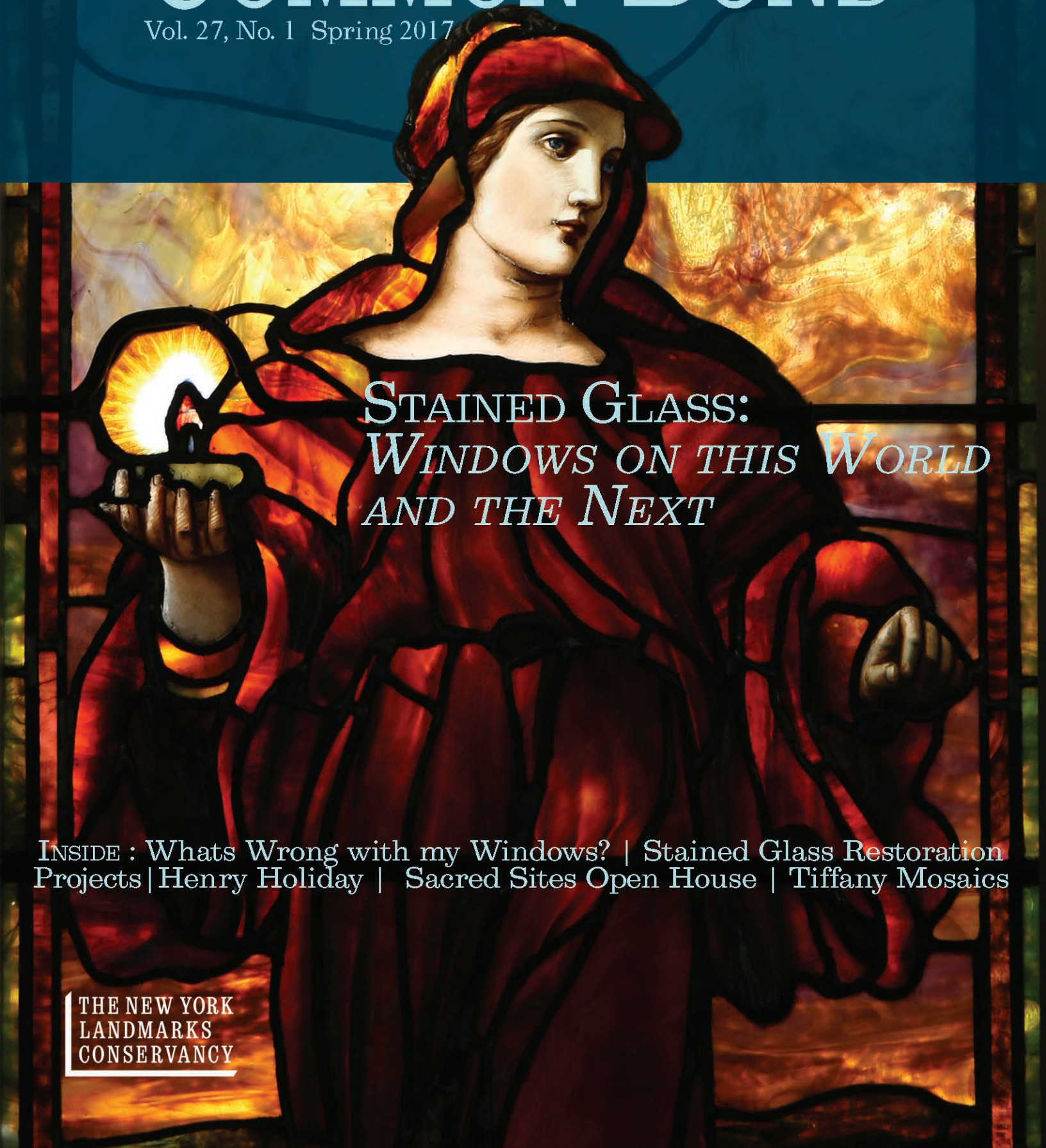
Common Bond

Vol. 27, No. 1 Spring 2017



Stained Glass: *Windows on this World and the Next*

Inside : Whats Wrong with my Windows? | Stained Glass Restoration Projects | Henry Holiday | Sacred Sites Open House | Tiffany Mosaics

The New York Landmarks Conservancy

From the President

Dear Friends,

We are pleased to present our latest edition of "Common Bond," which focuses on the remarkable and diverse stained glass that illuminates so many of our religious institutions.
"Stained Glass: Windows on this World and the Next" is also the theme of this year's annual Sacred Sites Open House Weekend on May 20 and 21.

The Landmarks Conservancy's 31 year old Sacred Sites program is dedicated to the preservation of historic religious architecture throughout New York State. Our program has granted close to $10 million over the past three decades, helping to restore 760 religious buildings of all denominations. Many institutions have received several grants through the years.

Religious buildings are often the most beautiful structures in their locales. They illustrate changing architectural styles and immigration patterns. Many also provide social service and cultural programs that serve the wider community. You don't have to be religious at all to appreciate them.

As wonderful as these buildings are, the public has seldom been inside them. That's why we began our Sacred Sites Open House Weekend seven years ago. So congregations could share their history, architecture and programs with the wider community, and people would have a greater understanding of why religious buildings should be preserved.

Last year, some 8000 persons participated in the weekend, visiting 170 institutions throughout New York City and State. We are working to make it bigger and better each year.

The Corning Museum of Glass is a new open house co-sponsor and contributed information to this issue of our magazine. The Museum is opening a special exhibition on stained glass this May. The Museum joins a large group of preservation colleagues and companies who have regularly co-sponsored the open house.

Our Sacred Sites program has always done more than disburse grants. Our expert staff travels to applicants in every county, helping congregants understand the building issues and helping to find qualified contractors to work on often complex buildings. Even after completion of a project, our staff often stays in contact with institutions for years.

Our "Common Bond" publications offer practical information on everything from basic maintenance, to consultant and contractor selection to religious architectural styles.

We remain one of a handful of programs in the country offering financial help to religious properties and the only program covering an entire state.

We hope you find this edition interesting and useful. And, we hope that however involved you are with a congregation, you will explore others in your area this May. We appreciate your interest and support.

Sincerely,

Peg Breen
President

The New York Landmarks Conservancy

Peg Breen, President
Ann-Isabel Friedman, Sacred Sites Program Director
Colleen Heemeyer, Manager of Grants and Technical Services

Sacred Sites Committee

Ronne Fisher, Chair
Justin Abelow
Oscar K. Anderson III
The Reverend Canon George W. Brandt Jr.
Bernadette Castro
August Ceradini
Gus Christensen
Lynne Crofton
Stuart P. Feld
Michael Jaffe
The Reverend John A. Kamas
Miriam Kelly
Malcolm MacKay
Lise Moran
Sheila Parekh-Blum
Stephanie Pincus, MD
Jonathan Plotkin
Marc P. Schappell

We are grateful to our 2016-2017 Sacred Sites Donors

The Achelis and Bodman Foundations
The Arthur F. and Alice E. Adams Charitable Foundation
Anonymous
Anonymous
Joan and Robert Arnow Fund
Barker Welfare Foundation
David Berg Foundation, Inc.
Seth Maerowitz and Ann-Isabel Friedman
Gerry Charitable Trust
Nash Family Foundation
May and Samuel Rudin Family Foundation, Inc.
Sophia D. Schachter
Marian M. Warden

Common Bond Vol. 27, no. 1. Spring 2017
Stained Glass Special Issue

Contents

Corning Museum of Glass: Tiffany Mosaics 3

Sacred Sites Open House in Broome County 6

Stained Glass Protection at St. Patrick's Cathedral 8

Stained Glass Restoration with Limited Resources 10

The Christ Church Stained Glass Restoration Project 12

Henry Holiday's Stained Glass Windows for Gilded Age New York 16

Technical Spotlight: What's Wrong with my Windows? 29

Common Bond is the technical journal of the Sacred Sites Program.

The New York Landmarks Conservancy's Sacred Sites Program offers congregations throughout New York State financial and technical assistance to maintain, repair, and restore their buildings. In addition to providing hundreds of thousands of dollars in matching grants each year, the Conservancy offers technical help, workshops for building caretakers, and publications.

Editor: Ann-Isabel Friedman
Managing Editor: Amy Woodin
Contributors: Mari S. Gold, Glen Umberger

Back issues are available in print and online at
http://www.nylandmarks.org/publications/common_bond/
For additional information about the Sacred Sites Program or
Common Bond please contact:

THE NEW YORK LANDMARKS CONSERVANCY

The New York Landmarks Conservancy
One Whitehall Street
New York, NY 10004
(212) 995-5260
nylandmarks.org

On the Cover

Detail of the Hibbard-Gold Memorial window depicting Faith (shown) and Christ. This Tiffany window was installed in Christ Church, Manlius, NY in 1890. Read more about their recent stained glass restoration project in our article on page 12.

New Yorkers travel around the world to enjoy magnificent art, architecture, and history. During this, the New York Landmarks Conservancy's 7th annual Sacred Sites Open House, May 20th and 21st, 2017, world class houses of worship throughout New York bring this experience to your doorstep.

This year, over 60 sites in New York City and more than 170 statewide will participate. This year's theme, Stained Glass: Windows on this World and the Next, highlights the extraordinary work of American stained glass masters as well as prominent European artists and studios that can be discovered in these houses of worship.

For more than 30 years, the Landmarks Conservancy's award-winning Sacred Sites program has helped congregations maintain and restore iconic buildings. Sacred Sites is the only state-wide initiative of its kind in the country. During the past three decades, the program has disbursed over $10 million in grants to 767 congregations, helping to fund 1,400 restoration projects.

To mark the 25th anniversary of the Sacred Sites program five years ago, the Conservancy inaugurated a statewide Sacred Sites Open House, inviting religious institutions from Buffalo to Brooklyn to open their doors to the public, introducing visitors to their extraordinary art, architecture, and history, as well as the wide range of social service and cultural programs they provide. This year's Sacred Sites Open House takes place May 20th and 21st. Since its inception, the program has flourished – drawing 8,000-plus visitors in 2016.

To kick off this year's Sacred Sites Open House, the Conservancy hosted a gathering at Temple Emanu-El on March 21st with stained glass tours led by Arthur Femenella, Femenella & Associates, whose firm performed the restoration of stained glass in the sanctuary and side chapel. Peter A. Rohlf, Rohlf Stained and Leaded Glass Studio, led a tour of Greenwald Hall, an auditorium chapel featuring handsome landscape windows, including two by the Tiffany Studios, which his firm relocated from a former funeral chapel at Temple Emanu-El's Salem Fields Cemetery in Cypress Hills, Brooklyn.

