



EVERGREENE
Architectural Arts

**WILLIAM J. BRENNAN COURTHOUSE
(HUDSON COUNTY COURTHOUSE)
PHASE II MURAL CONSERVATION: ROTUNDA DOME
JERSEY CITY, NEW JERSEY**



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INTRODUCTION

EXECUTIVE SUMMARY

Conservation Solutions, a Division of EverGreene Architectural Arts, Inc. (EverGreene) was retained by the Office of the County Engineer of Hudson County to perform conservation treatments on historic painted murals in the rotunda dome of the William J. Brennan Courthouse, located at 583 Newark Avenue in Jersey City, New Jersey (Figure 1). The purpose of the treatments is to repair damage to the murals and restore their physical and visual integrity. EverGreene carried out field work between June and September, 2020.

Management oversight was supplied by Director of Project Management Sarah Kloze and Project Manager Andrew Maziariski; field treatments were led by Conservator Guillemette Caupin¹ and Superintendent Kai Ladd-Griffin, who directed and coordinated the efforts of Assistant Conservators Yiyang Li and Netanya Schiff and Conservation Technicians Liz Kolligs and Marlene Sophia. All treatments and documentation procedures followed the standards and guidelines set-out by the American Institute of Conservation (AIC), as per the mandates of the Professional Associate status requirements of our Senior Conservators.

The following report summarizes conservation treatment efforts in the project scope, which were successful in addressing deterioration and damage to historic murals and canvas, including general soiling, paint flaking, loss and deformation, and canvas detachment. This document represents a comprehensive summary of all work completed in Phases I and II, and was prepared under the review of lead conservator Guillemette Caupin, in addition to AIC Professional Associates Kelly Caldwell, Katey Corda, Mary Slater, and Brooke Russell, and Director of Project Management Sarah Kloze.



Figure 1. September 2018 view of the Brennan Courthouse. (Image by Jim Henderson, Own work, CC BY-SA 4.0)

¹ Guillemette Caupin is currently a PhD candidate for Conservation from Paris 1 La Sorbonne.

PROJECT BACKGROUND

Historical Overview

Following is an abbreviated timeline summarizing significant dates in the history of the William J. Brennan Courthouse, formerly known as the Hudson County Courthouse:

- 1910 Construction is completed on the Hudson County Courthouse, designed in the Beaux Arts style by architect Hugh Roberts. Interior painted decoration included the creation of murals under the direction of muralist Francis David Millet, who engaged fellow prominent muralists Kenyon Cox, Edwin Blashfield, Charles Yardley Turner, and Howard Pyle to create artworks in corridors, public spaces, and courtrooms.
- 1959 Proposals and drawings are developed for restoration of the courthouse, although the work was never carried out. Building deterioration in the rotunda includes water damage and the loss of stained glass panels in the 1960s.
- 1966 County judicial functions and offices are moved to the newly-completed Hudson County Administration Building. The old courthouse stood vacant, and was eventually scheduled for demolition.



Figure 2. March 1979 view of the rotunda and fourth floor pendentives and lunette, before restoration. (Photo by Jack Boucher, Historic American Buildings Survey)



Figure 3. March 1979 view of the Pyle murals in the Freeholder's Room, before restoration. (Photo by Jack Boucher, Historic American Buildings Survey)

- 1970 A citizens group successfully lobbied for the preservation of the courthouse, and it was added to the National Register of Historic Places on August 25, 1970.
- 1975-85 A comprehensive restoration effort was carried out, including restoration of mural paintings, and the building re-opened in 1985. In 1984, it was renamed in honor of Associate Supreme Court Justice William J. Brennan.
- 2009 Exterior restorations were carried out at the roof and building envelope.

Currently, the building houses a number of courtrooms and county offices, and serves as a filming location.

Previous Work by EverGreene

Mural restoration work over the past decade has been overseen by the Office of the County Engineer, with oversight provided by Consulting Architect Helena Ruman Architects. Archival information on the history of construction and artworks was supplied by the client team. Between 2012 and 2016, EverGreene performed Phase I mural assessment and restoration, briefly summarized below.

2012 Phase I Investigation

A historic paint investigation was carried out for painted plaster substrates on the second, third, and fourth floors, including corridor and stairwell walls, ceilings, groin vaults and vault borders. Microscopic paint analysis concluded that the presenting paint scheme, dating from the 1975-85 restoration, was largely faithful to the original decorative paint scheme, which was intact to varying degrees beneath a skim coat of plaster.

Mural investigations were conducted for the four Pyle murals in the second floor Freeholder's Room, the surviving eight Millet second floor corridor frieze murals, the four surviving Millet third floor corridor medallions, the four surviving Cox fourth floor small lunette murals, and the four Turner and Millet fourth floor large lunette murals. Remote visual assessment was performed for the four Blashfield fourth floor pendentives and twelve dome ceiling panels, which were not able to be accessed at close range. Deterioration conditions were recorded, limited cleaning tests were carried out, and recommendations were provided for conservation treatment.

Findings of the investigations, performed in March and April of 2012, are summarized in EverGreene's report to the Office of the County Engineer, titled "Hudson County Courthouse Murals and Historic Finishes Investigation, Jersey City, New Jersey, May 25, 2012."

2016 Phase I Treatment

Conservation treatments were carried out on murals in the corridors of the second, third and fourth floors, and in the second floor Freeholder's Room. Treatments were primarily informed by the 2012 mural investigation, but additional techniques were developed in response to increased access and new conditions encountered during the course of the project. EverGreene's work, documented in an Interim Report dated September 30, 2016, is briefly summarized below.

Second Floor Corridor Murals

- All paintings were surface cleaned with non-woven, disposable cotton cloths (**Webril** wipes) dampened with **distilled water**.
- Areas of detached canvas were re-attached with **Roman Pro 732** clay-based adhesive.
- Minimal paint deformation, also known as tenting, was corrected by injecting **Plextol B500** acrylic resin adhesive behind the paint layers and gently pressing them back into plane using a tacking iron, with a Mylar sheet barrier placed between the iron and the paint.

- Minimal inpainting was carried out using **Gamblin Conservation Paint** coated with **Gamblin Conservation Resin** to modify the surface sheen.

Second Floor Freeholder's Room Murals

- Surfaces were cleaned with **Webril** wipes dampened with **distilled water**.
- Post-historic overpaint and discolored clear coatings were removed with **acetone gel**.
- Detached edges of canvas were re-attached with **Roman Pro 732** clay-based adhesive.
- Areas of blind canvas detachment were re-adhered by injecting **Lascaux HV 498** acrylic adhesive behind the canvas.
- A protective, isolating clear coating of **BEVA UVS** varnish (mixed at a ratio of 4:1 matte:finishing) was applied to mural surfaces.
- Areas of pinpoint loss, water damage and *pentimenti* were inpainted with **Gamblin Conservation Paint** and **Gamblin Resin**.
- A final spray application of **BEVA UVS** varnish was applied to integrate the inpainting.

Third Floor Medallion Murals

- All four medallions were cleaned with cotton swabs using **ammonium citrate** (2% solution in water, pH 5.5), and then cleared with distilled water.

