useful when considered in conjunction with other components of the collection.

Project Reports and Project Report Files provide the written context for buildings, locations, conditions, and findings represented photographically.

Project Paint Samples preserve the physical material documented in field photographs and cross-section images.

Pigment and Fiber Microscope Slides preserve analytical preparations that may correspond to photomicrographs appearing in reports or publications.

PLM Laboratory and Specialized Analysis Notebooks may contain observations and identifications associated with analytical images.

Publications and Lectures demonstrate how selected photographs and photomicrographs were subsequently used to communicate project findings, research methods, and discoveries to a broader professional audience.

These relationships can allow a researcher to follow the visual record from building and sampling location → physical sample → microscopical examination → photographic documentation → interpretation → report or publication.

Using Photographic Materials in Practice

For project-specific research, a useful approach is to begin with the Project Report File or final report and identify the building areas, sampling locations, finishes, or analytical questions under investigation. The corresponding photographic materials may then provide visual evidence for those conditions.

Researchers interested in analytical methodology may instead begin with a published photomicrograph or report illustration and attempt to trace it back through the laboratory documentation, microscope preparation, and original Project Paint Sample.

This second approach may be particularly valuable because the collection sometimes preserves several stages of the same investigation—from the original architectural material through its laboratory preparation and ultimately to the image through which the analytical finding was communicated.

Interpretive Value

The photographic materials preserve evidence that in many cases can no longer be recreated. Buildings have been restored, surfaces have been altered, finishes have been removed or covered, and physical conditions have changed.

The photomicrographs possess a related but somewhat different value. They preserve the **appearance of analytical evidence at the time it was examined** and document how that evidence was selected, prepared, observed, and interpreted.

Taken together, the architectural photographs and photomicrographs provide a visual record extending from the scale of the building itself to the microscopic particles from which its historic finishes were made.

Concluding Note

Photography formed a continuous thread throughout Welsh's investigative work, from documenting buildings and architectural surfaces in the field to recording paint stratigraphy, pigments, fibers, and other material evidence in the laboratory.

The photographic materials should therefore be approached not simply as illustrations, but as an integral part of the research record. Used in conjunction with Project Report Files, Project Paint Samples, microscope preparations, laboratory notebooks, reports, and publications, they can help researchers reconstruct both **what was observed and how that evidence was interpreted and communicated**.

PUBLICATIONS, ARTICLES, LECTURES, AND WORKSHOPS

Communicating Research, Methods, and Professional Practice

Overview

Publications, lectures, and workshops constitute an important component of the Frank S. Welsh Collection and an essential record of the development and dissemination of architectural paint research and analysis within the field of historic preservation.

Throughout his career, Welsh regarded the communication of research findings as an important extension of the investigative process itself. Project investigations frequently generated discoveries that had significance beyond the particular building under study. Publishing those findings and presenting them to professional and academic audiences provided a means of sharing new methods, materials research, and practical experience with others working in historic preservation and related fields.

The collection contains published articles, book chapters, newsletters, lecture and workshop materials, correspondence, illustrations, photographic materials, and associated digital files documenting this aspect of Welsh's professional work. Researchers should consult the **Finding Aid** for the location and description of individual physical and digital materials.

The Development of Writing and Publication

Writing was not initially a natural or easily acquired skill for Welsh. In 1972, while returning from an extended journey to Spain and considering the direction his life might take, he recorded among his personal goals a desire to become a writer. At the time, there was no apparent connection between that aspiration and the professional career that would shortly follow.

After joining the National Park Service and beginning his work with historic architectural paints and finishes, Lee H. Nelson encouraged Welsh to document and publish what he was learning. Nelson believed that discoveries made through preservation research should be shared so that others could benefit from the methods, successes, and problems encountered in practice. This early encouragement was later reinforced by Walter C. McCrone, who likewise urged Welsh to write and lecture about the information accumulated through his project and laboratory work.

Welsh took that encouragement seriously. His first professional article, **“Report on an Early Wall Stencil in Philadelphia,”** appeared in the *Bulletin of the Association for Preservation Technology* in 1973. Over the following decades, his publications addressed an increasingly broad range of subjects involving historic paints, pigments, colors, wallpapers, microscopy, analytical techniques, and individual preservation projects. The bibliography preserved with the collection records approximately thirty published articles, chapters, and related works.