Other events preceding the Sacred Sites weekend include; a conservator-led tour of the stained glass conservation studio at The Metropolitan Museum of Art for the Conservancy's Professional Circle members and the annual Sacred Sites Open House photo contest. Special, pre-booked tours featuring magnificent stained glass and mosaics will be offered throughout New York City, including conservator-led tours of recently restored windows at St. Patrick's Cathedral, and a curator- led tour of Tiffany glass at Woodlawn Cemetery. Sacred Sites from Manhattan to Albany, Utica, and Buffalo will offer tours of stained glass windows designed by British Pre-Raphaelite Henry Holiday.

Fortuitously, the Corning Museum of Glass, a co-sponsor of this year's Open House, is opening the first major exhibition dedicated to Tiffany's glass mosaics on May 20th. The Corning exhibit includes beautiful, interactive digital photographs of mosaics located in churches, chapels, cemeteries, and museums around the state. These mosaics can be viewed in situ via special Sacred Sites Open House tours.

Highlights of the Open House Weekend include congregations in each borough offering special tours during the weekend:

St. Michael's Episcopal Church, 225 West 99th Street (Manhattan). The church has seven Louis Comfort Tiffany lancet windows in the apse depicting St. Michael's victory in Heaven, installed in 1895. Tiffany Glass and Decorating Company also decorated the dome of the apse and installed the Vermont white marble high altar, reredos, credence niche, altar rail, pulpit and other apse decorations.

Brown Memorial Baptist Church, 484 Washington Avenue, Clinton Hill (Brooklyn). Designed by Brooklyn resident Ebenezer Roberts and constructed in 1860 as the Washington Avenue Baptist Church, Brown Memorial Baptist Church is considered an unusually ornate example of the Romanesque-revival style. Inside are several large Tiffany stained glass windows including the Roberts Memorial Window, also known as "The Pilgrims" window. This window, restored in 2014, also serves as a memorial to the struggles of the Pilgrim religious leaders, including abolitionists and workers of the Underground Railroad, a nod to Clinton Hill's past as a hotbed of abolitionist activity.

St. Agnes Roman Catholic Church, 433 Sackett

Street (Brooklyn). St. Agnes Church was designed in the neo-Gothic style by the noted Brooklyn church architect, Thomas Francis Houghton (1840-1913), a student and later partner of the famed 19th century architect, Patrick Charles Keely. Constructed between 1904 and 1913 it is the neighborhood's dominant structure, featuring soaring towers and a façade of rugged Manhattan schist with limestone trim. The stained glass windows of St. Agnes were made in 1904 in Munich by the renowned firm of Franz Zettler. Unique in many respects, they are an unusual theme choice for a church nave: While the windows of most churches use a variety of biblical themes, the eight windows in this nave portray only the life and martyrdom of the church's patron, St. Agnes. (Shown Opposite)

Church of the Resurrection, 85-09 118th Street (Between 85th and Hillside Avenues, Kew Gardens) Queens. As the oldest church in the Richmond Hill neighborhood, the church was founded by members who had migrated from the city when the new railroad station was established. In December 1874, architect Henry Dudley designed the small wooden frame church in the Gothic style for the newly incorporated Church of the Resurrection that remains the core of the existing building. Jacob Riis, the noted reformer who campaigned tirelessly on behalf of New York's working poor through his pioneering photo essays was an early parishioner; the Riis Family memorial stained glass window, the "Good Shepherd" remains in the building today. The church was remodeled and enlarged incrementally between 1905 through the 1920s with the additions of side aisles, a front porch, belfry, transepts, and chancel.

Calvary Presbyterian Church, 909 Castleton Avenue, West Brighton (Staten Island). Calvary Presbyterian Church features a steeply pitched gable roof and tall bell tower. The church is eclectic in style, with Romanesque and Tudor elements and a magnificent side tower. The interior of the church is especially notable for its tall ceilings and exposed wooden trusses. The church also features four beautifully executed art glass windows by Maitland Armstrong, moved here in 1951 from the 1892 Randall Memorial Church at Sailors Snug Harbor, which was razed. Maitland Armstrong's "Emmaus" window was restored in 2002-2004.

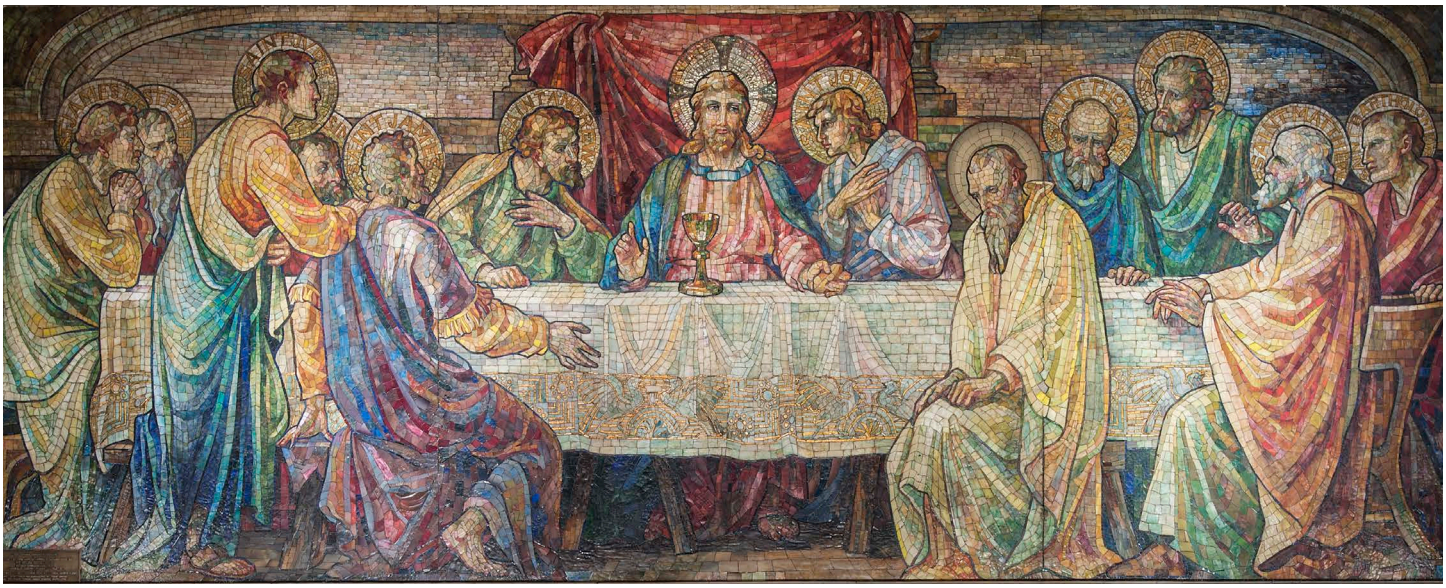
First Major Exhibition of Tiffany's Glass Mosaics on Display at The Corning Museum of Glass

Little-Known Aspect of Tiffany's Artistry and Innovation Revealed

The first exhibition to explore Louis C. Tiffany's glass mosaics will be presented by The Corning Museum of Glass (CMoG), in Corning, New York, May 20, 2017 through January 7, 2018. Tiffany's Glass Mosaics, organized jointly by CMoG and The Neustadt Collection of Tiffany Glass, combines works from both collections with important loans and specially designed digital displays to reveal how Tiffany's mosaics reflect this aspect of his studio's artistry and innovation in glass. The exhibition will feature nearly 50 works dating from the 1890s to the 1920s and will range from small-scaled decorative items designed for home use to large-scale mosaic panels and architectural elements composed of thousands of individual pieces of glass. Tiffany mosaics of such wide-ranging scope and scale have never before been displayed together. In addition, architectural mosaics still in situ will be presented through digital displays.

Showcasing detailed watercolor studies and drawings as well as surviving glass sample panels and examples of completed work, the exhibition will reveal the process of creating a mosaic at Tiffany's studios, exploring the labor-intensive processes. Objects on display will include original examples of colored sheet glass, glass "jewels," and glass fragments made for specific mosaics. In addition to items in CMoG's collection, there will also be loans from private collections and the Chrysler Museum of Art, Haworth Art Gallery, Kalamazoo Institute of Arts, Metropolitan Museum of Art, Charles Hosmer Morse Museum of American Art, Museum of Modern Art, Rockwell Museum, and the Virginia Museum of Fine Arts.

(Detail) Panel, The Prayer of the Christian Soldier, 1919. Tiffany Studios, designed by Frederick Wilson (British, b. Ireland, 1858–1932). Glass mosaic. First Presbyterian Church (now United Presbyterian Church), Binghamton, New York.



Reredos, The Last Supper, 1902. Tiffany Glass and Decorating Company, designed by Frederick Wilson (British, b. Ireland, 1858–1932). Glass mosaic. Christ Episcopal Church, Rochester, New York.

"Although Louis C. Tiffany is best known for his pioneering leaded glass windows and lamps, his mosaics are the culmination of his experimentation and artistry in glass," said Lindsy Parrott, director and curator at The Neustadt and co-curator of Tiffany's Glass Mosaics. "Indeed, the mosaics represent an exciting synthesis of his work in both leaded and blown glass. Using a rich variety of materials, including multicolored opalescent glass and shimmering iridescent glass, accented with three-dimensional glass 'jewels,' Tiffany's innovations in glass established a bold new aesthetic for mosaics and contributed a uniquely American character to the centuries-old art form."

The exhibition will also highlight the role of Tiffany's turn-of-the-20th-century showroom, where he presented the finest examples of his completed work. Photographs of the workrooms were part of Tiffany's marketing efforts and were used in both his advertisements as well as his marketing brochures. These "behind-the-scenes" photos emphasized that each object made at the Tiffany Studios was handcrafted, as opposed to mass produced.

Many of Tiffany's mosaic murals are still installed in their original settings, and will be represented by photographs including new photography by CMoG's team that visited 12 locations in New York State, Philadelphia, Baltimore, and Chicago to capture detailed shots of these mosaic commissions, adding significant imagery to the field. This exciting new photography will be presented in an immersive "Mosaic Theater," a gallery in the exhibition that will use high-definition monitors to transport visitors to the various mosaic sites. They will be able to experience these mosaics up close and at eye level, in their original architectural settings, and in stunning detail, providing the opportunity for heightened appreciation of the design, glass selection, and craftsmanship.

