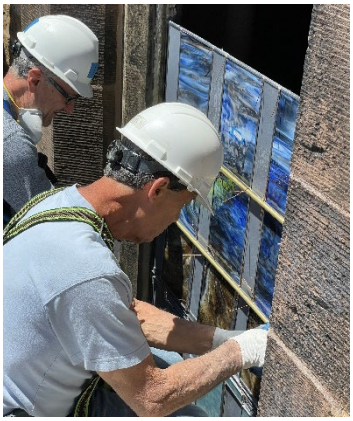
QUICK REFERENCE GUIDE | STAINED- AND LEADED GLASS





Left: Stained-glass restoration of the SJOA Sacristy clerestory windows from the St. Joan of Arc Parish, Indianapolis, IN. Photo by St. Joan of Arc Catholic Church.
Center: Stained-glass window restoration in the sanctuary of Central Presbyterian Church, Summit, NJ. Photo by Central Presbyterian Church.
Right: Reinstallation the restored clerestory stained-glass windows from the Church of the Covenant, Boston, MA. Photo by Roberto Rosa, Serpentino Stained Glass.

STAINED- AND LEADED GLASS

Glass is a highly versatile material. When in its molten state, glass can be spun, blown, shaped, rolled, and colored, and, when cooled, polished, beveled, etched, engraved, and painted. One of the most impressive ways to show the versatility of glass is through stained-glass.

> *Stained-glass is colored, painted, enameled, or tinted glass that is assembled into an image or decorative pattern.*
>
> *Leaded glass is a type of glass assembly composed of glass pieces held together by H-shaped lead, copper, or zinc strips called cames.*

Stained-glass has been used in windows and other building elements since ancient Rome. In the United States, glassblowers were among the founders of Jamestown in 1607, but it was not until the 1840s that American stained-glass truly emerged. One of the most significant early American stained-glass installations was the 1843-1848 John and William Jay Bolton windows at St. Ann and the Holy Trinity Episcopal Church in Brooklyn, New York (a National Fund for Sacred Places grantee). America's stained-glass industry boomed during the second half of the nineteenth century, but by the 1940s, it had faded from popularity. Today, stained- and leaded glass can be seen in all building types and architectural styles. It can be seen in windows, doors, ceilings, fanlights, sidelights, light fixtures, and other glazed features in historic buildings.

Glass is one of the most durable but fragile building materials. It is virtually immune to natural deterioration, so it can last a very long time, but it can be easily broken. Decorative elements (primarily paint) applied to glass in stained-glass can fade or peel. The structural system supporting stained- or leaded glass can deteriorate or fail.

GENERAL RECOMMENDATIONS

All projects funded by the National Fund for Sacred Places must respect the property's historic character and materials, and must adhere to the Secretary of the Interior's Standards for Rehabilitation. Below are general recommendations for the treatment of stained- and leaded glass, but they do not cover all the specific recommendations. Reference the resources in the section below for more detailed recommendations.

- **RETAIN AND PRESERVE:** Preserve historic stained- and leaded glass, including its frame and structure.
- **CONTRACTORS:** Only qualified craftspeople with experience working on historic stained- and leaded glass should be used.
- **PROTECT AND MAINTAIN:** Protect and maintain the stained- and leaded glass frames by ensuring they are watertight. Maintain the paint on existing painted frames, and maintain all mortar joints in masonry frames. All joints (such as the joint between the stained- or leaded glass panel and the frame, and the joint around the window frame) should be properly sealed.
- **CLEAN:** Use the gentlest method possible for cleaning the glass. The type of cleaner that should be used depends on the glass. The first cleaning method to try is water. If water alone is insufficient, a non-ionic detergent could be used. Glass with a layer of shellac, lacquer, varnish, or very stubborn grime may require the use of alcohol or solvents to clean the glass. Painted glass must never be cleaned before the stability of the paint is confirmed, and only then with great caution. The cleaning method should be tested in an inconspicuous location to confirm that no damage is being caused and to ensure the gentlest method can be used before finalizing the appropriate cleaning method.
- **REPAIR GLASS:** Original glass should be retained whenever possible, even if it is damaged. Cracks in the glass should be repaired with either copper foil, epoxy edge-gluing, or silicone edge-gluing. The appropriate repair must be selected based on the specific damage and window. If replacing the glass is the only option, the glass should be replaced in-kind.
- **REPAIR FRAME:** Repair stained- and leaded glass frames by patching, splicing, consolidating, or otherwise reinforcing them using recognized preservation methods.
- **REPLACE WATERPROOFING CEMENT:** Replace the damaged or deteriorated waterproofing cement as needed to ensure there is a watertight bond between the cames and the glass. Hardening agents should not be included in the mixture, and solvent-based driers should be used sparingly.
- **FULL RESTORATION:** If the window is bulging, sagging far out of plane, has over 5% of its glass broken, or its solder joints are failing, the window should be properly restored, including flattened, waterproofed, reinforced, cleaned, and releaded. To do this, the stained- or leaded glass must be removed. The removal and reinstallation should be done carefully to avoid damaging the window.

- **ADDITIONAL SUPPORT OR STRUCTURE:** If additional support bars or saddle bars are needed to support the stained- or leaded glass, the original design should be taken into consideration so the new support bars do not intrude on the important features in the window. Sometimes, small thin braces can be manipulated to exactly follow existing lead lines, which can make the new supports appear almost invisible.
- **PROTECTIVE GLAZING (STORM GLAZING):** If protective glazing is installed, it should be installed in an independent frame that can be removed for periodic maintenance. The frame for the protective glazing should follow the configuration of the stained- or leaded glass window so there is not a different configuration that creates shadows on the stained- or leaded glass. The protective glazing must be ventilated to ensure that heat and condensation do not build up in the air space between the stained-glass and the protective glazing. Protective glazing is not an alternative to maintenance. When protective glazing is improperly installed, it can accelerate the deterioration of stained- and leaded glass.

RESOURCES

Preservation #33: The Preservation and Repair of Stained and Leaded Glass

Preservation Matters: Stained Glass, National Center for Preservation Technology and Training at the National Park Service

Preservation Matters: Protective Glazing of Stained Glass, National Center for Preservation Technology and Training at the National Park Service

Lead Safety for Stained Glass and Historic Windows, The Fillet Foundation