Fourth Floor Small Lunette Murals

- Surfaces were cleaned with **Webril** wipes dampened with **distilled water** to remove general soiling and mold.
- Selected canvases were surface cleaned with cotton swabs using **ammonium citrate** (2% solution in water, pH 5.5), and then cleared with distilled water.
- Damaged varnish was removed with **acetone**.
- Detached edges of canvas were re-attached with **Roman Pro 732** clay-based adhesive.
- Areas of blind canvas detachment were re-adhered by injecting **Lascaux HV 498** acrylic adhesive behind the canvas.
- Lifting paint was consolidated with **Plextol B500**.
- A protective, isolating clear coating of **BEVA UVS** varnish (mixed at a ratio of 4:1 matte:finishing) was applied to mural surfaces.
- Areas of pinpoint loss, damage and *pentimenti* were inpainted with **Gamblin Conservation Paint** and **Gamblin Resin**.
- A final spray application of **BEVA UVS** varnish was applied to integrate the inpainting.

Fourth Floor Large Lunettes

- Surfaces were cleaned with **Webril** wipes dampened with **distilled water**.
- Limited flaking and tenting paint was consolidated with **Plectol B500**.
- Detached edges of canvas were re-attached with **Roman Pro 732** clay-based adhesive.
- Areas of blind canvas detachment were re-adhered by injecting **Lascaux HV 498** acrylic adhesive behind the canvas.
- Limited plaster consolidations was carried out using a pre-wet solution of acrylic resins, followed by a resin solution of **Rhoplex 1950** and **Rhoplex MC-76**.
- Limited inpainting was performed using with **Gamblin Conservation Paint** and **Gamblin Resin**.

Second Floor Decoratively Painted Frieze

- Surfaces were cleaned with **Webril** wipes dampened with **distilled water**.
- Small losses were filled with **Flügger** acrylic filler and inpainted with **Goldens Acrylic Paint**.
- The damaged clear coating at a section of original 1910 decoration was removed with a **hydrocarbon solvent, acetone gel**, rinsed with **liquid solvent**. The paint layer was surface cleaned with water, infilled with **Flügger**, and inpainted with **Gamblin Conservation Paint**. A brush application of **BEVA UVS** varnish (matte) was applied to the inpainted surface to integrate the loss compensation, protect the original paint, and evenly saturate the sheen.

Third Floor Decoratively Painted Wall Panels

- All four medallions were surface cleaned with cotton swabs using **ammonium citrate** (2% solution in water, pH 5.5), and then cleared with distilled water.
- Plain wall panels were cleaned with **Webril** wipes dampened with **distilled water**. Small pinpoint losses were filled with **Flügger** acrylic filler and inpainted with **Goldens Acrylic Paint**.

Fourth Floor Decorative Painting

- All of the groin vault ceilings were cleaned with **Webril** wipes dampened with **distilled water**.
- Hairline fissures and delaminating plaster were consolidated using a pre-wet solution of acrylic resins, followed by a resin solution of **Rhoplex 1950** and **Rhoplex MC-76**.
- Areas of loss were filled with **Flügger** acrylic filler and inpainted with acrylic paint.
- Loss of metallic field paint was replicated with **Modern Master Acrylic Paint** adjusted with **mica powders**. Adjacent borders and stencils were inpainted with **Goldens Acrylic Paint**.

TREATMENT APPROACH

Treatments for Phase II mural restoration at the dome ceiling and pendentives followed the precedent set by the Phase I treatments. All work was performed in accordance with the *Code of Ethics and Guidelines for Practice* of the American Institute for Conservation (AIC). Following is a list of materials tested and used for each type of treatment In Phase II:

Cleaning

- **Webril** wipes dampened with **distilled water**
- **Ammonium citrate** (1-2% solution in distilled water, pH 5.5), cleared with distilled water

Canvas Reattachment

- **Roman Pro 732** clay-based adhesive (preferred treatment for large detachment areas)
- **BEVA Gel** conservation-grade water-based thermoplastic adhesive dispersion (tested)
- **Plextol B500** acrylic resin adhesive (preferred treatment for injection on slightly detached areas)

Consolidation

- **Plextol B500** acrylic resin adhesive (preferred treatment)
- **Lascaux HV 498** acrylic adhesive (tested)
- **Lascaux Medium for Consolidation** (tested)

Filling

- **Flügger** acrylic filler

Isolating Varnish

- **BEVA UVS** varnish (formulated with **Regalrez 1095**)

Inpainting

- **Gamblin Conservation Colors**
- **Golden Acrylic Paints**

Unifying Varnish

- **BEVA UVS Matte Finishing Varnish** (formulated with **Regalrez 1095**)
- **BEVA UVS Gloss Finishing Varnish**
- **Golden Archival Aerosol Matte Varnish with UV Light Stabilization**

ONSITE TREATMENT

EverGreene was on site between June and September 2020, during which time condition assessment, treatment testing, and conservation treatments were carried out. Access to the project area was provided by the general contractor, SMBA Construction, LLC. Initially, access consisted of a mobile scaffold tower (approximately 45 feet high) that allowed access to three ceiling panels at a time (Figure 4). By August, this scaffold configuration was disassembled and replaced with a fixed, multi-tiered pipe frame scaffold that allowed access to both the ceiling panels and the pendentives (Figure 5).



Figure 4. Initially, ceiling panels were accessed with a mobile scaffold tower. (Photo by EverGreene, June 2020)

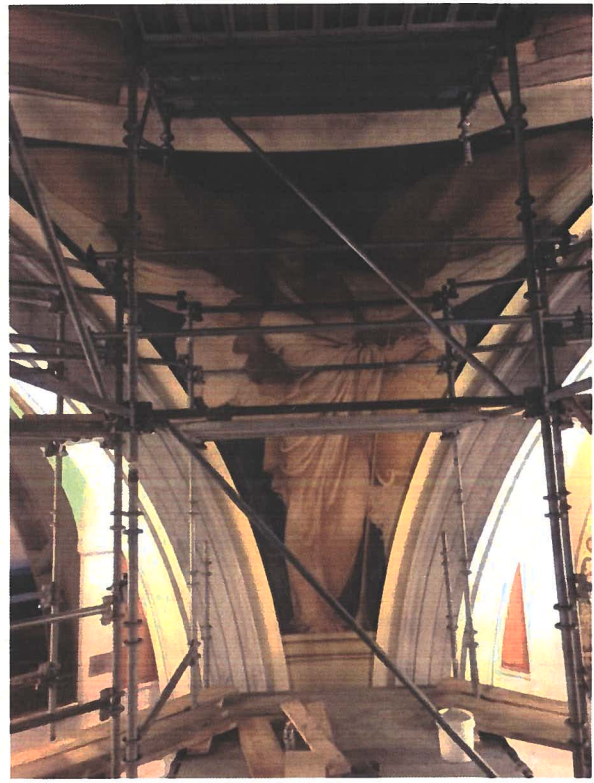


Figure 5. In August, a fixed, multi-tiered scaffold was in place to access both the ceiling panels and the pendentives. (Photo by EverGreene, August 2020)

ROTUNDA DOME MURAL CONSERVATION

CONDITION ASSESSMENT

Ceiling Panels

The rotunda dome ceiling contains twelve wedge-shaped plaster panels, each of which is filled with decoration painted directly on plaster featuring a sign of the Zodiac (Figure 6). According to archival materials reviewed during the 2012 mural investigation, the panels were designed by Edwin Blashfield and executed by his assistants. In addition, archival information suggested that these murals are only remnants of the originals, extensively infilled and retouched during the 1975-85 restoration campaign. Close-range access to the ceiling panels was not provided in 2012.