The Corning Museum of Glass is home to the world's most important collection of glass, including the finest examples of glassmaking spanning 3,500 years. The campus in Corning, NY, includes a year-round glassmaking school, The Studio, and the Rakow Research Library, the world's preeminent collection of materials on the art and history of glass. Located in the heart of the Finger Lakes Wine Country of New York State, the Museum is open daily, year-round. Children 17 and under receive free admission. For more information: www.cmog.org

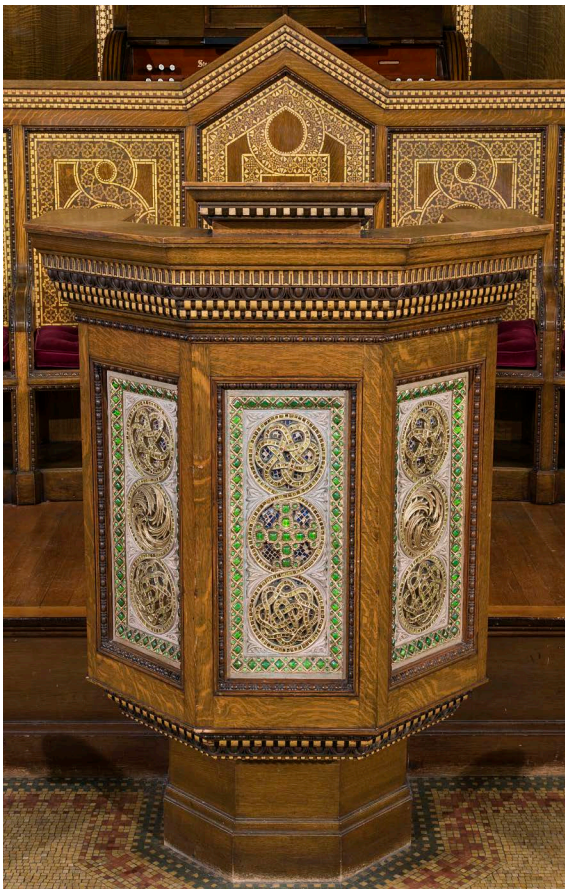
Dedicated to preservation, scholarship, education, and connoisseurship, The Neustadt Collection of Tiffany Glass provides an in-depth look at the artistry of Tiffany Studios and its contribution to a uniquely American chapter in the history of stained glass. The organization shares its collections with audiences through its gallery at the Queens Museum in New York City and exhibitions that travel to museums nationwide. In addition to Tiffany's celebrated lamps, The Neustadt holds windows, metalwork, and rare archival materials, including more than a quarter of a million pieces of original Tiffany flat glass and glass "jewels."
www.neustadtcollection.org

CORNING MUSEUM OF GLASS

Above Left: Detail of pulpit, 1895–1897. Tiffany Glass and Decorating Company. Glass mosaic; wood, inlaid with glass. First Presbyterian Church, Bath, New York. Above Right: The Prayer of the Christian Soldier, 1919.

The following sites featured in the Corning Museum of Glass' Tiffany Glass Mosaic exhibit will be open May 20th or May 21st for public visits as part of the 2017 Sacred Sites Open House: Clicking on each church name will take you to their site page on sacredsitesopenhouse.org for more information.

Christ Episcopal Church, Rochester
Christ Episcopal Church, Corning
First Presbyterian Church, Bath
United Presbyterian Church, Binghamton
St. Paul's Episcopal Church, Troy
St. Michael's Episcopal Church, Manhattan
Woodlawn Cemetery, Bronx



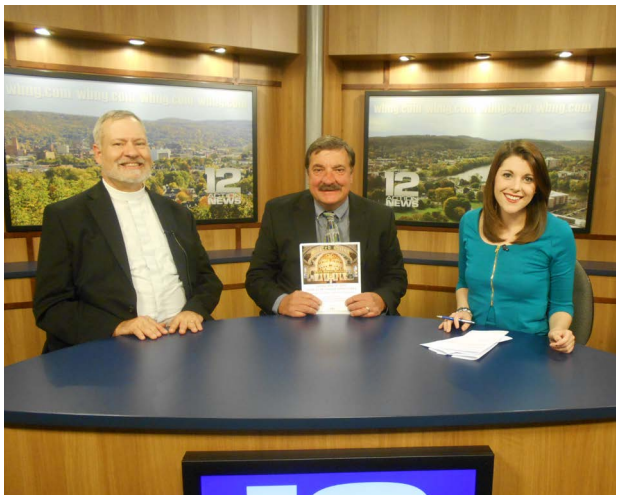
Right: Detail of interior of Willard Memorial Chapel, Auburn, New York, 1892. Tiffany Glass and Decorating Company, designed by Jacob Adolphus Holzer (American, b. Switzerland, 1858–1938). Oak, inlaid with glass and glass jewels; stone mosaic; stenciling. The Willard Chapel was unable to participate in this years Open House do to scheduling but, we invite you to plan a visit during one of their public programs listed here: www.willard-chapel.org

Sacred Sites Open House in Broome County

A Conversation with Ron Borgna

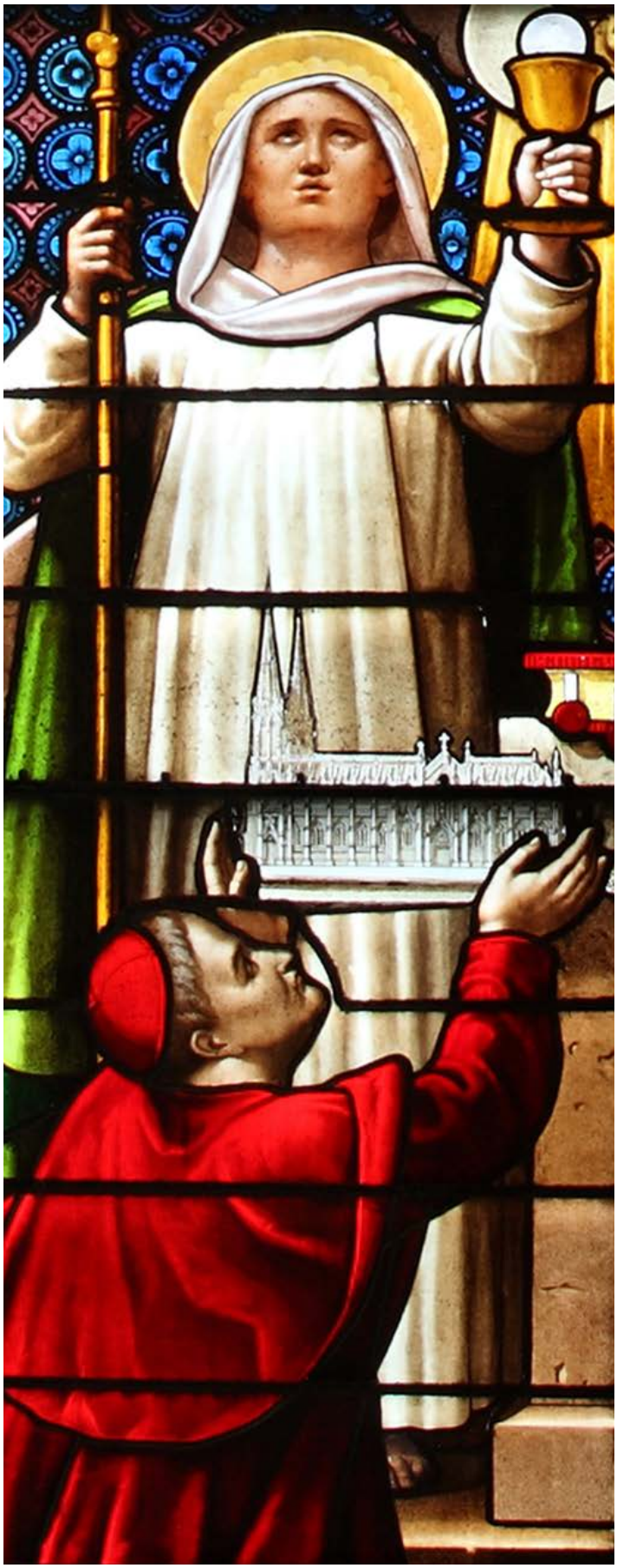
Six years ago, Ron Borgna, a retired middle school teacher from Binghamton, NY went on an open house tour of area homes. He thought that the same idea could be expanded to local houses of worship and Borgna developed his idea by working with a committee to develop an inventory of religious structures in Broome County. Through this endeavor, he heard about the Sacred Sites Open House program organized by the New York Landmarks Conservancy and got in touch with Ann Friedman, the program director. "Whenever I meet someone from the clergy, I make a note of his or her contact information," Borgna says. "Using my association with the Preservation Association of the Southern Tier (PAST), I get in touch with whomever I've met and encourage the organization to participate in the Landmarks Open House Weekend. In 2016, we had twenty-one participants."

Borgna takes his task seriously, devoting his time and energy on securing congregations to participate from January until the Open House weekend in mid-May. He begins by sending an invitation to his contacts that include the date, time and other details, following up in a month if he hasn't had a response, and finally, sending a confirmation message to those who wish to participate. "We get media coverage on our two local radio stations as well as on WBNG-TV where I'm interviewed along with someone from one of the sites," Borgna explains. Thanks to his publicity efforts, The Binghamton Press runs a list of sites and photographs as part of its "The Go" column on Thursdays and The Owego Pennysaver also publishes a list of open house sites with photographs. Borgna assembles and distributes display boxes with brochures



and distributes them along with 2000 posters printed by PAST, to libraries, senior centers, diners, restaurants and literally "anywhere people congregate. I keep a stash of materials in my car," Borgna says, "so any time there's an opportunity, I can taken advantage of it." His wife and son are also part of the marketing effort.

Borgna also solicits support from local politicians including mayors, city council members, county executives, state senators and assemblymen with personal invitations. Academia is also included with invitations sent to Binghamton University's Art Department, which teaches a course on architecture. "As a middle school teacher for thirty-three years, I met and talked to lots of people," Borgna says. "The ministers, rabbis, church historians and others I meet along the way as part of this effort are not only interesting, they are genuinely nice people who want to help. Sacred Sites Open House is a wonderful event that everyone in the area enjoys no one more than I."

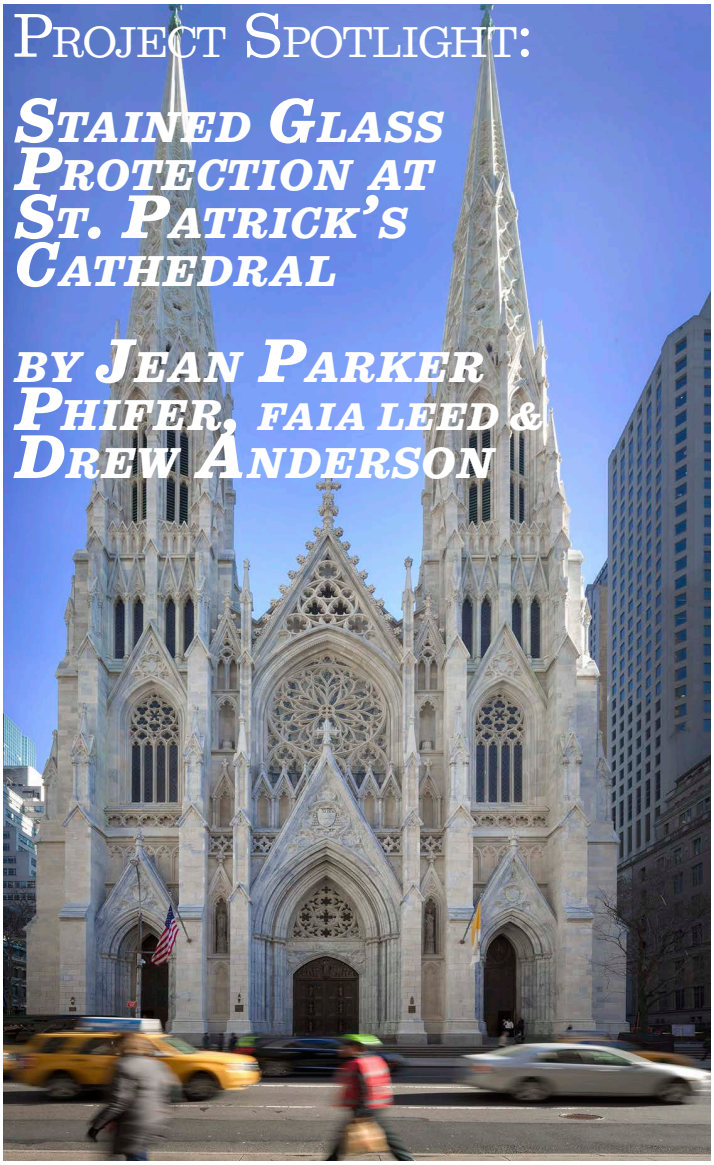


Above: Stained glass window in St. Patrick's commemorating the dedication of the Cathedral in Manhattan. Article follows on page 8.

