



# Paintings

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## 1.1

### Introduction

This set of recommendations for the cyclic maintenance of paintings and murals was prepared as part of the professional services contract for art conservation. Under this contract, a number of paintings and murals were conserved within GSA's Fine Arts Collection. The intention of these recommendations is to enable GSA personnel to participate in the monitoring and care of artworks in their buildings.

GSA's painting and mural collection encompasses artistic works through the early 21st century, including the historically significant WPA period of 1933–43. Works by important American artists were commissioned to be hung and, in some cases, incorporated into the fabric of the buildings. GSA's painting and mural collection comprises a significant and permanent part of our collective historic heritage.

Art conservation is the field of professionals who are trained to restore artwork and to understand art materials, causes of deterioration, and the environment required to preserve optimal artwork condition over time. It would be appropriate to consult with an art conservator through GSA's Fine Arts Program promptly if conditions within the GSA building setting appear to endanger the artwork by defacement, accident, water intrusion, excessive heat or light, and so on. Art conservators usually specialize in either paintings, paper artifacts, or objects.

## 1.2

### The structure of easel paintings

Easel paintings are typically smaller than murals, painted in a studio, and then hung in a frame on the wall in a building. It is helpful to understand what a painting is made of when assessing its condition.

- **Support.** The support is the substrate upon which the paint is applied. Typically, this may be canvas tensioned over a wood framework known as a stretcher. Paintings may also be done on solid panel supports such as wood, Masonite, or artist's board. Increasingly, artists are working over unconventional supports. The support has a large effect on what sorts of conditions may seriously harm the painting. A paper support is usually considered the most delicate, requiring the artifact to be framed properly with archival, non-acidic materials touching the paper support.
- **Ground layer or priming.** Most traditional paintings utilize a ground layer or priming as an isolating and sealing layer between the absorbent support and the paint layer. Some modern paintings do not utilize a ground layer allowing paint to stain into the support on purpose. Traditional grounds are either oil or water-based (glue and whiting). Contemporary works often use a more flexible acrylic ground or priming. Knowledge of the presence of a ground layer or priming will help one understand the appearance of the painting and possibly identify why a painting may be experiencing one sort of problem or another.
- **Paint medium.** The paint medium is the binder that holds the paint together. Watercolor is a

delicate, transparent paint medium utilizing a gum base on a paper support and is usually treated with separate framing and conservation considerations. Gouache, distemper, and tempera are all terms for more opaque, water-soluble, glue-based paints. The term “tempera” also may encompass true egg tempera in which the binder is egg yolk and the work is characterized by short, careful brushstrokes. Casein is a more durable water-based paint in which the traditional medium was milk. Most traditional water-based media are characterized by a matte finish.

Acrylic paints are water-based and utilize a polymer binder. They dry to an even satin sheen and are mildly water-resistant when dry. They came into wide usage in the 1960s. Oil paints utilize the most durable binder, which is a drying oil such as linseed. It can be very difficult to differentiate between the appearance of some acrylic and oil paints. Oils usually show a difference in gloss in some areas. Oils are sometimes applied over acrylics.

- **Varnish.** A varnish is a coating applied to saturate the different colors on a painting, unify gloss, and provide a measure of protection from atmospheric pollutants. Traditional oil paintings are usually varnished. Paintings done in water-based media are generally not varnished. Most varnishes yellow as they age and, if chosen properly, will remain soluble over time. Varnishes are meant to be removed and replaced every 50 to 100 years. The choice of a varnish and its application or removal are serious work requiring a professional conservator.

## 1.3

### The structure of murals

A mural is a large painting generally painted for a specific location in a building. A mural may have been painted *in situ* or executed in the artist’s studio and then installed at the site.

- **Support.** Some murals are simply very large easel paintings executed on canvas over a wooden stretcher. With their large size, one may encounter potential problems such as loose canvases that change in tension as humidity fluctuates and develop planar distortion. Most canvas murals are, however, painted and then intentionally attached to the wall. Many of the canvas murals through

*Literature, Poetry, Science and Art* attributed to Henry Meixner  
Old Erie Public Library, United States Courthouse, Erie, PA  
McKay Lodge Fine Arts Conservation Laboratory, Inc.

**Left:** During conservation

**Right:** During conservation, detail



the WPA era and up to the mid-1960's were marouflaged, i.e., attached directly to plaster walls with an adhesive composed of white lead in oil or oil/varnish. These adhesives are tenacious, insoluble, and hazardous if mishandled. Removal and remounting of a mural adhered with white lead in oil is a serious and expensive undertaking. Murals may also have been mounted with glue, paste, or commercial wallcovering adhesives.