Developing the ability to communicate this increasingly technical material was itself a gradual process. Fred Clement, a professional freelance writer and longtime friend, provided important early assistance, editing Welsh's writing and helping him develop greater skill in grammar, composition, organization, and presentation. His guidance also helped Welsh learn to communicate technical subjects more effectively to audiences outside the laboratory.

Over time, writing became an integral and particularly rewarding part of Welsh's professional work.

Publications as an Extension of Research

The subjects represented in Welsh's publications closely parallel the development of his investigative and analytical methods.

Early articles addressed subjects such as painted decoration, historic graining, paint analysis, color, and restoration practice. As laboratory methods became increasingly sophisticated, the publications expanded to include pigment identification, polarized light microscopy, microchemical analysis, paint cross-sections, historic wallpapers and fibers, and other specialized subjects.

Among these were articles on **Prussian blue**, microchemical analysis of historic house paints, the preparation of polished paint-layer cross-sections, the investigation and authentication of historic wallpaper fragments, and the microanalysis of historic paints and wallpapers.

One particularly important example is Welsh's chapter “The Early American Palette: Colonial Paints Revealed,” published in Roger W. Moss's Paint in America: The Colors of Historic Buildings. The chapter grew from Welsh's 1992–1993 Charles E. Peterson Research Fellowship study of early American paints, pigments, and colors. The published chapter should be understood in conjunction with the original Fellowship study preserved at the Athenaeum, which contains a substantially larger body of comparative research, pigment analyses, charts, photographic documentation, and supporting material than could be incorporated into the published version. Researchers interested in this subject are strongly encouraged to consult the original Fellowship materials described later in this Guide.

The publications therefore provide more than a bibliography of completed research. Read chronologically, they document the evolution of Welsh's methodology and the expanding scientific basis of architectural paint analysis over the course of his career.

They also demonstrate an important relationship among the components of the collection. A question originating during a project might lead from:

Field investigation → project paint sample → laboratory analysis → microscope preparation → photographic documentation → interpretation → project report → publication or lecture

Researchers interested in a particular article may therefore find substantial supporting evidence elsewhere in the collection, including original project files, samples, microscope slides, laboratory notebooks, photographs, correspondence, and research materials.

Finish Notes

An important extension of Welsh's commitment to communicating research was ***Finish Notes***, the newsletter published by Welsh Color & Conservation, Inc. during the 1990s.

Unlike a conventional scholarly journal article, *Finish Notes* provided a more direct means of communicating observations, research findings, technical developments, project experiences, and practical information to clients and professional colleagues.

Subjects ranged widely and included historic wallpapers, Monticello, paint cross-sections, color measurement and spectrophotometry, lead paint, Grand Central Terminal, analytical techniques, and other topics arising from professional practice.

Maria Thompson, an architectural historian and writer, served as editor and contributed importantly to the development and presentation of the newsletter.

Researchers should consider *Finish Notes* not simply as promotional literature, but as part of the collection's record of professional communication. The issues capture research and observations in a more immediate form and may provide information, commentary, or context not found in formal project reports or subsequently published articles.

The Development of Lecturing and Teaching

Public speaking developed along a path similar to writing.

Welsh's first major professional presentation occurred early in his National Park Service career at a large NPS conference in Denver. Because his position represented a new specialization within the Service, he was asked to explain his work to colleagues gathered from around the country.

The presentation proved personally difficult. Although well prepared, Welsh was inexperienced and uncomfortable speaking before such a large professional audience. The experience initially diminished rather than strengthened his confidence as a speaker.

A subsequent opportunity proved decisive.

After Welsh established his independent practice and completed an early investigation of the historic paints at the Athenaeum of Philadelphia, **Roger W. Moss** invited him to present his work to a meeting of the Victorian Society of America held at the Athenaeum. The presentation was successful and provided the confidence to continue.

From that point forward, lecturing, teaching, and eventually conducting workshops became regular components of Welsh's professional career.