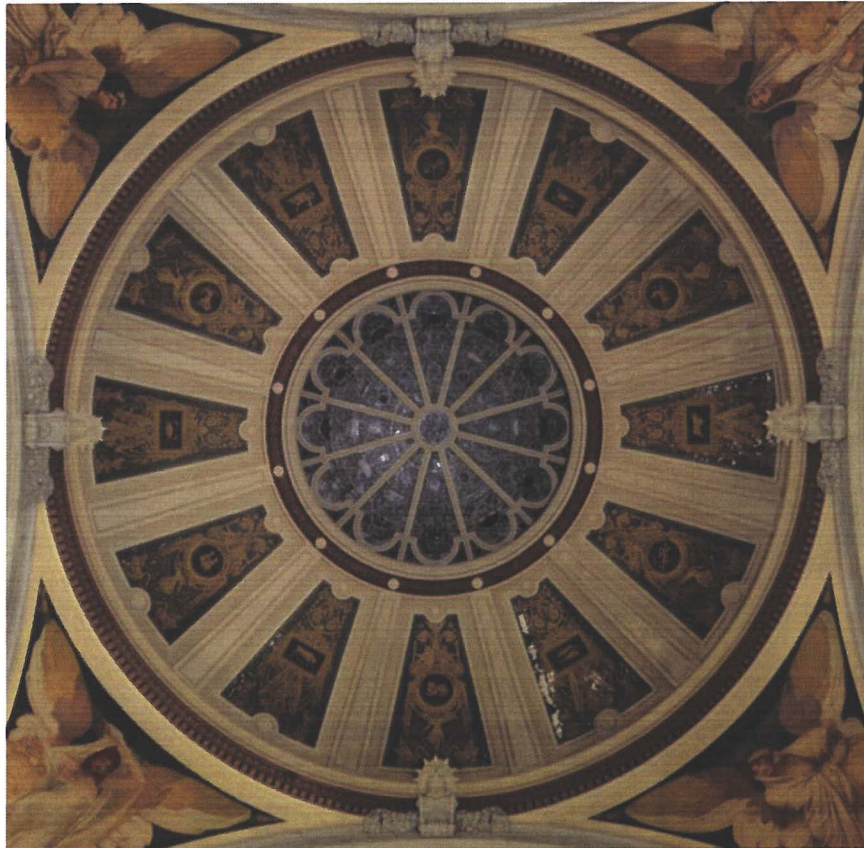


Figure 6. 2016 view of the rotunda ceiling and Zodiac panels, before treatment. (Photo by Whitney Cox, September 2016)

Close-range assessment of the ceiling panels was carried out in June 2020. Initial evaluation was limited due to the scaffold configuration, which only allowed access to three panels. Visual and tactile assessment and condition mapping was updated as access was provided to all twelve panels. Detailed examination indicated that no original paint from the 1910 decoration remains, and the panels are total reproductions from the 1975-85 restoration. Names were found in the "Cancer" panel, which likely represent the artists responsible for the reproduction.

Paint Layer

The structure of the current murals consists of an oleaginous paint medium applied thinly over a white ground paint on a plaster substrate. Adhesion of the paint layer to the substrate is poor and many sections have been found to be unstable on close examination. The paint layer displays evidence of soiling, staining, water damage, salt migration in the form of drips, and abrasions. The paint layer is delaminating from the substrate, with tenting, cupping, network cracking, and lifting of the paint layer. The southwest quadrant is especially compromised, where large sections of paint film have detached from the surface resulting in complete losses. The paint layer has become acidic and embrittled over time, resulting in a delicate and easily disrupted surface. In some sections where the paint layer has embrittled and detached from the surface it has warped into a curled position away from the substrate (Figure 7).



Figure 7. Detail of severe paint detachment and curling at "Capricorn" panel.
(Photo by EverGreene, July 2020)

Primary Support

The murals are painted on a plaster substrate over a thin white ground layer. Both the plaster substrate and ground have suffered varying degrees of water infiltration and damage, resulting in staining and the movement of soluble salts from the plaster substrate to the painted layer (Figure 8). Salts traveling from the plaster substrate through the painted layer have resulted in ruptures and detachment of the painted layer as well as insoluble salt effloresces in the form of drips. Due to this damage from water infiltration, coupled with continual fluctuations in relative humidity in this section of the building, these layers of plaster substrate and ground layer have disaggregated, as evidenced by a pitted and friable surface, particularly in sections where it is thought that past water damage has occurred and paint is actively detaching. It should also be noted that the deterioration of the plaster, which in turn is contributing to the deterioration of the paint surface, is likely to continue unless measures are taken to stabilize the environment of the dome ceiling and correct the origins of water infiltration in this section of the building.



Figure 8. Detail of plaster deterioration (efflorescence and chalking) at "Capricorn" panel. (Photo by EverGreene, July 2020)

Pendentives

There are four pendentives at the base of the rotunda dome that contain paintings on canvas by Edwin Blashfield (Figure 9). The classically rendered winged figures representing Fame hold cartouches bearing portraits of prominent New Jersey men John Stevens, Abraham Zabriskic, Alexander Hamilton, and Richard Vanck. The paint medium appears to be an oleaginous medium, and was applied thinly with a brush. The background brushwork mimics mosaic tesserae with localized *impasto*. The primary support is tabby weave linen canvas, attached to the substrate with lead-based adhesive. The composition of each mural is executed on several pieces of canvas, which were in turn slit, seemingly to accommodate the curvature of the substrate. Close-range access to the ceiling panels was not provided in 2012. Close-range assessment of the pendentive murals was carried out in August 2020.

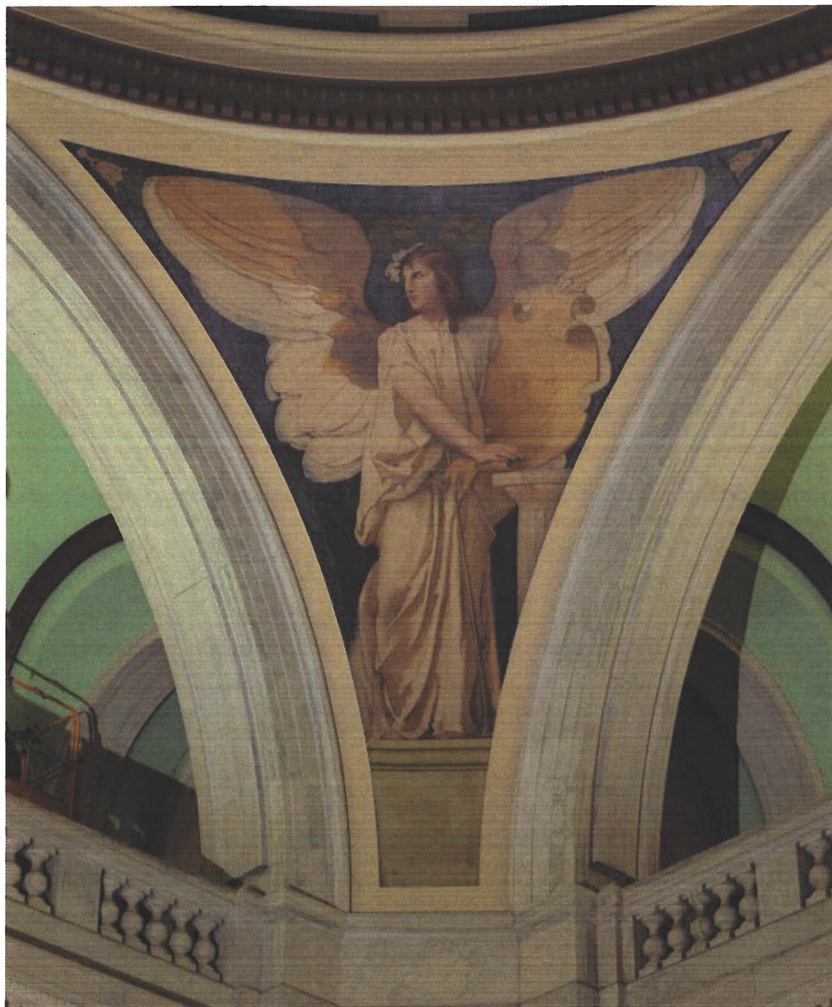


Figure 9. 2016 view of a rotunda pendentive with the mural depicting Fame with a portrait of Alexander Hamilton, before treatment. (Photo by Whitney Cox, September 2016)