Project Spotlight:

Stained Glass Protection at St. Patrick's Cathedral

by Jean Parker Phifer, faia leed & Drew Anderson



For many years, all sorts of protections have been used to prevent mechanical damage to stained glass windows. When it comes to protection, there are numerous options such as wire guards made of galvanized steel, copper, powder coated stainless steel or laminated or tempered glass. Unfortunately, what we most often see are discolored, misshapen polycarbonate sheeting or some similar form of unsightly protection.

For over a century, external protective glazing has been used in the United States, and here in New York at St. Patrick's Cathedral, protective glazing was purposely included in the building specification of 1856. The stained glass windows at St. Patrick's, having been protected from the damaging effects of condensation and pollution during the years since the industrial revolution, shows painting generally in superb condition, bearing witness to the benefits of protective glazing when compared with unprotected glass from the same period. St. Patrick's is a rare successful example of unventilated protection, although it is assumed due to the age of the windows, some sort of ventilation may have existed, albeit unintentional.

It is unusual that unvented protection yields such positive results. Any form of protective glazing is better than none at all, but unventilated protective glazing has been used for years with disturbing consequences. For example, when the protection and the stained glass are set too close together, moisture can be trapped leading to buckling glass panels, accumulations of plant life, insects and grime are frequently found. Condensation can cause the paint to deteriorate, resulting in a faded appearance or even total loss.

When it comes to the installation of protective glazing, the main concerns are normally protecting the stained glass windows from vandalism or preventing heat loss from the building rather than the consequences of condensation on the vulnerable painted surface of the windows. Generally, it is agreed that internally ventilated systems such as "Isothermal Glazing" are the best to protect vulnerable painted surfaces.

In efforts to preserve sensitive and unstable painted surfaces, isothermal glazing systems have been proven to perform better than externally vented protection. In this system, by moving the stained glass windows a few inches to the inside of the architectural surround and placing a clear glass panel in the groove where the stained glass was originally mounted, the vulnerable painted surface is protected. Leaving sufficient ventilation gaps at the base and top of the stained glass allows the free circulation of internal air to pass freely over both faces of the stained glass. The air, being of equal temperature on both sides, prevents condensation, thus keeping the glass in a dry, near museum condition within its architectural setting.

This form of protection is not without its problems, however. Architects often fear its use will deface the building's appearance, and future removal of the stained glass can be difficult and expensive. Even so, isothermal glazing systems have proved to be the most effective method of preventive conservation at our disposal.

In spite of its problems, the use of isothermal glazing offers benefits for future repair and restoration work that could not be performed if the stained glass was acting as a climatic barrier

between the internal and external environments. In this case, it becomes possible to use adhesives and lead work which otherwise may be too weak to withstand direct exposure to the elements.

Original lead matrices in stained glass windows are frequently replaced as a matter of course, but the historic value of original lead cannot be underestimated. The lead matrix is an integral part of the artistic design of a panel and contributes to its value. At St. Patrick's, thanks to the early use of protective glazing, the great majority of window panels, many well over a hundred years old, were in sound condition and did not require removal for the replacement of their lead matrices. In this case, of paramount importance was the desire for a conservative approach that ensured the retention of almost all of the original fabric including the glass, metal armatures as well as the lead came.

Above: Stone colored silicone sealant serves to weatherproof the perimeter of the protective glazing, and leaded joints in the protective glazing align where possible with joints in the stained glass.

The conservation treatment of the St. Patrick's windows began with careful documentation of each and every panel of stained glass and detailed examination to determine which elements were in need of repair and which could remain in place to be cleaned. The scope of work included the cleaning of both sides of the stained glass, selective removal of panels to be conserved in a private studio, and minor repair work to the panels in situ that were not to be removed. While in situ work is not always the most desirable option, in this case it was deemed a necessary alternative to removing panels for the sake of one or two repairs, since removing a stained glass window from very hard putty could cause more damage than originally existed. The most severely damaged glass fragments were removed to be edge bonded or painted in the studio, and any lead that was no longer functional was replaced with lead came matching the size and profile of the original.

Although it was not necessary to install a full isothermal protective glazing system at St. Patrick's, a method was specially designed to permit the flow of a small amount of air between the stained glass and protective glazing. Small individual pieces in the stained glass panels were removed and reset at an angle at the top and bottom of the lancets to create air gaps that allowed air from the interior of the building to circulate into this interstitial space without being visible from below. This was an innovative, discreet method for ventilating the windows demonstrating what can be accomplished with a little bit of thought while operating within limited parameters.

As many congregations acting as custodians of stained glass are often operating on a limited budget, the full removal and releading of windows can be an expensive business. It is always prudent to explore other avenues. When considering options, many questions should be asked concerning the current condition of the windows, for example, is the deterioration due to inherent conditions or are there other external forces at work? If so, what are these issues and can they be addressed in a conservative manner? If the windows are in need of long-term protection, an isothermal system should be considered. The installation and use of isothermal glazing is becoming increasingly simplified making it a less expensive option than in years past. Nevertheless, as the project at St. Patrick's shows, there may be more creative solutions to address site-specific problems that can be accomplished in a cost-effective way.

Jean P. Phifer of Thomas Phifer and Partners worked as a key member of the St. Patrick's design team led by Murphy Burnham & Buttrick. The stained glass studio was Botti Studios.

Mr. Drew Anderson is responsible for the Metropolitan Museum's stained-glass collection. He received an MA in Stained Glass Conservation from the Victoria and Albert Museum/Royal College of Art and served as senior conservator in the Stained Glass Conservation Section of the Victoria and Albert Museum from 1999 to 2004.

Stained Glass Restoration with Limited Resources

A Conversation with Practitioner Julie L. Sloan

If your congregation has stained glass windows in need of repair, and are short on funds, there are a number of ways to approach the problem. How the process begins, however is crucial. "Don't simply open the phone book and arbitrarily pick a stained glass conservation studio," says Julie L. Sloan, owner and chief consultant at Julie L. Sloan, LLC, Consultants in Stained Glass, located in North Adams, Massachusetts. She adds that talking to six studios is likely to yield six different approaches.

Instead, Sloan advises the congregation "contact one of the organizations that offer help with identification process including the New York Landmarks Conservancy for initial referrals and also the appropriate member of the Preservation League of New York State to connect you locally." Starting the repair process in this way provides experienced assistance to winnow out unhelpful information. "You need a real assessment of your congregation's specific situation so you can fully understand the total cost, time involved and what problems you need to address first," Sloan continues.

A building condition study, even a small one if that is what your organization can afford, is worth the money as it examines the entire building and helps prioritize potential issues. There may be surprises. "Sometimes, fancy or important windows are in better condition than lesser ones," Sloan points out. "These may be in a prominent part of the building while less dramatic examples might be in a not-so-obvious place, for instance, a staircase, and therefore less looked-after." By looking at the entire building, other building issues such as roof repair or waterproofing may need to be addressed before moving ahead with window restoration.

When addressing suggested repairs to stained glass windows,

Before (left) and after (right) restoration of a stained glass window at St. Thomas's Episcopal Church, Manhattan.

Sloan cautions "Don't opt for protective glazing simply because a studio insists that this is a magic bullet. In some cases protective glazing can do more harm than good. Or, it may be a temporary fix that only ends up 'kicking the can down the road.' I've seen instances in which studios even try to sell congregations more of the wrong kind of work than they need."

Identifying the right person to lead the process is another key element to success, and it may not necessarily a parishioner. Since many religious buildings have building committees, there may be an individual ready to take charge but regardless of a desire to be involved, the lead individual will be dealing with many issues and organizations so be sure he or she has the time and is willing to take on what can be a fairly complex project.

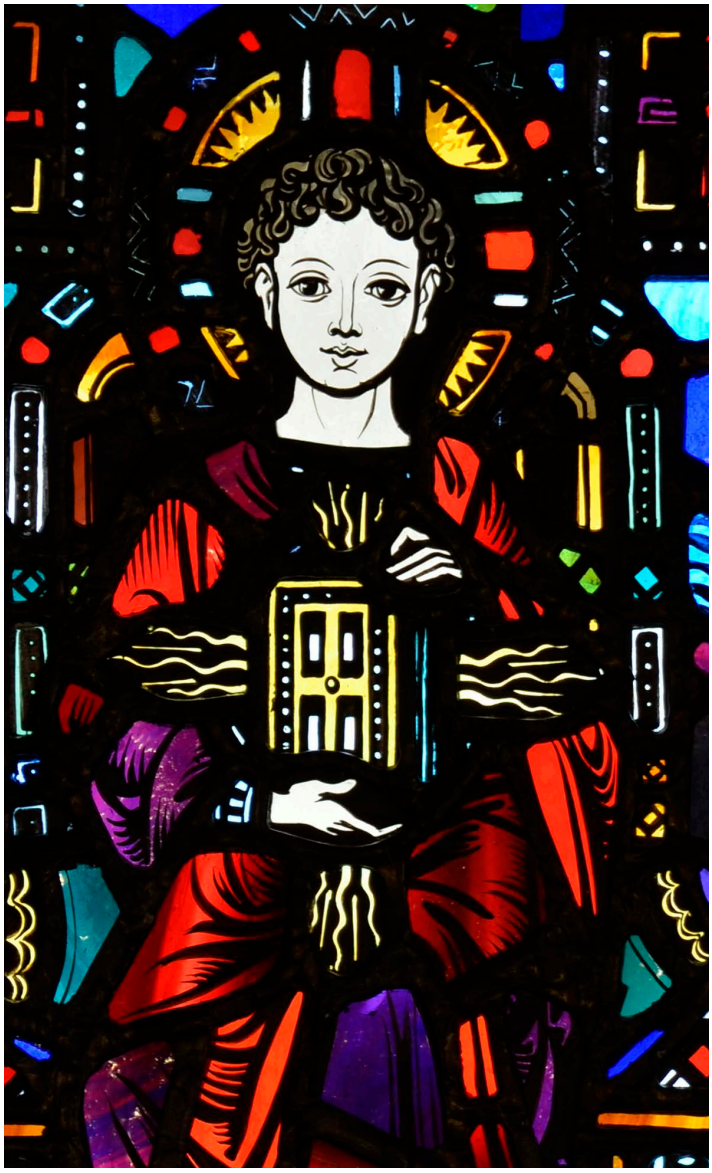
If your congregation isn't financially equipped to fund the process, you will need to raise money, and that may entail applying for a grant. Writing a successful grant application requires special skills so it's often worth the financial outlay to hire a professional grant writer and/or a fundraiser. If you hire a fundraiser, be sure the budget includes money for an experienced grant writer. Some foundations specifically exclude religious institutions from grant eligibility but local foundations sometimes will provide grants to religious institutions for stained glass window restoration, as well as other capital projects, particularly if the institution is active in cultural, educational or charitable community programming. As the grant application is written, incorporate all your building's needs. To keep your request manageable, it may be helpful to

break your plan into modules putting the most pressing issues first.