Professional and Academic Presentations

Over the succeeding decades, Welsh presented his research to a wide range of professional, academic, institutional, and public audiences.

These included presentations to undergraduate and graduate students at institutions such as the **University of Pennsylvania, Cornell University, University of Virginia, University of Florida, and University of Texas at Austin**, as well as lectures at numerous annual meetings of the **Association for Preservation Technology (APT)**.

Other presentations were given for museums, historic sites, professional organizations, preservation programs, and individual clients, including Colonial Williamsburg's Antiques Forum, Historic Annapolis, Stratford Hall, the Preservation Institute: Nantucket, and the Campbell Center, among others.

Particularly meaningful were presentations at **Inter/Micro**, the annual microscopy conference associated with Walter C. McCrone and the McCrone Research Institute in Chicago. In this setting, Welsh presented architectural paint and finishes research to audiences composed primarily of microscopists rather than preservation professionals.

These meetings provided an unusual exchange between disciplines. In preservation settings, Welsh was introducing microscopy and materials analysis to architectural historians, architects, conservators, and preservation professionals. At Inter/Micro, he was instead demonstrating to experienced microscopists how their analytical methods could be applied to questions involving historic buildings, paints, pigments, wallpapers, and fibers.

Lectures as a Means of Teaching Methodology

As Welsh's experience as a lecturer developed, presentations increasingly became opportunities not simply to report project findings, but to explain **how investigations were conducted and conclusions reached**.

His lecture on the investigation, analysis, and authentication of historic wallpaper at the annual meeting of the American Institute for Conservation (AIC) in 2000 provides a particularly useful example. The presentation organized wallpaper investigation around five principal considerations: searching for physical evidence; evaluating its stratigraphic context; studying pattern styles; identifying methods of manufacture; and determining the composition of papers, pigments, binders, and fibers.

Individual projects were then used as case studies demonstrating how these forms of evidence could confirm—or sometimes contradict—initial expectations. At Gunston Hall, for example,

microscopical identification of chrome yellow demonstrated that a wallpaper fragment hoped to be associated with an eighteenth-century period was more likely of nineteenth-century origin.

Such presentations are useful records of Welsh's working methodology because they show not merely the final conclusions presented in reports, but the reasoning and evidence through which those conclusions were reached.

Workshops and Live Microscopy

Workshops allowed Welsh to extend this teaching further by demonstrating analytical materials and methods directly.

During the 1990s, he assembled portable video equipment that could be connected to his stereomicroscope and displayed on a color monitor. The microscope, video equipment, monitor, and related materials were transported in specially fitted cases to workshops and educational programs.

This made it possible for students and participants to observe paint samples, layer structures, cross-sections, and other microscopical evidence collectively rather than individually at the microscope.

Welsh used this equipment in workshops and educational presentations at a variety of venues, including the **Preservation Institute: Nantucket**, where he taught on several occasions, as well as programs at the Campbell Center and elsewhere.

These workshops represented an important extension of the philosophy underlying both the publications and lectures: analytical techniques became more useful to the preservation field when they could be demonstrated, explained, and shared with others.

From Lecture to Publication

Lectures and publications frequently reinforced one another. Research first presented to a professional audience could subsequently be refined into an article or book chapter, while published research could form the basis for later lectures and workshops.

A particularly significant example occurred late in Welsh's lecturing career with his presentation **“Restoring the Colors of Thomas Jefferson: Beyond the Colors of Independence”** at the **Third International Architectural Paint Research Conference**, hosted by Columbia University's Graduate School of Architecture, Planning and Preservation in New York City in January 2008.

The three-day international conference brought together researchers, conservators, architects, and other specialists from fourteen countries to examine the investigation and conservation of architectural finishes. For Welsh, the occasion provided an opportunity to synthesize

approximately thirty years of research involving Thomas Jefferson's buildings, including the Virginia State Capitol, Monticello, Poplar Forest, and the University of Virginia.

The presentation drew upon documentary research as well as extensive physical evidence from historic paints and wallpapers to interpret the development of Jefferson's architectural palette and aesthetic. It also reflected the transformation that had occurred within architectural paint research during Welsh's career—from the physical scraping of painted surfaces and visual color matching to a scientific discipline incorporating microscopy, pigment and fiber identification, cross-section analysis, and systematic color measurement.