Paint Layer

The structure of the Blasfield pendentives consists of an oleaginous paint medium thinly brushed onto a tabby weave linen canvas. Localized *impasto* blend with the slightly brushed technique of the artist, exposing the ground layer in isolated areas. On close examination, the overall condition of the pendentives is good except for localized areas of canvas detachment, paint losses, and abrasions which are not compromising to the integrity and the future stability of the murals (Figure 10). The paint layer displays evidence of slight dusting, post-historic overpaint and paint abrasions. The paint layer is slightly delaminating from the substrate in localized areas where water leaks compromised the paint layer adhesion and led to irreversible paint losses. The entire surface is covered by a thin, superficial layer of soiling and dust which does not alter the visibility of the composition. Post-historic overpaint has been applied onto the original paint surface with oil-based materials, which no longer match the original color palette in some areas (Figure 11). Overpainting is mostly localized along the edges of the murals and along the internal junctions of the canvas pieces.

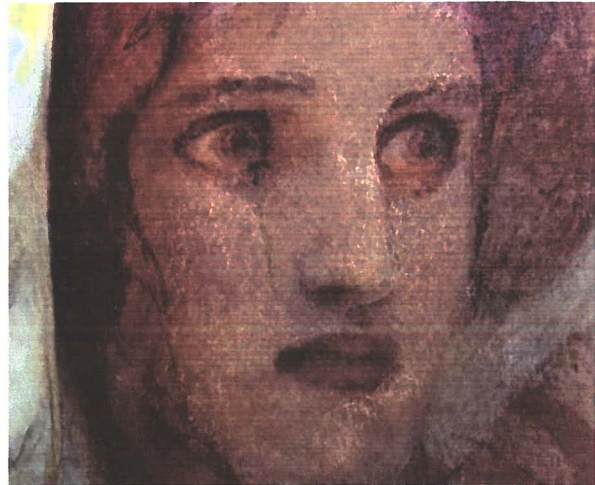


Figure 10. Detail of thin paint layer and exposed ground layer. (Photo by EverGreene, August 2020)

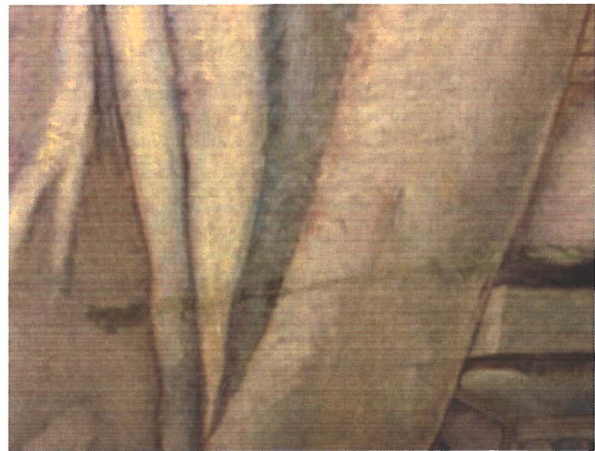


Figure 11. Detail of post-historic overpaint which no longer matches the surrounding original paint layer. (Photo by EverGreene, August 2020)

Primary Support

The paint layer is applied on an industrial tabby opened-weave, thick linen canvas. The linen canvas is thicker than the paint layer, which can lead to some paint delamination in the presence of environmental fluctuations. The entire mural had been mounted onto the wall with a lead-based adhesive which is no longer adhering to the plaster substrate in some areas. Canvas detachment is clearly visible along the edges of the murals and along the abutment and overlap of canvas segments (Figure 12). Synthetic adhesive residues – probably PVA based – from a previous restoration campaign were found underneath detached canvas areas (Figure 13). The synthetic consolidant is no longer adhered to the plaster substrate. The plaster exhibits localized disaggregation and efflorescence from water damage (Figure 14). We also observed a good amount of mold growth on the smaller lunettes above the doorways, than previously seen in the 2012 and 2016 treatment programs. This also identifies the presence of environmental fluctuations.



Figure 12. Detail of canvas detachment and lifting. (Photo by EverGreene, August 2020)



Figure 13. Detail of PVA based adhesive from previous restoration campaign. (Photo by EverGreene, August 2020)

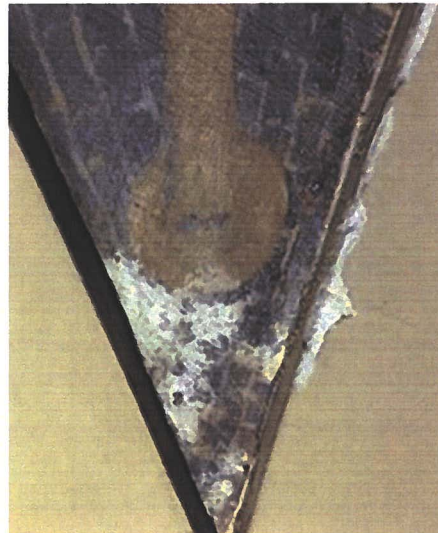


Figure 14. Detail of water damage and efflorescence at mural and adjacent plaster molding. (Photo by EverGreene, August 2020)

TREATMENT TESTING

Cleaning

Cleaning tests were performed on ceiling panels on June 8th, 2020 to determine the best methods for the removal of surface soiling present on the panels. Distilled water and solutions of ammonium citrate in distilled water were tested on the surface, applied with cotton swabs in small sections and the results compared. At the ceiling panels, distilled water was found to be the most efficient at removing surface soiling (Figure 15). At the pendentives, 2% ammonium citrate was the most effective at removing a light superficial grime film, possibly nicotine accretion (Figure 16). The greasy dirt coating was barely visible to the naked eye because of the palette shades but clearly perceptible on cotton swabs. The lowest levels of the pendentives were not varnished, and the original paint was sensitive to water; accordingly, dry cleaning was carried out with a cotton cloth. This cleaning also removed surface mold spores.

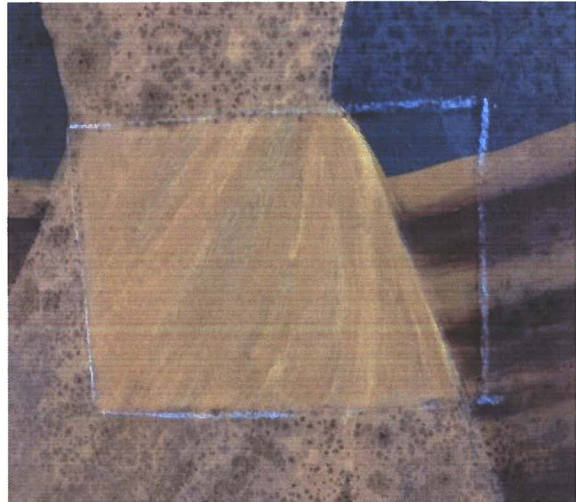


Figure 15. Detail of surface cleaning testing on "Leo" zodiac panel. (Photo by EverGreene, June 2020)



Figure 16. Detail of surface cleaning testing on Blasfield pendentives. (Photo by EverGreene, August 2020)

Canvas Reattachment of Blashfield Pendentives

Canvas reattachment was carried out with three different adhesives of different properties (viscosity, drying and evaporation speed, etc.). Each were selected according to their efficacy in consolidating one of the three failing interfaces: canvas/plaster interface, canvas/previous synthetic residue interface, and canvas/lead-based adhesive interface. Canvas reattachment materials Roman Pro 732 clay adhesive, Plextol B500, and BEVA Gel were tested. Roman 732 was effective in reattaching open edges and seams, and BEVA Gel was effective in re-adhering edges and seams that contained residues of previous consolidation. Plextol B500 was effective as an injected adhesive for remediation of bubbled canvas. All adhesives were activated by heating with a tacking iron at low temperature (80 degrees C), using silicone release paper as a protective layer between the iron and the paint layer.