In most cases, stained glass window repair can be done in phases, as Sloan points out. "Even if all the windows are the same age and by the same maker, usually one side of the building is in worse condition than the other. South and west exposures tend to deteriorate faster than on the north and east. "A good condition study should prioritize [the work], noting windows that need to be restored immediately, ones that will need work in the next two to five years and those that can wait still longer. If the building needs other work requiring scaffolding, scheduling window restoration to make use of that scaffolding helps amortize that cost even though scaffolding is often required on both the inside and outside of windows for removal and reinstallation."

Once you have a plan for stained glass window restoration completed, it is imperative to fully understand the ramifications of the entire job and securing funding and selecting the right professionals to perform the work will ensure success. Sloan says that "keeping windows in good repair is important—structurally and esthetically. With proper maintenance, your building's stained glass has many more years of life ahead."

Vestry Room detail, stained glass at St. Thomas Church.



Resources for Congregations

Preservation League of New York State
www.preservenys.org/preservation-colleagues.html

New York Landmarks Conservancy
www.nylandmarks.org

National Conference of
State Historic Preservation Officers
www.ncshpo.org

"Standards and Guidelines for the Preservation of Historic Stained Glass: An Owner's Guide"
Stained Glass Association of America
www.stainedglass.org

The Foundation Center
www.foundationcenter.org

New York State Parks Restoration
and Historic Preservation
www.nysparks.com/grants/historic-preservation/default.aspx

Julie L. Sloan, LLC is not commercially affiliated with any stained glass studio. Julie L. Sloan, LLC brings to each project many years' experience in history, fine arts, architectural conservation, and project management, combined with an unswerving devotion to the craft and restoration of stained glass. The author of many articles and several books on stained glass, Sloan consults, teaches, and lectures around the country, and is Adjunct Professor in the Graduate School of Architecture at Columbia University, as well as an Instructor in the Art Department of Williams College, Williamstown, Massachusetts.

The Christ Church Stained Glass Restoration Project

by Robyn Visser

Editor's note: We are delighted to publish this article on a successful stained glass restoration project in Manlius, NY, from the point of view of the 10-year parishioner and 7-year volunteer Property Chair managing the project. Ms. Visser has devoted much time to researching the windows' history, managing their restoration, and reporting on the project to the congregation and community. Prior to the window project, between 1990 and 2006, The New York Landmarks Conservancy helped fund three projects at Christ Church: foundation repair, roof truss repair, and steeple restoration. We are pleased to report that the window restoration was completed so successfully, self-funded by the congregation, and that the windows will be on display at this year's Sacred Sites Open House.

Throughout its long history, the Episcopal Christ Church in Manlius, NY has survived due to bold transformations. The church's story began December 13, 1801, when Reverend Benjamin Moore, rector of Trinity Church in Manhattan and later Bishop of New York, sent Deacon Davenport Phelps to spread the gospel to the Native Americans in Upper Canada. Faced with harsh winter weather and slowed by illness, Phelps persisted on his journey, stopping and waiting until his health and the weather conditions improved. In 1802, when Phelps arrived in Manlius, he wrote Bishop Moore, saying: "In this place there is a prospect of a church being organized."

On January 18, 1804, Manlius Trinity Church was formally organized; then reincorporated in 1805 as Trinity Church and, in 1811, finally named Christ Church. As time passed, the church's once-vigorous membership fell off and, by 1831, money had run out. Twice the building was put up for sale and both times there were no offers.

Armed with courage, vision and most of all, faith, the Vestry voted to roll the church downhill on logs to the terminus of the Cherry Valley Turnpike, the main road that brought settlers from the east to the wild frontier of central New York. The building's journey was completed in October 1832, "With the bell hanging and stoves standing, without racking the joints, or jarring off so much as a square foot of plastering."

The Taylor Memorial window, the church's first stained glass, was installed in February 1867. Located behind the altar, the window depicts a sandaled St. Luke, a fitting image since the Apostle St. Luke is the patron saint of physicians and the window, constructed in Buffalo by William Meyers, is a memorial to Dr. William Taylor, a prominent Manlius physician. Eight more memorial windows, four on either side of the church, were ordered in 1889, with the donors asked to select designs that would work together. Over the front door is the only round window, the American-made Babcock Rose window installed in 1911 as a memorial to Lewis Babcock who died in 1901.

Above: Babcock Rose Window. Opposite page: Twitchell memorial window. Christ Church Manlius, NY. All photos courtesy of the Author.

Time passed and all the windows became dulled by dirt accumulated over a century. The lead joining the stained glass pieces on the St. Luke window had deteriorated and the Babcock Rose window was beginning to bow. Conversations about restoration began, with a 2006 estimate for the work coming in at over $100,000. For several years, other projects took precedence.

Then in 2010, when the Rev. Dena Cleaver-Bartholomew became the church's first female rector, she proposed raising funds to restore all the windows beginning with those that needed it most. However, cost remained a significant factor. Funds had been stretched by an addition to the main building costing $1.2 million dollars, as well as the purchase of adjacent properties over a period of several years to make the expansion possible. "The donation for the windows was made as I began the process of a second capital campaign to address the construction debt and deferred maintenance, particularly the windows," said Rev. Cleaver-Bartholomew. "As we began to research the best people for restoring the windows, we had a woman at our parish who had been a local contractor do some research and meet with candidates," she added. "I believe she interviewed three groups, two from upstate New York and the other downstate, and then made recommendations to our subcommittee and Vestry. The downstate organization was fairly busy and we would have needed to wait a while. The other local group gave us a lower but much less thorough proposal and was not as professional in their interactions as we would have liked. Brennan Studio [in nearby Syracuse] was spoken of very highly by other churches that had used them; they gave us a very thorough proposal, and were delightful to work with. I can't say enough about how pleased we were with their work."

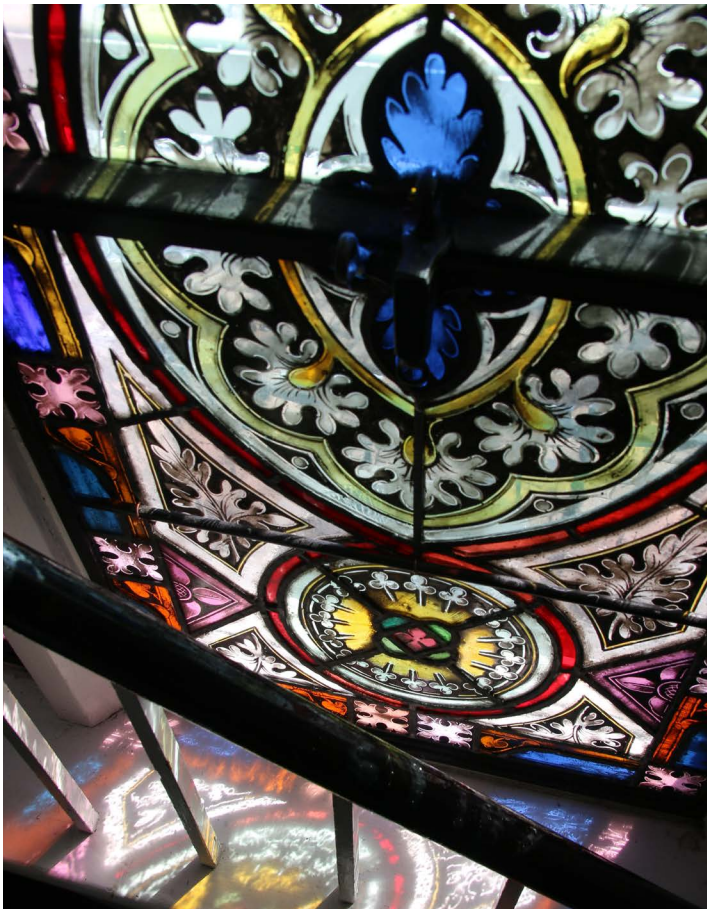
Still, cost remained a factor. Then, after meetings among members of the congregation, an anonymous donor stepped forward and offered to fund the entire restoration project!

The project required expert attention so the highly-regarded Brennan Stained Glass Studio in Syracuse was selected. The first windows were removed in July 2013, with all twelve removed, restored and replaced by the spring of 2015. After the St. Luke window, the next removed were the four on the east side facing the parking lot with particular attention paid to the middle one, the Hibbard-Gold Memorial window. This is an authenticated Tiffany window depicting two central figures of Faith and Christ. The sky above them is a luminous opalescent red and gold with a huge crack through it that we think occurred when the building was in transit. The second Tiffany window, the Van Schaack Memorial, is next to the Hibbard-Gold. The original installation of both these windows April 3, 1890, was announced in Syracuse Weekly Express.

In August of 2013, I arranged to visit Brennan Studio, to learn about the process and report on the progress of our windows to the parish. Greeted by Onyx, the shop cat, I then met Christopher Brennan, son of owner Scott Brennan, who showed me our disassembled St. Luke window. Removed from its exalted place behind the Christ Church altar and in pieces, my first impression was how small the window looked. I was also surprised at how thin the glass was due to when it was made: in the post-Civil War period, lead and glass were scarce materials. The painstaking restoration included re-leading with "lead came," an alloy created with lead, copper, tin, antimony and bismuth and formed into flexible strips. These strips join pieces of glass and have channels into which a bond material is inserted to keep the glass in place and then soldered into the piece as a whole. Measuring is a challenging task as each segment must be precisely measured so that the finished window fits back into its frame perfectly. To relieve the weight of the window and prevent bowing reinforcement bars were put in place and, in some cases, additional bars added. Where the blue glass on St. Luke's robe was broken, Brennan Studio created new pieces exactly like the originals, a complex process that took three days. The work began by copying a piece of the original glass. Paint for the details was made of glass ground so fine it became a powder. After the paint was applied and fired, the piece was cooled, turned over, painted on the backside to tone down the color and then turned over again for another paint application. When the glass was heated in the kiln it required a temperature of 1,300 degrees to fuse. (In earlier days, restorers simply looked inside a kiln to see if the glass was red indicating fusion.)