The conference papers were subsequently published in ***Architectural Finishes in the Built Environment***, edited by Mary A. Jablonski and Catherine R. Matsen and published in London by Archetype Publications Ltd. in 2009. Welsh's contribution appeared as the chapter **"Restoring the Colors of Thomas Jefferson: Beyond the Colors of Independence."**

The progression from decades of individual project investigations, through comparative research and analysis, to an international presentation and finally a published scholarly chapter provides an especially appropriate example of the close relationship among **field investigation, scientific analysis, historical research, lecturing, and publication** that characterized Welsh's mature professional practice.

Brown Zinc Paint at the United States Capitol

Among Welsh's publications, the study of **Brown Zinc Paint at the United States Capitol** represents a particularly comprehensive example of the integration of historical research, microscopy, instrumental analysis, and scientific interpretation.

The investigation brought together methods developed over many years, including examination of paint stratigraphy, polarized light microscopy, photomicrography, microchemical testing, dispersion staining, scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDS), ultraviolet microscopy, Raman spectroscopy, mineralogical research, and historical documentary investigation.

The analysis identified an unusual group of mineral pigments and led to further research into their relationship with the Franklin and Sterling Hill mineral deposits in New Jersey and the history of the New Jersey Zinc Company. In this way, microscopical evidence recovered from the Capitol became a point of departure for a broader investigation into nineteenth-century American paint manufacture and mineral-pigment use.

The resulting publication is particularly representative of Welsh's mature approach to research: **physical evidence was examined scientifically, interpreted historically, placed within a broader technological context, and ultimately published so that the findings could be available to others.**

The article received the Association for Preservation Technology's **Anne de Fort-Menares Award** for excellence in the application of historical research to preservation practice. Welsh's preceding article concerning the Mobile Public Library received the same award the previous year.

Professional Communication and the Development of the Field

The publications, lectures, and workshops represented in the collection had consequences beyond the individual projects from which many originated.

Publication allowed analytical observations and methods developed through practice to become available to other preservation professionals. Lectures provided opportunities to demonstrate findings visually and discuss them with professional and academic audiences. Workshops enabled participants to observe materials and investigative methods directly.

These activities also helped bring greater professional visibility to Welsh's practice. More significantly, however, they contributed to broader awareness and acceptance of **architectural paint research and analysis as a specialized area within historic preservation**.

As the field grew and additional practitioners entered it, analytical methods continued to develop and expectations for investigation became increasingly sophisticated. Welsh's own methods likewise continued to evolve through research, collaboration, teaching, publication, and professional exchange.

What had begun in 1972 as a personal aspiration to write thus became something considerably larger: a means of documenting and communicating the development of a new area of preservation practice.

Organization and Access

Publications, lecture materials, workshop records, and related documentation are preserved in several physical and digital portions of the collection.

Researchers should consult the Athenaeum's **Finding Aid** to locate specific materials, which may include:

1. published articles and tear sheets;
2. book chapters and other publications;
3. issues of *Finish Notes*;
4. lecture manuscripts and notes;
5. presentation materials;
6. 35mm slides and later digital presentation images;
7. workshop materials;
8. correspondence relating to publications and presentations; and
9. audiovisual recordings.

Researchers interested in a particular publication or lecture are encouraged to search beyond the finished work itself. Related Project Report Files, Project Paint Samples, microscope preparations, PLM Laboratory and Specialized Analysis Notebooks, photographic materials, and correspondence may preserve the underlying evidence from which the publication or presentation developed.

Special Note on Audiovisual Materials

At least one important lecture—the presentation given at the **Colonial Williamsburg Antiques Forum**—survives in the collection as a VHS recording.

The recording has particular documentary value because it preserves not merely the content of the presentation, but the manner in which research was communicated through spoken explanation and accompanying visual material.

Because VHS is now an obsolete format and presents limitations for researcher access and long-term preservation, **digitization of this recording should be considered when resources permit**. Researchers interested in audiovisual lecture materials should consult Athenaeum staff regarding their availability and current access requirements.