Paint Consolidation

Three consolidants commonly used in mural painting conservation, Lascaux 498, Lascaux Medium for Consolidation, and Plextol B500, were tested in selected areas of the "Leo" panel (Figure 17). Test areas were faced with an unbuffered Lens-tissue with neutral pH . The consolidation mediums were applied through the paper and allowed to cure for 24 hours. After 24 hours the consolidant was activated in each section using a heated tacking iron, over an intervening layer of silicone release paper, to re-adhere the flakes to the support (Figure 18). This procedure successfully worked on extensive areas of tenting paint. In areas of paint loss, direct application (brushing and spraying) of the consolidant onto the plaster substrate was effective without the use of a tissue layer. Plextol B500 yielded the best results of the consolidants tested, creating a strong bond between the paint layer and the plaster substrate. Testing established the preferred method where consolidant is applied through the Lens-tissue or directly onto the plaster substrate (depending on the paint layer condition), followed by use of a heated tacking iron to activate the consolidant and adhere flaking paint back on to the substrate. Excess Plextol B500 residue on the paint surface after consolidation is removed with acetone.

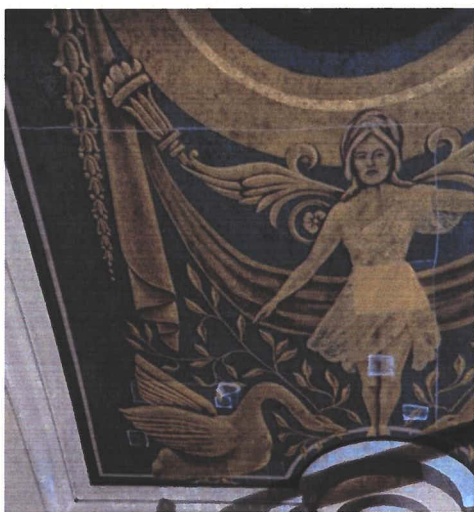


Figure 17. Paint consolidation testing on lower left corner of "Leo" panel: pressure application after ironing. (Photo by EverGreene, June 2020)



Figure 18. Detail of paint consolidation testing on "Leo" panel: pressure application after ironing. (Photo by EverGreene, June 2020)

Isolating Protective Varnish

It was determined that after cleaning and consolidation of the paint layer, Beva UVS varnishes would be applied across the entire paint surface of the murals to strengthen and protect the paint layers, as well as to create an isolating layer between the original paint surface and inpainting materials to be used in loss compensation. Beva UVS Matte Finishing Varnish and Beva UVS Gloss Finishing Varnish is mixed at a ratio of 4:1 in order to saturate the original colors for inpainting and also to respect the original matte appearance of the zodiac panels and the pendentives. The isolating protective coating was applied with large flat brushes, for the best application of the material to prevent brush strokes.

Filling and Inpainting

Filling of large sections of paint loss are first filled with Flügger, a commercial conservation grade acrylic filler, to level the areas of loss with the surrounding paint layer and create a smooth surface on which to inpaint (Figure 19). Inpainting of losses was completed to visually reintegrate paint losses into the decorative motif and recreate the continuity of the composition. It was determined that Golden Acrylic paints be used for inpainting, offering both ease of reversibility and a good aesthetic match to the original paint layer. Golden Acrylic paints provide more opacity and have good covering characteristics that match the visual appearance of the original paints used on both the pendentives and the zodiac panels. In contrast, Gamblin Conservation Colors commonly used in mural conservation have translucent properties that mimic the appearance of glaze finishes on historic oil paintings. It is also determined that large sections of paint loss be first filled before inpainting, to provide a more seamless transition between the original surfaces and the inpainted areas.



Figure 19. Detail of paint losses filled with Flügger on "Leo" panel before removing the excess of filler. (Photo by EverGreene, July 2020)

Unifying Varnish

It was determined that after loss compensation a final protective coating of varnish would be applied in order to visually integrate and unify inpainting areas with original materials. The final varnish layer also has an aesthetic role providing the adequate sheen and finish to a painting.

Two different varnishes were selected for the dome panels and the pendentive murals. On the dome panels Golden Archival Matte varnish was selected in order to integrate the opacity of the Golden Acrylic inpainting with the surrounding opacity of the existing paint layer. Due to the location of dome panels and their lighting, a satin or semi glossy resin varnish would have affected the aesthetic integrity of the panel by creating a reflective surface. Golden Archival Matte varnish is a solvent-based, reversible acrylic co-polymer resin designed to produce a flexible protective film protecting paint layers against environmental concerns such as ultraviolet light, dirt and moisture. For the pendentives, a final Beva UVS varnish was selected (mixed at a ratio of 4:1, matte:gloss) that has the same surface finish as the original oil paints used by Edwin Blashfield.

TREATMENT: DOME CEILING PANELS

Following is a summary of conservation treatment procedures conducted on the painted ceiling panels at the rotunda dome.

Cleaning

General surface cleaning was carried out using Webril wipes and cotton swabs dampened with distilled water (Figure 20). Wipes were passed carefully over the surface avoiding areas of unstable and flaking paint which were consolidated prior to surface cleaning. Webrils and cotton swabs were frequently turned and changed out to present a consistently clean surface to soiled areas. Four passes were usually necessary to remove all dust and soil particles from the paint surface (Figure 21).



Figure 20. Detail of "Leo" panel, during surface cleaning (Photo by EverGreene, June 2020)

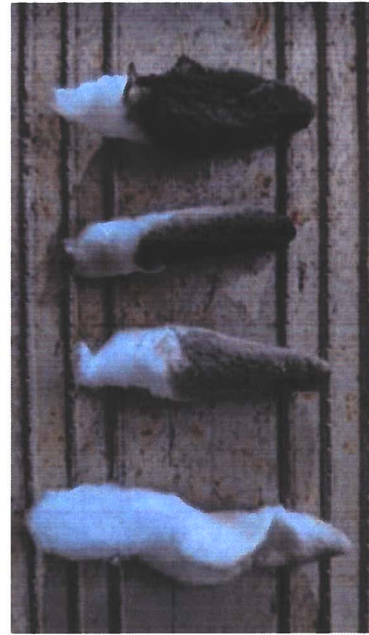


Figure 21. Cotton swabs after surface cleaning on zodiac panels (Photo by EverGreene, June 2020)

Paint consolidation

It should be noted that in the intervening time between the initial 2012 assessment and the 2020 treatments, the overall extent of flaking and peeling paint increased across the dome panels. However, the underlying plaster substrate did not appear to be unstable or significantly damaged.

Lifting and flaking paint was reattached to the substrate using Plectol B500 applied using varying methods corresponding to different conditions encountered across paint surfaces: by injection with syringes, by spraying or direct application, or with flat glue brushes onto the plaster or through Lens-tissue (Figure 22). After the application of adhesive to lifting paint, sections were heated with a tacking iron and an intervening layer of silicone release paper to activate the adhesive and create the bond at the paint layer and substrate interface. Heating temperature was always maintained between 30°C (the softening temperature of Plectol B500) and 80°C (the softening temperature of oil paint). After efficient consolidation, excess adhesive was removed from the paint surface with acetone (Figure 23) and Lens-tissue was gently removed from the surface by wetting the paper. Through this method, a strong bond was created between the paint layer and substrate.