Talking with Scott Brennan, I learned how he became a restorer. His first plan was to enter law enforcement but a shoot-out while riding along with a Manlius cop changed his mind. Instead, he followed his father, Bruce, a commercial glazier and talented artist, who was getting calls to fix stained glass and opened Brennan Studio in 1975. Scott learned the craft both from his father and also from working as an apprentice to master designer and painter, Stanley Worden. Scott remembers his time with Worden warmly, noting that his training took place at the master's home to which he went every Friday night for five years armed with $100 and a carton of cigarettes for Worden, a heavy smoker. Worden taught Scott Brennan many trade secrets which Brennan Studio now passes on via classes in stained glass techniques. In addition to teaching and restoring church windows, the studio works on other projects like restoring valuable Tiffany lamp shades and stained glass windows for private homes, an aspect of the business that is currently experiencing increased demand. The studio remains a family operation with Scott's son Christopher involved in restoration work, daughter Kimberly working in the office and foreman Gary Messenger integral to the operation. Scott prefers working on jobs locally so that anything that isn't correct can be addressed quickly. "If something doesn't fit," he explained, "we'll take it back (to the shop) and adjust it."

In addition to the work of Brennan Stained Glass Studio, new aluminum frames were made for the outside of the Christ Church windows. As Scott observed, "A central New York winter can be brutal so, until 1973 when fuel got expensive, nobody covered their windows." Although it may be tempting to leave windows uncovered, practicality dictates that these works of art be protected. The new frames are the work of J. Sussman, Inc., Jamaica, New York, one of very few companies nationwide which manufactures custom aluminum window sash that replicates the bent or curved shapes of arched or trefoil windows. This allows protective glazing to match the shape and profiles of the original



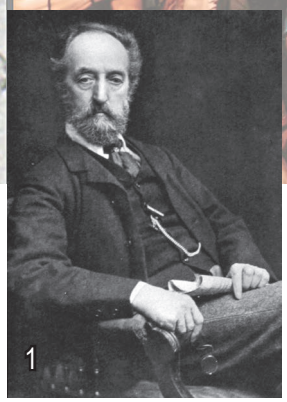
Detail of narthex window. Christ Church Manlius, NY.

Left: Van Schaack window showing exterior frame.
Right: Detail of Remington memorial window.

wood sash underneath, preserving its appearance from both exterior and interior. Because of costs, many churches protect stained glass windows with acrylic sheeting as Christ Church first did. Instead of Plexiglas, Brennan Studio prefers to install the preservationist's glass of choice, laminated safety glass, which breaks but stops a projectile. As an added bonus, with safety glass in place, the window becomes a sealed unit with less heated air escaping outside. Besides the glass restoration, Brennan Studio also repaired the Church's operable windows so the lower panels now open and close. For a church that at the time lacked central air conditioning, this was more than just cosmetic. The entire project was costly due to many factors including the need for scaffolding. As Scott Brennan pointed out, "Three hundred people may look at that window every week. That's why it's worthwhile to do the best job possible even it if is expensive."

During the restoration process, Rev. Cleaver-Bartholomew took photographs. As she observed, "It's a huge visible difference--clean, sparkling, really visible patterns and you can see the leaves on the tree behind the window move in the breeze." When I stood with her as the final panels of St. Luke were once again carefully set in place, we were privileged to see the windows in the exact same way that the people in 1867 saw them. Scott Brennan's favorite is The Twitchell Memorial window depicting birth with spring flowers on one side and death with autumnal harvest foliage. This window was among those ordered in 1889, as a memorial to Manlius farmer and businessman Curtis Twitchell.

The total cost of the work at Christ Church was $212,600. Everyone at the Church is grateful to our anonymous donor, someone who not only loves God and this church but also reveres art and history. Our windows are more than decoration; they are part of our worship as well as a treasure we inherited from a distant generation. Now they are our gift for the future. This is the beauty and magic of stained glass: to delight the eye, incite the imagination, and inspire the faithful.



Transatlantic Treasures:

Henry Holiday's Stained Glass Windows for Gilded Age New York

By George B. Bryant

New York is important for many things but it was particularly important for the English artist and stained glass designer Henry Holiday. His work was first introduced to Americans in 1876 at the Centennial International Exhibition in Philadelphia and his first American commissions were for churches in suburban Philadelphia and Boston. Holiday first entered the New York market in 1881 at a time when the new "American Glass" designs by John La Farge and Louis Comfort Tiffany were being touted as "much beyond all contemporary competition" so as to "take away the breath of any modern European glass-stainer."[1] Also, during the 1880s and 90s, the arts in New York City were increasingly spoken with a French accent as young American artists and architects completed their studies at the École des Beaux-Arts and returned home to create a new "American Renaissance" based upon what they had learned in Paris. Their vision was warmly embraced and promoted by a large number of fabulously wealthy patrons.[2] Even so, Holiday found great success in New York, designing over thirty windows in New York City, and many others in Albany, Buffalo, Utica and Wappinger's Falls.

Although Holiday was one of the finest stained glass artists of his time, he has not received the wider recognition he deserves and has been overshadowed by his American contemporaries. In an effort to correct this, the New York Landmarks Conservancy's Sacred Sites Open House, May 20th – 21st, will feature tours of New York churches containing Henry Holiday windows. This article will serve as a prelude to this event and as an introduction to Henry Holiday and his art.

Holiday's Early Education and Career

Henry George Alexander Holiday (fig. 1) was born in London in 1839 and showed a talent for drawing at an early age.[3] His parents encouraged his interest and paid for initial drawing lessons for Henry and his sister. He continued his art instruction by attending evening classes at Leigh's Art School and in 1854, he was accepted to the Royal Academy school; he began classes as the youngest student in January of 1855.

The Academy courses proved to be dull, conventional and very disappointing, with one exception. The 'Life-school' offered to Academy students was an anatomy class vividly illustrated with actual body parts that were progressively dissected. After each lecture, the students were free to examine and make drawings of

1 R. Riordan, "American Stained Glass: Third Article," American Art Review, (May 1881): 61.

2 For general information on the 'American Renaissance', see Richard Guy Wilson, Diane H. Pilgrim and Richard N. Murray, The American Renaissance: 1876 – 1907 (New York, 1979).

3 The primary source for biographical information on Henry Holiday is his autobiography: Reminiscences of My Life (London, 1914)

the body parts at their leisure. Holiday could not understand why so few of his fellow students took the class. This study of anatomy proved to be an important influence on Holiday's art. He was very particular about making sure his figure studies were anatomically correct, to the extent that he drew his figures first as nudes and then added clothing. (fig. 2)

During his studies at the Academy, Holiday became intrigued by the work of the Pre-Raphaelites who were the radical avant-garde painters of the day. He succumbed to their influence after seeing the painting *Autumn Leaves* by John Everett Millais which was exhibited in 1856. A few years later he was introduced to some of the Pre-Raphaelites including Dante Gabriel Rossetti, William Holman Hunt and Edward Burne-Jones, with whom he became a lifelong friend.

Through these friends, Holiday met the Gothic Revival architect William Burges, who in 1861, commissioned him to contribute a painted panel of Sappho and Phaon to his Great Book Case. In December of 1862, James Powell & Sons, Whitefriars Glass Works in London hired Holiday to design cartoons for stained glass windows. Powell & Sons had begun making stained glass in 1844, and during the 1850s and 60s, the company had established a very strong reputation, primarily due to an excellent group of freelance designers. Burne-Jones began designing for Powell & Sons in 1857 and continued to do so until he left in 1861 to collaborate with his close friend William Morris. Holiday was to be his replacement and even though he had no experience designing windows, the firm was willing to give him a chance based on his artistic talent. Burges offered him advice and technical assistance and began to commission designs for his own projects.

Powell & Sons were so pleased with Holiday's work that they offered him an exclusive contract to be their principal designer. He accepted but almost immediately had to renegotiate the contract in order to accept another commission from Burges to design seven windows for Worcester College Chapel in Oxford. Thus, he began his career as a freelance designer providing designs to other stained glass firms such as Heaton, Butler & Bayne in addition to Powell & Sons. With his professional prospects improving, he married Kate Raven in 1864. The next year, the couple celebrated the birth of their daughter, Winifred.

In the spring of 1867, Holiday traveled through France and Italy with sketchbook in hand. On Burges' advice, he spent several weeks in Assisi where he made a detailed study of Giotto's frescos.

Figure 1: Henry Holiday, c. 1912, portrait from Holiday, Reminiscences of My Life (1912).

Figure 2: Comparative details of Christ the Consoler, St. Luke's Hospital, New York: Left, detail of naked study published as Fig. 56 in Holiday, *Stained Glass As An Art (*1896), Right, detail of completed window.

Figure 3: (Detail) Henry Holiday, chancel window (1869), St. Mary Magdalen's, Paddington, London.

Figure 4: (Detail) Henry Holiday, Resurrection (1865), St. Michael's, Mere, Wiltshire (photo by Dennis Hadley).

Figure 5: Henry Holiday, Christ Blessing Children (1878), Trinity Church, Boston.

Figure 6: (Detail) Henry Holiday, Joseph and Benjamin (1880), Grace Church, New York, NY

Figure 7: Henry Holiday, The Ascension the Shelton Memorial (1889), St. Paul's Cathedral, Buffalo. (photo courtesy of Thomas Heyer).