Murals may also be painted directly upon a wall in either exterior or interior settings. Exterior supports include cement stucco, brick, block, and false wall systems. Interior supports include all of these as well as traditional lime plaster and drywall. Knowledge of the wall substrate is important in understanding condition and causes of deterioration.

- **Ground layer or priming.** As with easel paintings, a mural may or may not have a ground or priming. (See section 1.2, "Ground layer or priming.")
- **Paint medium.** Murals have been executed in all the media identified above for easel paintings. If painted directly on plaster, the wall may be smoothly burnished or coarse and textural. In the U.S., most murals executed directly on a wall are done over dry plaster, cement, or block, and this may be referred to as a *secco* fresco. The medium may be either oil or water based. These murals are sometimes prone to separation or flaking of the paint film from the substrate. Murals executed in the rarer, traditional Italian manner of true *buon* fresco imply that pigments were applied to a smooth, wet lime stucco support, area by area. Traditional *buon* fresco can be extremely lovely and durable and GSA is fortunate enough to have fine examples of this medium.

## 1.4 Environment

GSA painted artworks are primarily set in the interiors of their buildings. In such settings, the agency can influence the appreciation of the artwork and its longevity with choices that are made about the environment. Many factors make up the interior environment. It is appropriate for artwork caretakers to assess the existing environment of the installed artwork as well as to consider the setting into which they will install future artwork.

- **Temperature.** The normal office temperature range likely to be encountered in a federal building will probably be acceptable to the artwork. One exception would be the loss of heat in winter through equipment breakdown or construction/renovation. Paintings should not be allowed to experience freezing conditions as this promotes cracking.

Temperature is one of the two factors that determine relative humidity. Air with the same moisture content will have a higher relative humidity when it is chilled and a lower relative humidity when it is heated. Changing the thermostat setting changes the relative humidity unless water is removed or added to the system.

- **Relative humidity.** Relative humidity (RH) is a description of the moisture present in the air at a given temperature. It is expressed as a percentage of the total moisture the air can carry at that temperature. Relative humidity has a major effect on the materials used in paintings. Most materials in artwork absorb moisture and will seek an equilibrium moisture content with the air around them. This induces dimensional expansion and contraction of the various materials that make up the artwork. This movement occurs at different rates and magnitudes characteristic of the materials. This exercising of the materials leads to cracking, warping, flaking paint, and so on. Some paintings are more susceptible to serious problems than others, owing to their original materials and construction, **but excessive or unnecessary RH changes are deleterious to all paintings. In addition, mold growth is promoted by RH levels above approximately 70 percent.**

Relative humidity may be monitored in a space by several methods. Sling psychrometers are much more accurate than simple readout dials and should be used occasionally to check other RH instruments. There are many battery-powered, LED-readout instruments for RH and temperature that often have internal recording of highest RH and temperature even after they are reset. Museums in the past have used highly accurate recording hygrothermographs, which record data with a pen onto a chart on a rotating drum. They require a windup and paper change periodically but are highly accurate and provide a record over time. Data loggers are often used now to record conditions and require downloading onto a computer disc.

GSA should consider RH and temperature monitoring for questionable spaces that are being considered for artwork installation or spaces that in the past have proved problematic. **We suggest GSA aggressively monitor RH in any space where mold has been observed; the objective is to constantly stay below approximately 70 percent RH.** Monitoring RH and temperature can also determine whether heating or cooling systems are functioning well. **In the winter, we generally would like to see abnormally low RH readings (below 20 percent) avoided. At any time, but especially summer, we would like to see no more than 70 percent RH in an interior space with artwork.**

- **Lighting.** **Excessive levels of light and/or a high percentage of ultraviolet within the light will actively degrade the condition and appearance of the artwork.** Pigments, paint media, supports, and varnishes can all be compromised. Depending on the materials, fading, embrittlement, browning, and so on may occur. Paintings executed in watercolor and other media on paper are considered the most susceptible, generally requiring supplemental glazing protection in framing. (See section 1.5) In oil paintings and frescoes, the media and supports are more durable, but certain pigments remain subject to fading from light. As the light-fastness of any painting cannot be assumed, it is prudent to limit overall levels and UV content for all painted artwork.