Concluding Note

The publications, lectures, and workshops preserved within the Frank S. Welsh Collection represent the outward-facing component of more than five decades of investigation and research. They document the process through which findings made in buildings and laboratories were communicated beyond individual projects and made available to preservation professionals, scientists, students, and other researchers.

For this reason, they should not be viewed separately from the Project Report Files, physical paint samples, microscope preparations, laboratory notebooks, and photographic materials described elsewhere in this Guide. They often represent the **culmination of the research process**—the point at which evidence gathered from a building, examined in the laboratory, and interpreted through research was communicated to others.

They also document a personal and professional evolution: from an early aspiration to write and an initially difficult experience with public speaking to decades of publication, teaching, lecturing, and professional exchange.

In encouraging Welsh at the beginning of his career to publish what he discovered, **Lee H. Nelson helped establish a principle that remained central throughout Welsh's professional life: research achieves its greatest value when its findings are carefully documented and shared.**

ADDITIONAL RESEARCH AND PROFESSIONAL MATERIALS

Supplementary Resources and Opportunities for Future Research

Overview

The preceding sections of this Guide describe the principal components of the Frank S. Welsh Collection and the relationships among the Project Report Files, Project Paint Samples, pigment and fiber microscope preparations, laboratory notebooks, photographic materials, publications, lectures, and workshops.

They do not, however, describe everything contained within the collection.

Over the course of more than fifty years of professional practice, Welsh accumulated a much broader body of research, reference, business, educational, promotional, and related professional material. Some of these materials relate directly to individual projects; others document subjects of continuing research, the development of Welsh's professional practice, and the growth of architectural paint research and analysis as a specialty within historic preservation.

Researchers are therefore strongly encouraged to use this Guide **in conjunction with the Athenaeum's Finding Aid**, which should remain the principal reference for identifying the full range and location of physical and digital materials within the collection.

The Charles E. Peterson Research Fellowship

Among the most substantial cross-project research resources preserved in the collection is Welsh's original research undertaken through a **1992–1993 Charles E. Peterson Research Fellowship**, administered by the Athenaeum of Philadelphia.

The resulting study, *Early American Paints—Their Colors and the Pigments Used to Make Them*, represented the culmination of approximately twenty years of investigation of historic architectural paints and a decade of increasingly intensive study of polarized light microscopy and pigment identification. From 175 Colonial-period sites on which he had worked, Welsh selected 54 buildings in nine states for comparative study. The research encompassed 140 historic colors, 95 of which were subjected to pigment analysis, resulting in the identification of 17 pigments.

Of particular value to researchers are the extensive comparative charts prepared for the project. These record individual buildings and their dates and locations; types of paint; colors and approximate periods; pigments identified through polarized light microscopy; architectural features on which the colors occurred; colorimetric measurements; and corresponding color standards. Welsh also assembled more than 80 photographic transparencies illustrating pigments, paint-layer cross-sections, and restored buildings represented in the study.

The research extended considerably beyond the presentation of colors and pigment identifications. It included discussions of paint-analysis methodology and color matching, historical painting materials and practices, pigment history and characteristics, documentary sources, decorative painting, and related subjects. It therefore preserves not only the results of the investigation but also the methods and historical framework through which those results were interpreted.

The Fellowship research subsequently provided important material for Welsh's contribution to Roger W. Moss's *Paint in America: The Colors of Historic Buildings*. **Researchers should be aware, however, that the published version represents only a portion of the much more extensive original Fellowship research.** A substantial amount of the underlying data, comparative documentation, analytical material, and supporting research contained in the original submission could not be included in the published chapter.

For this reason, the original Fellowship research should be regarded as an **independent primary research resource**, rather than solely as preliminary material for the later publication. Researchers interested in eighteenth- and early nineteenth-century American paints, pigments, colors, architectural color use, or the historical development of scientific paint analysis are particularly encouraged to examine the complete study.