Figure 8: Henry Holiday, Christ the Consoler and Seven Acts of Mercy (1894), Muhlenberg Chapel, St. Luke's Hospital, New York, NY

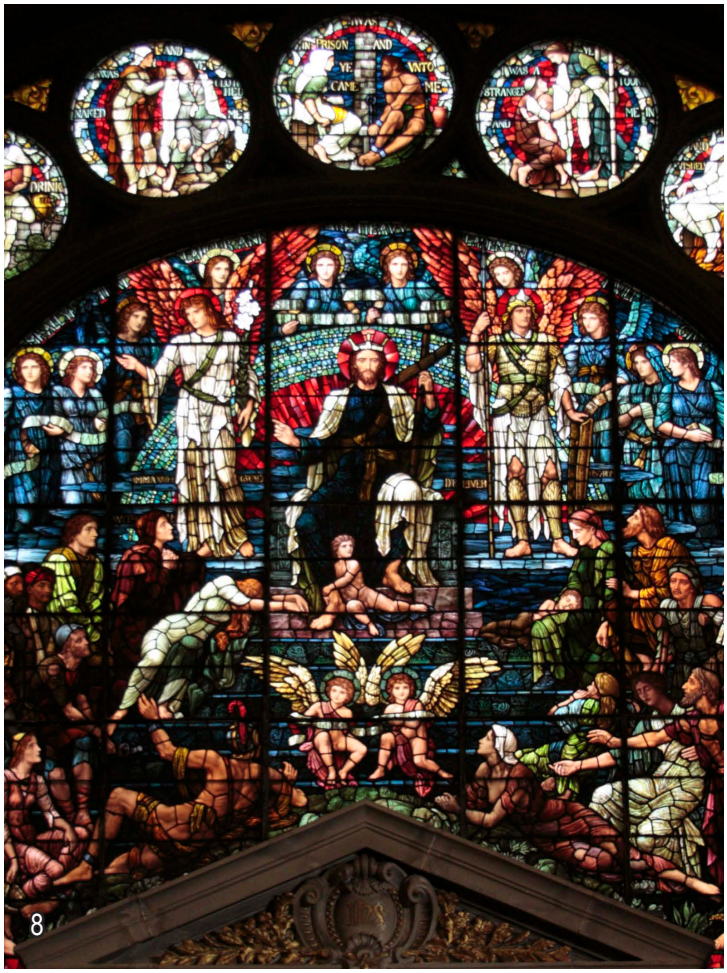


Figure 9: Henry Holiday, comparative Adoration details: left, St. Peter's, Albany (1884), center, Church of the Holy Trinity, New York (1898), right, Epiphany Chapel, Springside Chestnut Hill Academy, Philadelphia (1905).

Figure 10: Henry Holiday, 3-light chancel window (1895), Zion Church, Wappinger's Falls (photo courtesy of Zion Church). Compare the left-hand Nativity window with Figure 11: Henry Holiday, Nativity (1899), St. George's, Flushing.

The artistic riches of Italy were a revelation to Holiday and the trip was a turning point in his artistic career. Upon his return home, Holiday began to part artistic ways with his Pre-Raphaelite friends, moving towards a more classical approach to figure painting and glass design.

His first opportunity to try out these new ideas came in 1868 with the commission from architect Richard Norman Shaw for the Brunel memorial window produced by the firm of Heaton Butler & Bayne for Westminster Abbey. The following year he was given another important commission by architect George Edmund Street to design all of the windows for the new St. Mary Magdalene Church in Paddington. (fig. 3)

In 1875, Lewis Carroll commissioned Holiday to provide illustrations for his nonsense poem, *The Hunting of the Snark* and the book was published in April of 1876. By that year, Holiday's reputation as a stained glass designer and muralist was growing in England and he was well connected to many of the major artistic movements of the day. Despite his growing success in England, he was generally unknown in the United States.

The Centennial Exhibition in Philadelphia provided a showcase for numerous stained glass designers from Europe and the United States including James Powell & Sons, which was one of thirteen English stained glass firms exhibiting their work. For the Exhibition, Powell & Sons decided to recycle designs from their exhibit from the Paris Exhibition of 1867 rather than show more recent examples of the products.[4] One of the two exhibited works was a three-light window designed by Holiday depicting the Resurrection that had originally been designed in 1865 for St. Michael's Church in Mere, Wiltshire; copies were made for both the Paris and Philadelphia exhibitions. (fig. 4) While the Pre-Raphaelite-inspired design was more than ten years old and no longer representative of Holiday's current more classical style, this window served as Holiday's American debut.

American Patronage

Holiday's success in the United States came through a small, but loyal network of patrons, who were predominantly devout Episcopalians sharing a broad and liberal theology with a strong belief in social outreach.[5] Among his early patrons were important clergymen Phillips Brooks, Arthur Brooks and Henry Potter, all major figures in the Broad Church Movement, while his non-clergy patrons tended to be wealthy businessmen or their wives or children, all with progressive reform ideals.

Another commonality amongst three of his important patrons, Robert Treat Paine in Boston, Dr. George Woodward in Philadelphia and the Rhinelander family in New York City, was an interest in the Settlement Movement and affordable housing for the poor. But,

4 Dr. Dennis Hadley and Joan Hadley, "Windows by James Powell & Sons at the Centennial Exhibition of 1876," in International Seminar on Stained Glass of the 19th and 20th Centuries, ed. Virginia Chieffo Raguin (Worcester, MA, 1994): 22.

5 See George Bryant, "Frank Furness and Henry Holiday: A Study of Patronage, Architecture and Art," Architectural History, 56 (2013) for a further discussion of Holiday's American patrons.

Figure 14: Henry Holiday, chancel window detail, Hannah and David (1894), Grace Church, Utica.

most importantly, his patrons were independent-minded people who were not afraid to step outside the bounds of popular taste and make choices that resonated with their own personal beliefs. They often commissioned more than one window from Holiday and the main clusters of his windows are found in New York City, Philadelphia, Boston and Washington DC.

Phillips Brooks first contacted Holiday in 1878 to design two windows for Trinity Church in Boston.[6] (fig. 5) One of these was paid for by Robert Treat Paine, who declared the finished window to be the best in the church. When Henry Potter saw these windows during a visit with his dear friend Phillips Brooks, Potter wrote to Holiday, "To study your glass, Mr. Holiday, is a liberal education." Potter soon started commissioning windows from Holiday for his own Grace Church.

During his tenure at Grace Church, Rev. Potter had purchased many windows for the church from the English commercial firm of Clayton and Bell but, after seeing the windows at Trinity Church, he shifted his patronage to Holiday.[7] (fig. 6) It is Rev. Potter's influence that is the common link between most, if not all of the Henry Holiday windows in New York City.

Arthur Brooks followed his brother's and Rev. Potter's lead and commissioned Holiday to replace some of the windows destroyed by a fire in the Church of the Incarnation in 1882. The church also contains later windows by La Farge, Tiffany, Burne-Jones and Kempe and the collection offers a good opportunity for comparison of the works of these artists. Other windows were also commissioned from Holiday during the 1880s for St. Peter's Episcopal Church Albany, Christ Church, in Cobble Hill, Brooklyn and the Brick Presbyterian Church in New York City. (fig. 17)

Holiday's Visit to America

Inspired by Edward Bellamy's utopian vision of the artist's role in a more just political economy, as described in his novel Looking Backward, and his own unhappiness with the division of labor and the decline of production quality in commercial stained glass firms, Holiday contemplated starting his own firm. However, he first needed to secure his existing client base and expand his contacts

6 Holiday, Reminiscences, 259-260.

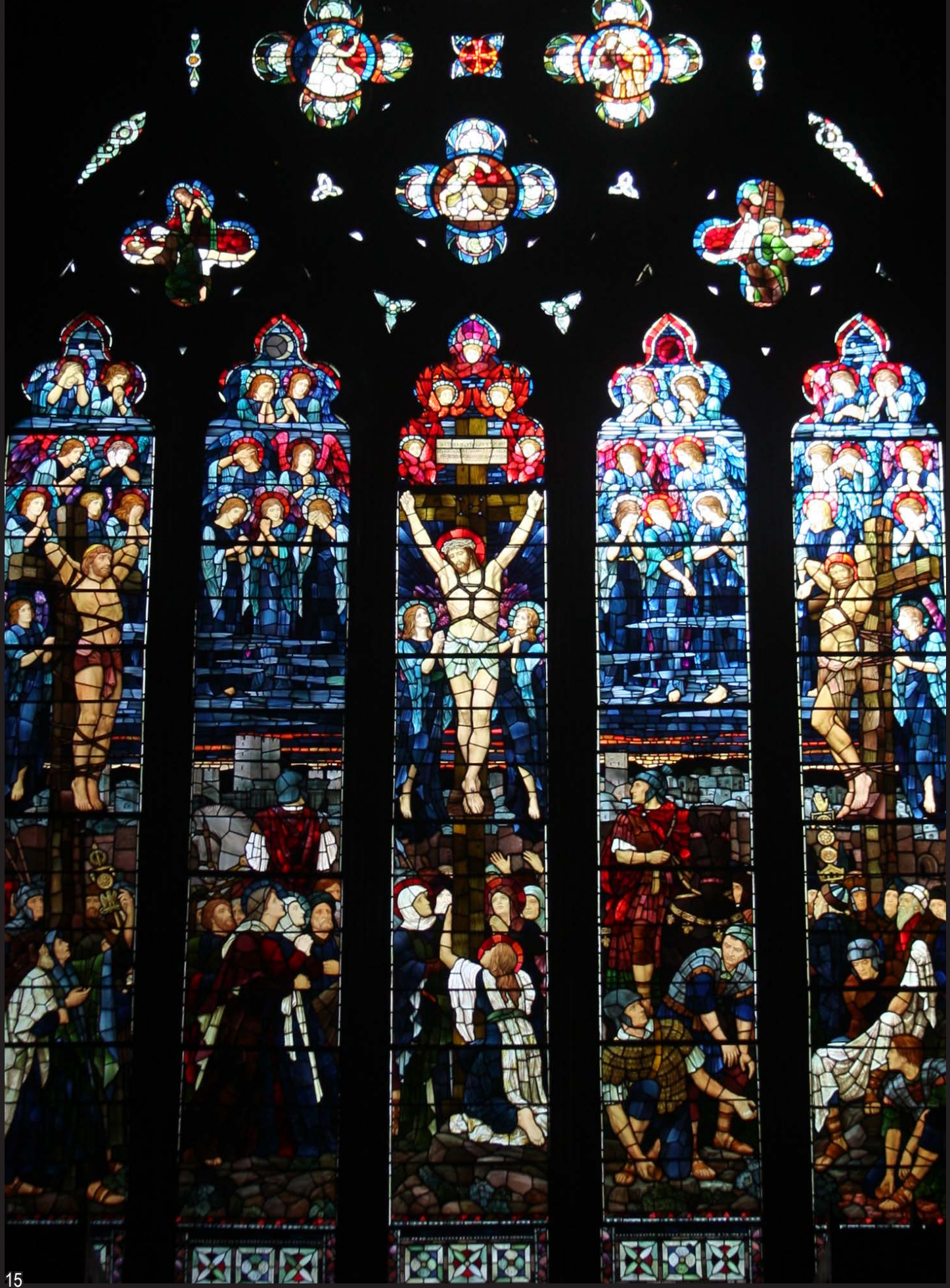
7 William Rhinelander Stewart, Grace Church and Old New York (New York, 1923): 269-284.

Figure 13: Henry Holiday, Rhinelander memorial chancel window (1898-9), Church of the Holy Trinity, New York.