**GSA should seek to position paintings that are moveable in places that do not receive direct sunlight or are illuminated by fluorescent lights that are very high in UV content.** If this is not

*Untitled* by Alex Katz  
Silvio V. Mollo Federal Building  
New York, NY  
Page Conservation, Inc.

**Left:** Before conservation: Note environmental damage caused by spray cleaning of display case and hair oil due to chairs in front of mural, as well as visual disruption.

**Right:** After conservation: Note removal of chairs and cases, and addition of protective railing and interpretive plaque at left.



possible, sunlight may be controlled conventionally with drapes or shades. Tinted glazing known as neutral density filtering can reduce UV levels. **UV filtration is clear and may be incorporated in window glazing.** Fluorescent fixtures may be controlled in several ways. **Bulbs with built-in UV filtration are available, as are clear UV-filtering sleeves to go over conventional bulbs.** Alternatively, it is sometimes **easier to fit UV-filtering Plexiglas over the lens of the fixture.**

As it is not possible to gauge the amount of UV in a light source without manufacturer's data or instrumentation, it may be appropriate to consult a museum lighting professional to determine overall levels and UV content and to advise as to lighting changes, if needed. Modern museum-standard lighting for artwork does not contain UV. Generally, lights attached to the tops of frames should be removed and discarded.

- **Traffic.** We have observed numerous paintings that are in danger in GSA buildings because of poor placement in the path of heavy foot traffic or cleaning and trash carts. Paintings and murals at lower heights are particularly vulnerable. Also, the changing of security requirements have required redesign of entry lobbies with potential impact on pre-existing artwork. If paintings and murals are showing scratches or scuff marks, it may be appropriate to consider either repositioning the artwork or adding some sort of barrier device. There are many sorts of barriers that have been utilized in federal buildings. Some of the more successful types have been steel railings mounted low on the wall to allow the floors to be cleaned. In one building, the marble shoe molding was extended outward to prevent mail carts from striking the murals. The best solution, however, is to place artwork where it may be observed without being crowded by people or service personnel.
- **Heating and cooling systems.** Often the environment in a federal building will be conducive to artwork longevity. The buildings are heated and cooled to comfortable levels and often have excellent thermal retention because of their mass. However, personnel must be aware of several situations to avoid with artwork. Each space with artwork needs to be examined as to where the

HVAC outlets are located. **Artwork should not be placed near incoming or return duct outlets.** The local environment can be rendered poor by an incoming blast of hot or cool air. Return ducts tend to constantly draw dust-laden air across a painting. **With murals mounted directly on walls, one must also ascertain that HVAC ductwork does not run behind or above the mural in the wall as the ducts can sweat and dampen the wall. Radiators can desiccate the artwork and provide a constant updraft of dust-laden air. They should not have artwork hung over them.**

A separate issue from duct and outlet placement is excessive cycling of heating and cooling systems in federal buildings. In an effort to save energy and reduce costs, heating and cooling systems are often cut back aggressively in the evenings and on weekends. This can cause excessive fluctuation in temperature and humidity levels. Changes in humidity induce differential movement in the materials that make up paintings and promote flaking paint. By inducing movement unnecessarily often, the cycling of heating and cooling systems hastens structural instability in paintings. We recommend moderating the range of the allowable daily temperature and humidity fluctuation in areas where artwork is placed. In cases where artwork has been noted as experiencing flaking problems, a constant environment should be maintained daily.

- **Water intrusion.** Ideally, one would like to position artwork to minimize the chances of catastrophic water damage. Questions should be asked before artwork is installed, such as: Where are plumbing, water lines, and HVAC ductwork in relation to the artwork? Installing a mural that cannot be easily moved, e.g., underneath a bathroom location, is a poor idea. Less obvious system questions to ask include whether the artwork is near a roof seam or internal gutter, an environmentally uncontrolled pipe chase in the wall, steam heat pipes, and so on.

## 1.5 Framing and hanging

Presumably, most commissioned artwork for a federal building will come preframed. Often, however, frames are damaged or need to be upgraded for better appearance. If a frame looks damaged, a frame conservator or competent frame shop should be able to determine whether the frame is worth having conserved or simply replaced. Please note that there is a lot of WPA-era (1933–1943) artwork in federal buildings that have plain frames that are historic and should be conserved.