Due to extreme temperature and humidity fluctuations within microenvironments that are often present in the top of large, lighted, highly lofted spaces (such as a dome), added to the infiltration of water and moisture over time, paint layers can become permanently deformed. This is evidenced by a tenting matrix across the paint surface. Typically, during consolidation, deformed, tenting paint flakes are massaged back into plane by the interaction of the consolidant and heat. However, after extended periods of time, the paint layers become increasingly deformed and the feasibility of massaging them back into plane decreases. This deformation, which is more visible in raking light, does not indicate continued paint failure following treatment. The treated paint is adhered to the surface. The alligator type appearance of the paint layer is simply due to this irreversible and permanent deformation (Figure 25). Attempts to force these paint layers back into perfect plane would have resulted in further paint loss and cracks networks.



Figure 22. Ongoing paint consolidation on "Libra" panel. (Photo by EverGreene, July 2020)



Figure 23. Detail of paint consolidation before removing remaining adhesive excess from the paint surface. (Photo by EverGreene, July 2020)

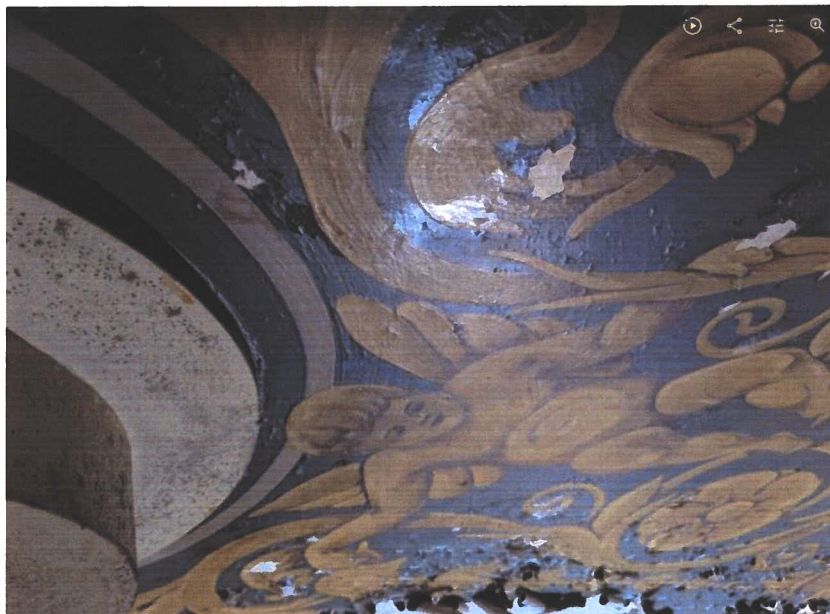


Figure 24. Detail of paint consolidation area (top) next to a non-consolidated area (bottom) (Photo by EverGreene, July 2020)



Figure 25. Upper left corner of "Leo" panel , after paint consolidation. Paint distortions remain visible under certain light angles, although the paint layer is strongly bond to the plaster substrate (Photo by EverGreene, July 2020)

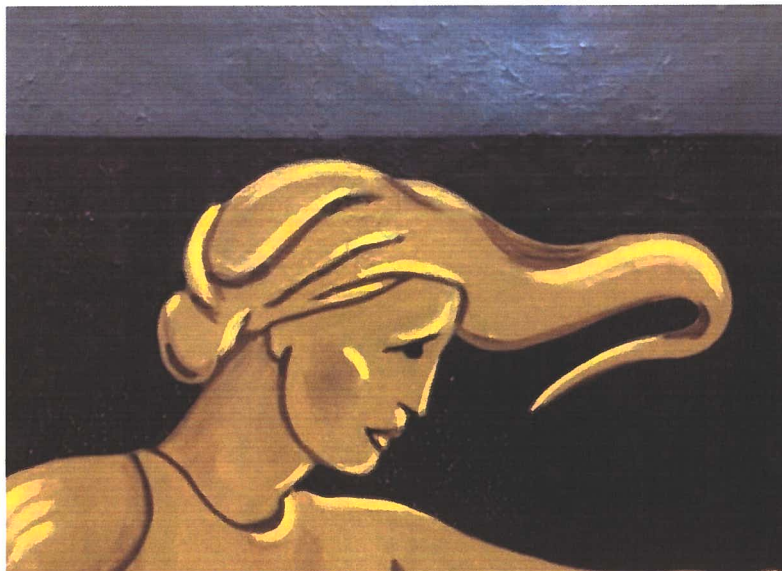
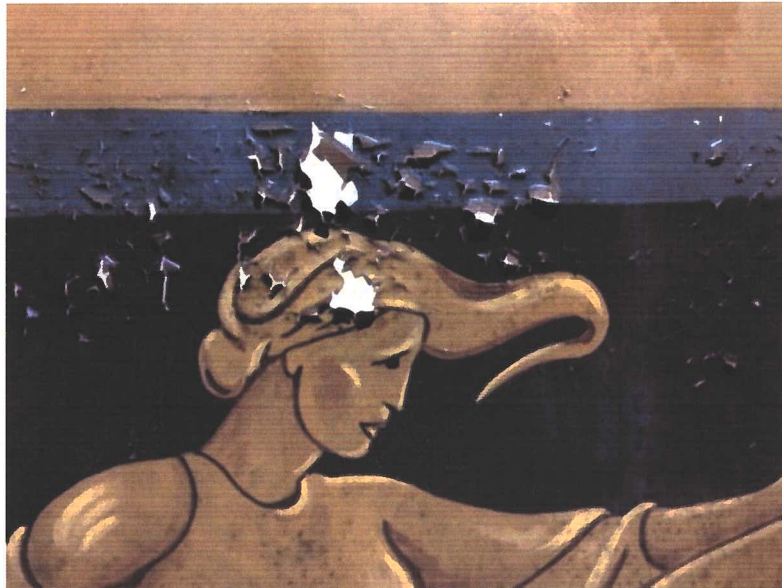


Figure 26. "Virgo" panel , before (top) and after (bottom) paint consolidation.
(Photo by EverGreene, July 2020)

Filling

Areas of paint loss with visible differentials in depth were filled with Flügger acrylic filler to create a level surface for inpainting. Filler was applied with palette knives and spatulas and then leveled with sand paper. Excess filler on the paint surface was removed using wet rags. Fills were finished even with adjacent paint surfaces prior to inpainting.

Isolating Varnish

After surface cleaning and paint consolidation was completed, a layer of reversible Regalrez 1095 based Beva UVS Matte and Gloss Finishing Varnish (mixed at a ratio of 4:1) was applied across the entire surface of the murals to strengthen and protect the existing paint layer, as well as to create an isolating layer between the original paint surface and the areas where inpainting was required. The mixed resin varnish was applied with large flat brushes to obtain a homogeneous coating.

Inpainting

Golden Acrylic Paint was used to visually integrate areas of paint losses, according to which material best matched the existing paint color and sheen (Figure 27). Acrylic paint was selected among conservation grade inpainting colors for its opacity and matte finish which matches the original paint layer. Golden Acrylic paints also provide a durable and flexible paint film, with excellent chemical resistance to light and water resistance.