The Fellowship also represents an important intersection of several influences documented elsewhere in this Guide. **Roger W. Moss encouraged Welsh to apply for the Peterson Fellowship**, while Welsh's study and work with **Dr. Walter C. McCrone** provided the microscopical knowledge necessary to undertake the extensive pigment analysis upon which much of the research depended. The project brought together historical investigation, physical evidence accumulated through decades of fieldwork, color measurement, microscopy, pigment identification, photography, and comparative analysis in a single comprehensive study.

The Athenaeum preserves the original hard-copy research materials associated with Welsh's Charles E. Peterson Research Fellowship. The complete Fellowship study contains a substantially larger body of comparative research, pigment analyses, supporting data, and documentation than could be incorporated into the subsequently published chapter in Paint in America. Researchers interested in this subject are therefore strongly encouraged to consult the original research materials. They may be located in the Athenaeum's **Finding Aid** by searching for “Peterson.” Direct **Finding Aid** search: Peterson.

Related photographic documentation also survives elsewhere in the collection. Approximately 22 original 35mm slides associated with the Peterson Fellowship Study are preserved among the larger body of photographic slides transferred to the Athenaeum. These include photographs of historic sites represented in the study as well as photomicrographs of pigments taken from paint samples whose sample envelopes are preserved elsewhere in the collection. Among the sites represented are Monticello, Brice House, Cliveden, Woodford, Trent, Trinity Church, and others. Welsh made duplicate slides from these originals for inclusion with his Fellowship submission.

Because the written Fellowship research, the original photographic slides, and the associated Project Paint Samples are physically housed in different portions of the collection, researchers

consulting the Fellowship materials should also refer to both the Photographic Materials and Project Paint Samples described elsewhere in this Guide.

The original Fellowship research papers are maintained in off-site storage and must be requested in advance through Athenaeum staff. Researchers planning to consult them should allow at least two days for retrieval from off-site storage.

Research Files and Unfinished Lines of Inquiry

Among the supplementary materials are research files assembled by Welsh in connection with subjects that attracted his professional interest over the course of his career.

Some developed into articles, lectures, project reports, or other completed studies. Others remained subjects of continuing or preliminary investigation.

These files may contain research notes and correspondence, photocopies and excerpts from historical sources, manufacturers' literature and technical information, photographs and illustrations, analytical observations, references to related projects, comparative material gathered from different buildings, and preliminary ideas that were never developed into formal publications.

Researchers should not assume that the absence of a published article or completed report diminishes the potential value of these materials. In some instances, an unfinished research file may preserve the beginnings of an investigation that could be pursued further using resources and analytical methods available today.

One example is Welsh's research concerning **“pencilling,”** the decorative treatment historically applied to mortar joints in brick masonry. Evidence of this practice is particularly apparent on buildings such as the pavilions of the Lawn at the University of Virginia. Although Welsh began assembling information on the subject, the research was not developed into a comprehensive published study.

Such files present opportunities for future scholars to continue questions that originated during Welsh's active practice but remained unresolved or incomplete at the time of his retirement.

Project Profiles

Another useful component of the collection consists of **Project Profiles** prepared by Welsh to describe selected investigations and their findings.

Before websites provided an immediate means of presenting professional work, these profiles served as concise illustrated accounts of individual projects. They described significant assignments, analytical questions, discoveries, and restoration findings and were used to communicate the nature and range of Welsh's work to prospective clients and professional colleagues.

With the development of the Welsh Color & Conservation, Inc. website, a number of these profiles were subsequently adapted for online presentation.

Although created in part for professional and promotional purposes, the Project Profiles may have continuing research value. They provide concise summaries of selected investigations and may help researchers identify projects warranting more extensive examination through the corresponding Project Report Files, reports, samples, photographs, and analytical records.

Researchers should consult the **Finding Aid and Athenaeum staff** to determine the location and availability of Project Profiles preserved in physical or digital form.

Newspaper and Magazine Coverage

The collection also contains an extensive body of newspaper and magazine articles documenting individual projects, developments in architectural paint research, and, in some instances, Welsh's professional work and career.

These materials should not be regarded solely as publicity. They provide a contemporary record of how historic paint research, its methods, and its findings were presented to architects, preservation professionals, institutional clients, and the general public.