**Paper artifacts such as watercolors, prints, and drawings have special framing requirements. The major concerns are that the original paper support should be housed with an all-rag, acid-free window mat on the front and an equal quality mat on the reverse, that the artifact, especially a pastel, is not touching the glazing, and that the glazing is either UV-filtering Plexiglas or UV-filtering glass.** Plexiglas is more shatter-resistant and weighs less for large pieces but scratches easily if not cleaned properly and may not be used over pastels because of static attraction of the pastel pigments. Conservation glass with UV filtration is perhaps better for small- to modest-sized pieces in a controlled setting and for all pastels.

The frames attached around murals should not require much action from GSA personnel except to **avoid adhering masking tape to the frames.**

**In general, we suggest that frames not be touched by cleaning personnel.** Most frames are toned and/or created with water-sensitive finishes that are easily disturbed by wiping with a cloth or by overenthusiastic cleaning of the glazing. **(Note—Plexiglas requires a specially formulated cleaning solution and a soft, clean cloth, preferably cheesecloth, to wipe with.)** If possible, white gloves should be worn when handling gilded frames. Masking tape and self-adhesive labels should never be applied to the decorated surface of a frame.

The choice of where to hang paintings is discussed in various sections of **1.4 Environment**, above. Paintings and frames of small to modest size (such as up to 30 inches x 36 inches) may be safely hung from one wire strung across the reverse of the picture between two-thirds and three-fourths of the way up. Attachment of the wire to the back of the frame is best made with mirror hangers (straps with D-hooks) screwed into the back of the frame. Screw eyes are acceptable only on small paintings. Larger or wide paintings are best hung with two wire loops, one at each side on the reverse. Other arrangements including anti-theft hardware are available; consult a framer. Very large paintings and murals require professional installation with proper brackets.

Anchors into the wall may be placed in several different ways. Nail-in anchors with two or three nails accommodate fairly heavy paintings if the plaster or drywall is sound. Large or heavy paintings or paintings anchored to masonry walls require the setting of plastic sleeves into pre-drilled holes. The screw is driven into the anchor most of the way, leaving 1/8" of the shank to catch the wire.

Fome-Cor is a white backing material (one-quarter inch thick), which should be attached to the back of all paintings on stretchers not otherwise covered. This is for dust and puncture protection. The back of the canvas does not need to "breathe".

## **1.6** **Handling and storage**

**The specifications below are of a general nature. Handling and storage of works of art in GSA's Fine Arts Collection should be coordinated through GSA's Fine Arts Program. The Fine Arts Program maintains the Fine Arts Storage Facility and coordinates professional art transport for the collection.**

Significant and unnecessary damage can be incurred in handling and storage. In terms of handling, paintings are carried face-in to the carrier. Use white gloves if the frame is gilded. Do not lift a painting up until you are sure where you are carrying it, the path is clear, and there is

*City of Cleveland Welcomes the Arts* by William Hicok Low  
Howard M. Metzenbaum U.S. Courthouse,  
Cleveland, OH  
McKay Lodge Fine Arts Conservation Laboratory, Inc.

**Left and Right:** Protecting a mural with a plywood "box" during building renovation.



something soft such as padded carpet blocks on which to sit it at your destination. When transporting a painting in a vehicle, place it upright if possible, making sure seat padding is not pushing the back of the canvas. Secure the painting to keep it from sliding.

Paintings are normally wrapped in clear polyethylene plastic sheeting prior to travel. Mylar tape is commonly used over the polyethylene. Bubble pack or corner padding is also placed over the polyethylene. One can strap the painting corner to corner over the bubble pack or cover padding with Mylar tape. Bubble pack and all other packing materials should not press on the face of an unglazed painting. With heat or pressure, packing materials can stick to or indent varnish layers on a painting. Large size cardboard or Fome-Cor is useful to make either a protective U-shaped sheath or "sandwich" around the wrapped frame and painting.

The safest place for artwork is hung on the wall. However, this is not always possible. Offices move, walls are painted, spaces are renovated, and so on. In a federal building, we suggest utilizing a small locked room as a temporary storage area for artwork. The room must be dry, not contain water or steam pipes, have basic ventilation and a normal environment. For a small number of pieces, elaborate storage racks are not required. Very small paintings may be placed with a dust cover horizontally face-up on shelves. Moderate to large paintings may be stood face up on the side of the frame on some sort of padding such as carpet or carpet blocks as long as the frame does not have elaborate protruding ornaments. Clean cardboard or Fome-Cor may be used to interleaf between each vertical painting. It is customary to remove all hooks and wires from paintings that are placed in storage as these items tend to damage other adjacent stacked artwork.