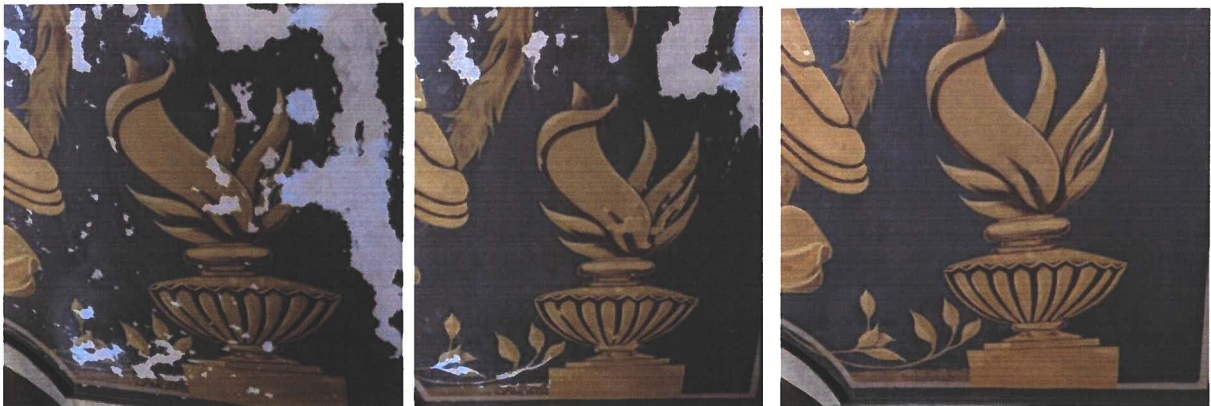


Figure 27. Detail of paint compensation progression on "Leo" panel (Photo by EverGreene, July 2020)

Unifying Varnish

After loss compensation and inpainting was completed, a final coat of Golden Archival Matte Varnish was applied to visually integrate conservation treatments with original materials, and to strengthen and protect the paint layer. Using this resin varnish on top of the Beva UVS coating achieves a unified and consistent finish across each panel, preserving the aesthetic integrity of each image. Golden Archival Matte Varnish, is a stable and yellowing-resistant resin varnish. It has a more matte finish than the Beva UVS resin, which prevents light reflection and interference along the curved surface of the panels.



Figure 28. "Pisces" panel, before (left) and after (right) conservation treatment and unifying varnish application. (Photos by EverGreene, July 2020)

TREATMENT: DOME PENDENTIVES

Following is a summary of conservation treatment procedures conducted on the painted canvases at rotunda dome pendentives by Edwin Blashfield.

Cleaning

General surface cleaning was carried out using Webril wipes and cotton swabs dampened with a 2% solution of ammonium citrate in distilled water, and then cleared with distilled water. Wipes were passed carefully over the paint surface. Webrils or cotton swabs were frequently turned and changed out to present a consistently clean surface to grime areas.

Canvas Reattachment

Areas of detaching canvas were re-adhered using Roman Pro 732, a clay-based adhesive, BEVA Gel, a conservation-grade water-based thermoplastic adhesive dispersion; and Plextol B500, an aqueous dispersion. Each adhesive was selected to perform canvas reattachment on different interface types. Roman 732 was used to attach "dry" open edges and seams, while BEVA Gel was used to re-adhere edges and seams that contained residues of previous heat-activated adhesive. Plextol B500 was effective as an injected material on bubbling areas where the canvas was delaminating from the lead-based adhesive. All adhesives were reactivated by heating with a tacking iron at low temperature (80 degrees C), using silicone release paper as a protective layer between the iron and the paint layers.

Paint Consolidation

Lifting and flaking paint was reattached to the substrate using an acrylic aqueous dispersion, Plextol B500. After the application of adhesive to the flaking paint, the paint was laid back down in each section using a heated tacking iron, along with an intervening layer of silicone release paper in order to reactivate the consolidant and create a strong bond between the canvas and the paint layer.

Filling

Areas of paint loss and seams between pieces of canvas (Figure 29) with visible differentials in depth were filled with Flügger acrylic filler to create a level surface. Fills were finished level with adjacent paint surfaces prior to inpainting.



Figure 29. Filler was applied to gaps between pieces of canvas (Photo by EverGreene, September 2020)

Isolating Varnish

After cleaning and consolidation of the surface was completed, a layer of reversible Regalrez 1095 based Beva UVS Varnish (4 parts matte to 1 part gloss) was applied across the entire surface of the murals to strengthen and protect the existing paint layer, as well as to create an isolating layer between the original paint surface and the areas where inpainting was required.

Inpainting

Gamblin Conservation Colors were used to visually integrate areas of paint losses and paint abrasions, according to which material best matched the existing paint color and modern oil painting sheen (Figure 30). The translucent finish of Gamblin Conservation Colors perfectly matches the lightly brushed artist's technique, and helped to reintegrate areas of post-historic discolored and yellowed overpaint (Figures 31 and 32).

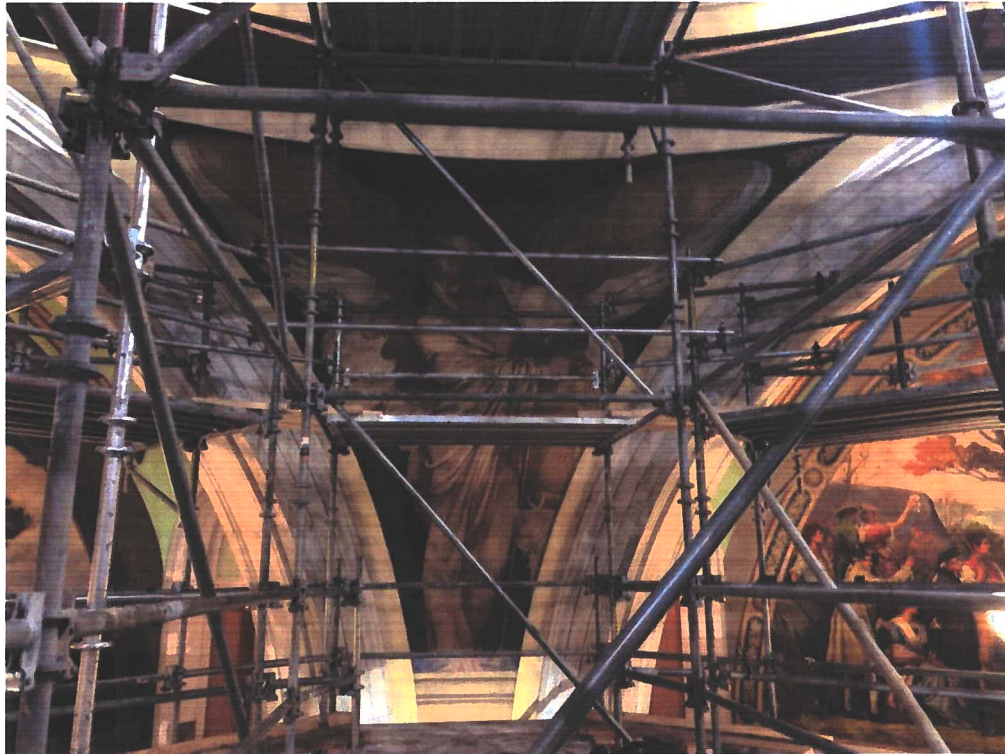


Figure 30. Overall view of a pendentive after inpainting (Photo by EverGreene, September 2020)