Articles concerning individual projects may contain photographs, interviews, descriptions of discoveries, comments by project participants, and accounts of restoration decisions that supplement information preserved in the corresponding Project Reports and files. In some instances, they document the public response to colors or decorative treatments revealed through analysis and subsequently reproduced during restoration.

Professional publications also demonstrate how the findings of architectural paint analysis entered the broader architectural and preservation literature. An article on the Peter Wentz Farmstead published in *Architectural Record*, for example, described the use of microchemical analysis and polarized light microscopy in determining the date and composition of the decorative finishes, as well as the process by which those findings were translated into the restored appearance of the building.

Other articles provide contemporary accounts of Welsh's laboratory methods, professional development, and the emerging field in which he worked. Such coverage offers a perspective different from Welsh's own reports and publications: it records how the work and the developing specialty of architectural paint analysis were understood and presented by others at the time.

Viewed collectively, newspaper and magazine coverage therefore constitutes another form of historical documentation within the collection. It may help researchers trace the history of particular projects, changing public attitudes toward historic color and restoration, and the increasing recognition of architectural paint research and analysis as a specialized component of historic preservation.

Using the Articles in Research

Researchers should consider newspaper and magazine coverage as a **secondary pathway into the collection**.

An article concerning a particular building or discovery may lead to related Project Report Files and completed reports, Project Paint Samples, photographic documentation, pigment and fiber microscope slides, PLM Laboratory Notebooks, correspondence and research files, and Welsh's own published articles or lectures.

Following these connections may reveal information that is not duplicated in any single component of the collection.

Researchers are encouraged to consult the **Finding Aid** for the full extent and organization of newspaper and magazine material preserved in both physical and digital form. Individual articles need not be identified in this Researcher's Guide; rather, the **Finding Aid** should serve as the principal means of locating them, while this Guide is intended to explain their potential research value and their relationship to other materials within the collection.

Professional and Promotional Materials

The collection also contains materials documenting how Welsh's work and the developing specialty of architectural paint research were presented to clients, preservation professionals, institutions, and the public.

These materials include advertisements and promotional mailings, brochures and professional literature, greeting cards and other business communications, trade-show and conference exhibition materials, project descriptions and profiles, presentation and display materials, and materials associated with professional conferences and exhibitions.

Welsh exhibited and presented his work at professional gatherings, including meetings of the Association for Preservation Technology and programs devoted to historic interiors and architectural finishes.

Viewed retrospectively, these materials document more than the marketing of an individual consulting practice. They provide evidence of how a newly developing professional specialty was **explained, illustrated, and introduced to potential clients and to the larger preservation community**.

They may therefore be useful to researchers interested not only in Welsh's individual career but also in the professionalization and dissemination of architectural paint research during the late twentieth century.

Digital Materials

The collection includes digital materials created during the later decades of Welsh's practice. These may include project photographs, reports, publications, correspondence, Project Profiles, presentation materials, business records, and other files.

Researchers interested in these materials should consult the **Finding Aid and Athenaeum staff** regarding the extent and accessibility of the digital holdings.

Using the Finding Aid to Explore Beyond This Guide

This Researcher's Guide is intentionally selective.

Its purpose is not to reproduce the Athenaeum's **Finding Aid** or describe every folder, file, object, publication, photograph, sample, or digital record contained within the collection. Rather, it is intended to provide the **context and working knowledge necessary to understand how the major components of the collection relate to one another and how they may be used effectively**.

Researchers should therefore regard the Guide as a point of entry rather than a comprehensive inventory.

After identifying an area of interest here, researchers are encouraged to explore the corresponding listings in the **Finding Aid**. Doing so may reveal related materials that are not individually discussed in this Guide and, in some cases, connections among projects and subjects that were not apparent during their original creation.

The collection developed organically through more than five decades of professional work. Consequently, potentially useful evidence may occur in unexpected places. A research subject represented in a Project Report File, for example, may also appear in correspondence, photographs, laboratory notebooks, newspaper or magazine coverage, lecture materials, a Project Profile, an unpublished research file, or a later publication.

Part of the value of the collection lies in discovering and reconstructing those relationships.

Opportunities for Future Research and Access

The collection was created as a **working research archive**. Its physical samples, microscope preparations, notebooks, photographs, reports, and research files were accumulated not simply to document completed work, but because the evidence they contained could be returned to, compared, and studied again.