There are professional companies that do nothing but wrap, crate, transport, and store artwork. They should be engaged to handle either large numbers of pieces or oversize paintings. Receipts for artwork being moved or loaned are normally required. A logbook of work going in and out of a storeroom is also practical.

## 1.7

### Yearly inspection

The specifications below are of a general nature. The inspection of artwork, determination of conservation needs, and the National Conservation Contract are managed through the Fine Arts Program.

It is appropriate for all the artwork in a federal building to be inspected in a formal manner at least biennially. Ideally, there would be an inventory of all artwork in a building and a curatorial or registrar file on each piece gathered in one location. A standard inspection form utilized on a regional or national level should be completed yearly. It is hoped that a user-friendly inspection form coupled with some preface materials, such as this report, would allow an observant nonprofessional to execute a useful inspection. It is hoped these forms would be reviewed by the curatorial staff.

There are several conditions that, if observed, require prompt attention, and some sort of mechanism for action must be in place. Acute conditions include:

- Fire or smoke damage.
- Water either directly hitting the artifact or simply nearby.
- Mold development or recurring high relative humidity.
- Defacement.
- Flaking, tears, broken pieces, losses, etc. to either the painting or frame.
- Faulty hangers, wires, or wall anchors.
- Pending construction or renovation including interior painting.

## 1.8

### Cyclic maintenance and protection

In the interior of a federal building, it is not appropriate to have service personnel touching artwork, paints, frames, and murals. **There does not need to be routine dusting, vacuuming, wiping, or polishing of paintings or frames as this almost always will lead to over cleaning, excess wear and damage.** We suggest that if excessive dust, paint drips, or dirty glazing are observed, personnel should contact the building manager who will then contact the regional fine arts officer. The regional officer will be in a better position to either locate an appropriate conservator, a good framer or, if the situation is truly not serious, direct some other in-house action.

We favor scheduled cyclic maintenance of paintings, frames, and murals being undertaken on a longer cycle, such as once every five years, by a qualified conservator on a building-wide basis. In most cities, a call to the local museum should provide a reference to a local private conservator who should be asked to walk around the building and provide a work plan and estimate for light, remedial removal of surface dust and grime from paintings and murals. This could be expanded as the needs are identified to include:

- Cleaning of glazing on frames.
- Replacement of faulty wires, hangers, etc.
- Retouching of minor nicks or scratches to paintings and frames.
- Removal of paint drips.

Periodically, buildings are painted and more extensively renovated. In the case of portable artwork, pieces should be removed and placed in storage during wall repair and painting. Exceptionally large pieces, including murals, have to be protected *in situ*. Care and time must be taken in the protection of murals with clean polyethylene sheeting prior to painting:

1. Before any dust is created, cut a piece of clean, clear polyethylene to a size larger than the mural.
2. If a mural has a conventional frame, drape the polyethylene over the mural frame and tuck it in behind. Tighten the corners with tape bonded to the polyethylene.
3. If a mural has only a minimal architectural molding frame or no frame at all, tape the polyethylene to the flat wall 3–4" outside of the frame or mural with blue 3M painters tape, which is formulated to release more cleanly than masking tape. (Note—A conservator should be consulted if a mural is to be covered for more than a few weeks or in conditions of high humidity.)
4. Perform all wall repair that creates dust and repaint surfaces.
5. Remove tape and polyethylene by folding the dusty side into itself to keep dust from migrating onto mural.
6. If polyethylene was taped to the wall, have a very skilled painter carefully paint in the wall up to the edge of the frame or mural. If the paint drips onto the frame or mural, a conservator should be called.

**In cases where serious renovation or construction work is to be done, an artwork protection plan must be developed in the construction planning phase.** It is not responsible custodial care of federal artwork to assume that a general construction contractor can or will protect the artwork. The artwork protection plan for renovation/construction must include:

1. A transport and removal plan for all artwork not attached to the walls.
2. A protection enclosure design incorporating filtered, active ventilation, if needed in the opinion of a conservator.
3. Review of proposed protection enclosure materials and installation procedures.
4. Documentation, including photographic, of condition of artwork prior to erection of artwork protection enclosures.
5. Inspection and acceptance of installed protection enclosure prior to start of construction.
6. Monitoring of artwork condition during construction. Minimum of one on-site inspection per month.
7. Emergency action plan to quickly notify GSA and a qualified conservator in the event of fire, water intrusion, freezing conditions, heavy vibration, and so on.
8. Post-construction survey of artwork condition, including photo documentation.