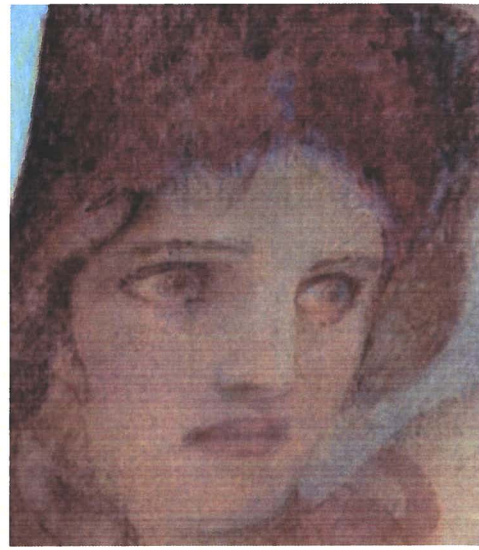
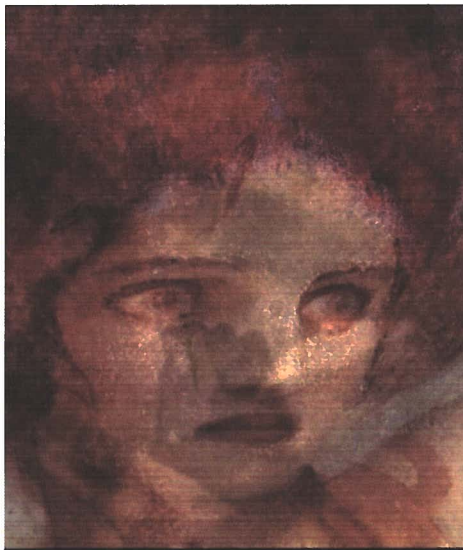


Figure 31. Detail before (left) and after (right) inpainting. (Photo by EverGreene, September 2020)

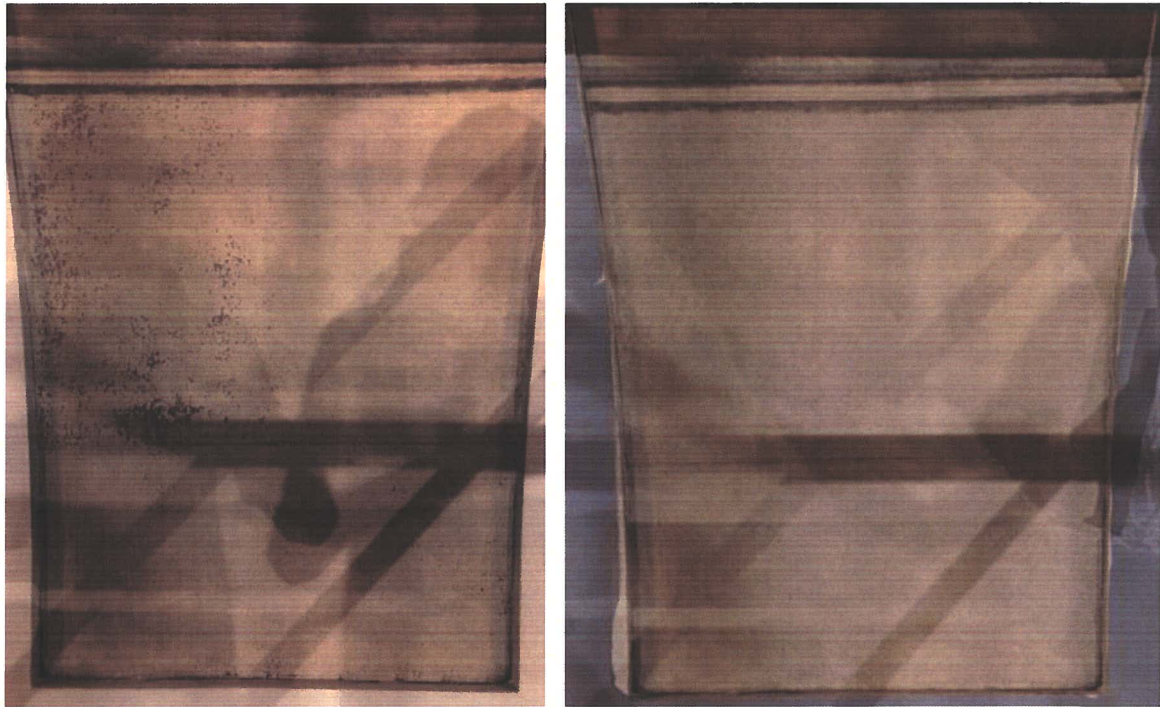


Figure 32. Detail of a pedestal, before (left) and after (right) inpainting. (Photo by EverGreene, September 2020)

Unifying Varnish

After loss compensation and inpainting was completed, a final protective coat of Beva UVS Matte varnish was applied with large flat brushes to visually integrate conservation treatments with original materials, and to strengthen and protect the paint layer. The final coating was successful in unifying the surface appearance and achieving a consistent finish across each painting. Additionally, it will provide future protection of the paint layers against ultraviolet light. (Figure 33).

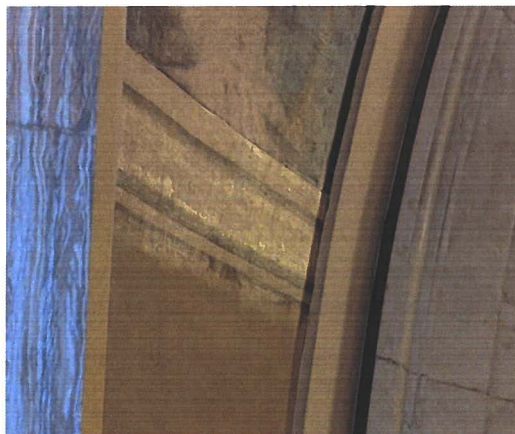


Figure 33. Detail of lower part of a pendentive pedestal, showing sheen differential before treatment. (Photo by EverGreene, September 2020)

CONCLUSION

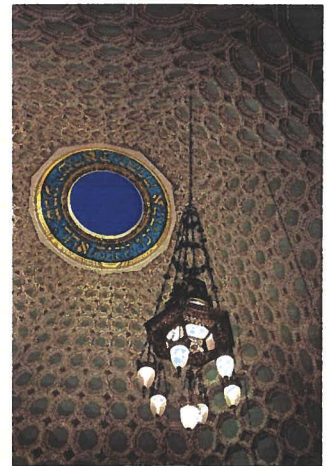
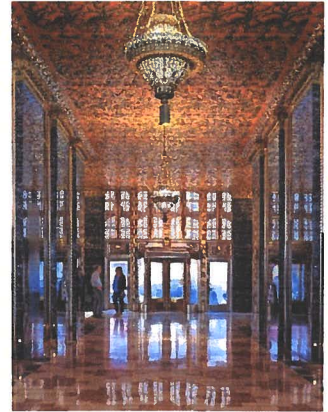
Treatments tested and implemented in this project phase were successful in addressing deterioration of the painted murals and canvas substrates. The treatments can be expected to be durable, as long as further water intrusion is prevented, and if ambient environmental conditions are controlled to minimize wide fluctuations in temperature or humidity.

EverGreene conducted all testing and treatments in keeping with the AIC *Code of Ethics and Guidelines for Practice* and as specifically detailed in our 2012 report, 2013 proposal, and 2016 interim report. These treatments were similar in methods and materials as those used during Phase I of the project, as noted in our September 30, 2016 Interim Report. No methods, treatments, or practices were used that do not conform to these guidelines, and all applied materials were conservation grade. Conservation materials used during the Phase II Rotunda Dome treatment follow the reversibility, compatibility and durability requirements for mural conservation treatment.

All interventions conducted on the paint layers, canvas and post-historic materials, on both the Edwin Blashfield pendentives and the zodiac dome panels, restore the original color palette and reestablish the continuity of the original compositions.



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