That possibility remains.

Future researchers may bring different questions, new historical information, improved imaging techniques, and analytical methods unavailable when the original investigations were undertaken. Physical paint samples and microscope preparations may therefore support research extending beyond the purposes for which they were initially collected.

Continued enhancement of access could further increase this potential. Among the possibilities that may warrant consideration over time are the creation of a cross-reference or index connecting pigment and fiber microscope slides with corresponding laboratory notebook entries and projects; digitization of audiovisual materials presently preserved in obsolete formats; continued identification and organization of digital research materials; availability of a **stereomicroscope** for examination of Project Paint Samples; and eventual availability of a **polarizing light microscope** for qualified researchers wishing to examine pigment, fiber, and other microscopical preparations.

These should be understood as **opportunities for the future rather than requirements for use of the collection**. The materials already preserve a substantial research record, but appropriate indexing, equipment, digitization, and continued interpretation could make portions of that record considerably more accessible.

A Living Context for the Collection

An unusual circumstance accompanied the transfer and organization of the Frank S. Welsh Collection at the Athenaeum: its creator remained available to assist in interpreting the materials.

As Archivist and Curator of Architecture **Kristina Wilson** observed during the processing of the collection, archivists frequently receive professional collections only after their creators have died. In such circumstances, questions concerning terminology, organization, working methods, relationships among materials, and the significance of individual records may no longer be answerable.

The opportunity to discuss these questions directly with Welsh provided an important means of recovering information that might otherwise have been lost.

This Researcher's Guide grew in part from that opportunity. It attempts to preserve not merely descriptions of the materials, but some of the **working knowledge that accompanied their creation**: why certain records were retained, how different forms of evidence relate to one another, how the materials were used in practice, and where future researchers may find connections that are not immediately apparent from an archival description alone.

LOOKING FORWARD

The Frank S. Welsh Collection represents the surviving professional and research record of more than fifty years devoted to the investigation of historic architectural paints, pigments, colors, wallpapers, and related finishes.

It also documents the formative decades of **architectural paint research and analysis as a specialized field within historic preservation**. What began in the early 1970s as an unusual area of investigation developed over succeeding decades into a recognized professional practice involving architectural investigation, historical research, microscopy, materials analysis, color measurement, conservation, documentation, and interpretation.

The collection preserves evidence of that development at an unusual level of completeness: not only completed reports and publications, but the original paint samples, pigment and fiber preparations, laboratory observations, photographs, correspondence, research files, newspaper and magazine coverage, lectures, and other materials from which conclusions and publications developed.

For that reason, its future value will depend not simply upon its preservation, but upon its **use**.

It is Welsh's hope that the collection will become increasingly known beyond the Athenaeum itself and will reach preservation professionals, architectural historians, conservators, scientists, educators, students, and researchers throughout the United States and internationally. Broader awareness may encourage new research, teaching, comparative study, and renewed examination of the physical evidence preserved within it.

The Athenaeum of Philadelphia provides an especially appropriate home for this work. Welsh's professional association with the institution extends to the early years of his career, and **Roger W. Moss**, one of his earliest clients, collaborators, mentors, and closest friends, encouraged him over many decades to preserve his reports and ultimately to place his professional records at the Athenaeum. What began with the gradual donation of individual reports eventually culminated, upon Welsh's retirement, in the transfer of the surviving record of his professional career.

In that sense, the collection's arrival at the Athenaeum represents not simply the end of a career, but the beginning of another phase in the life of the material.

The questions asked of it in the future will belong to others.

Some may return to individual buildings and compare present conditions with evidence recorded decades earlier. Others may study the development and chronology of particular pigments, colors, paints, wallpapers, or analytical techniques. Still others may use the collection to examine the history of preservation practice itself. And some may discover questions in these materials that were never anticipated when they were collected.

That possibility is perhaps the most important reason the collection was preserved.

The work represented here was built upon evidence, curiosity, research, and the sharing of discoveries with others. It is hoped that the preservation of the collection at the Athenaeum of Philadelphia will allow that process of discovery to continue.