Figure 18: Henry Holiday, Washing Feet (1921), Grace Church, New York.

so, on April 12, 1890 he sailed aboard the S. S. Etruria to America.[8] Before leaving England, he received a cable from Arthur Brooks inviting him to dine with Brooks and his wife when he arrived in New York. Brooks also invited a number of "distinguished" New Yorkers and the evening made for "a very pleasant introduction to the city." It was also on his first day in New York that he was given the commission for the seven large chancel windows for Grace Church in Utica. This was an auspicious beginning for his trip. Holiday also visited Rev. Potter, now a bishop and then travelled to Philadelphia, Richmond, Washington DC, Toronto and Quebec. He also traveled to Buffalo to confer with the donors of the five-light chancel window to replace the Shelton Memorial window that had been destroyed in the fire that ravaged St. Paul's in 1888. (fig. 7) After paying a visit to Bellamy, he then went to Boston for a visit with Phillips Brooks and made several more stops before returning to England. With a good number of new commissions, he opened his own studio in Hampstead in January, 1891.

8 Holiday, Reminiscences, Chapter 26.



15

Figure 15: Henry Holiday, Crucifixion (1901-02), Church of the Holy Trinity, New York.

Figure 16: Henry Holiday, The Church of Christ (1931), Church of the Holy Trinity, New York. The William Rhinelander Stewart memorial window was produced to Holiday's design by E. Liddle Armitage.

Holiday's Independent Studio

Now with greater control over the painting and production of his designs, Holiday quickly started improving the quality of his windows. Holiday's artistic development is seen by comparing three examples of the same design made over a period of about twenty years. An early window from St. Peter's, Albany shows the typical painting style of Powell and Son's during the 1880s: the white skin tone was one of the things Holiday wanted to move away from with the start his own studio. The progress he made can be seen by comparing the window in Holy Trinity, New York City and the one from a few years later in Philadelphia's Epiphany Chapel. Beautifully detailed painting, especially the faces, and richly colored glass, some made in his studio, are the distinctive qualities of the windows produced by Holiday's studio that set him apart from all other stained glass artists. (fig. 9)

Over the course of his long career, Holiday had assembled a large "cast" of figures, modeled on real people that he used to populate his windows. By manipulating the figures and assembling them in groups, he was able to efficiently populate his designs and streamline production. One of the ways to identify Holiday's windows is to recognize the many faces that reappear as different figures from one window to another. He would also reuse or slightly modify designs for different commissions such as the "Nativity" windows seen at St. George's Church in Flushing and Zion Episcopal Church in Wappinger's Falls. (figs. 10,11)

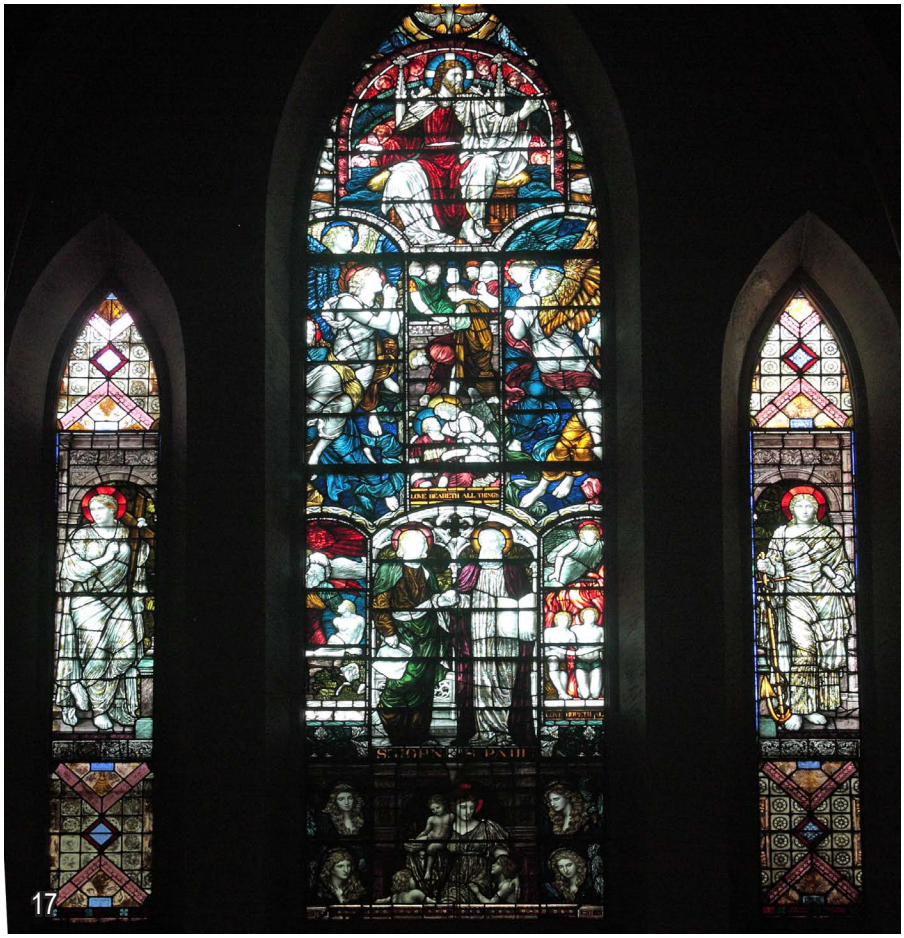


Figure 17: Henry Holiday, Love, (1884) originally designed for the Brick Presbyterian Church in New York. Relocated and reconfigured and now the chancel window in Christ Church, Cobble Hill in Brooklyn.

Holiday's new studio began to thrive on a steady stream of commissions from America and especially from New York. The studio was in operation from 1891 to 1906 and during that time Holiday produced his finest work, many of which can be found in New York.

Muhlenberg Chapel, St. Luke's Hospital and Grace Church, Utica

Bishop Potter was instrumental in the selection of Holiday to design the monumental window for the Muhlenberg Chapel in the new St. Luke's Hospital.[9] (fig. 8)The window was a memorial to Rev. Muhlenberg, the founder of the hospital and to Adam Norrie, long-time treasurer of the Hospital. During a trip to England in the summer of 1893, Bishop Potter visited stained glass firms and asked Holiday to provide a design sketch and a fee proposal for the memorial window; they were quickly approved and the window was completed by July 1894 and shipped to New York later that year. Holiday then began work on the seven chancel windows for Grace Church, Utica that had been commissioned four years earlier. (fig. 14)

Holiday saw these commissions as an opportunity to showcase his new studio's capabilities. While the promoters of "American Glass" produced by La Farge and Tiffany were stepping up their harsh criticism of English stained glass, being critical of even of

9 George Bryant, "Henry Holiday's Christ the Consoler window in the Muhlenberg Chapel at St. Luke's Hospital, New York City," The Journal of Stained Glass, (forthcoming).

Holiday, Caryl Coleman wrote in Architectural Record in 1893, "It is true Mr. Haliday [sic], a follower of Burne-Jones, has attempted in these later days to combine beauty of form with beauty of color, but without any marked result."[10] These windows can be seen as Holiday's response to this criticism and as physical manifestations of his philosophy of stained glass design. In 1896, he published his manifesto, *Stained Glass as an Art,* that included illustrations of these windows and several of his other American commissions, appending it with a sharply critical assessment of "American Glass" and the methodology of John La Farge. This did not sit well with American critics, such as Kenyon Cox, who wrote a very nasty review of the book for The Nation magazine. [11]

The criticism, however did not prevent Holiday from achieving further success in America in general, or New York in particular and commissions continued to stream in while his studio created windows for Church of the Incarnation and Grace Chapel in New York City, St. George's, Flushing, St. Peter's, Albany and Zion Episcopal Church, Wappinger's Falls. The greatest works were yet to come.

Figure 18: (Detail) Henry Holiday, Suffer Little Children (1900), Grace Chapel (now Church of the Immaculate Conception), New York.

The Rhinelander Memorial Church

In 1895, Serena Rhinelander entered into an agreement with the St. James Mission to build a new building on East 88th Street in Manhattan on property that was once part of the original Rhinelander farm. As the construction of the new St. Christopher House was underway, Serena Rhinelander made plans to build a new church and clergy house as a memorial to the Rhinelander family.[12]

William Rhinelander Stewart served as Serena's representative and organized and oversaw the construction of the church buildings as well as St. Christopher House. Stewart chose Barney and Chapman as architects, whom he had previously hired for the Grace Chapel (now Church of the Immaculate Conception) and it appears that Stewart and Barney traveled to Europe during the summer of 1896, quite possibly for architectural inspiration and stained glass.[13] Even though the design for the complex is a much more elaborate version of the buildings for Grace Chapel, the style is inspired by French Gothic of the 13th and 14th centuries, rendered in golden brick and brown terra-cotta.

This was quite a different architectural approach from the prevailing Beaux-Arts influence of the time as noted by the architectural critic, Montgomery Schuyler in his praising review of Barney's work in the Architectural Record in 1904.[14] He said, "The singularity of Mr. Barney's case is that the tyranny of temperament has so far prevailed with him over the oppression of his professional training as to make him a Gothic architect." Referring to the Barney's design of the Olin L. Warner residence, but equally applicable to Holy Trinity, Schuyler remarked, "the architect, or his client, was out of joint with the architectural tendencies of the time, which were divided …. between the expiring throes of Richardsonian Romanesque and the beginning of the reproductions of the French official style, as acquired, if not inculcated at the Beaux Arts."

The choice of a stained glass artist was equally out of step with the current vogue of "American Glass." The intention was to fill the large window openings with memorial stained glass dedicated to members of the Rhinelander family and Stewart wrote to Henry Holiday in 1896 asking him to design the seven, three-light chancel

10 Caryl Colman, "The Second Spring," Architectural Record (April- June, 1893): 480.
11 (Kenyon Cox), "Holiday's Stained Glass," The Nation (20 May 1897): 382-383.
12 "St. Christopher's House," The New York Times (11 April 1897): 12.
13 Stewart's and Barney's individual listings in The Social Register, New York, 1897 note that both of them arrived back in New York City on 2 September 1896 aboard the Teutonic. This seems too much of a coincidence not to have been planned.
14 Montgomery Schuyler, "The Works of Messrs. Barney and Chapman," The Architectural Record, 16 (September, 1904): 203-296.

windows depicting the life of Christ. (fig. 13)

Stewart could have chosen anyone to design the windows but chose Holiday over all others, telling Holiday that he had traveled for months in America, Great Britain and Europe in search of the best stained glass and had settled on Holiday.[15] Stewart was certainly familiar with Holiday's windows at Grace Church and most likely had seen the St. Luke's window. It is also likely that Stewart's good friend, Bishop Potter had recommended Holiday to him.

By May of 1899, four of the chancel windows were installed in time for the consecration ceremony led by Bishop Potter.[16] By that same time, Stewart had also commissioned Holiday to design the two transept windows. (fig. 15) The Rhinelander family reserved the remaining windows for future memorials and, at Stewart's insistence they were all to be designed by Holiday himself. Stewart was so pleased with the windows for Holy Trinity, he commissioned two other windows from Holiday.[17]

The first in 1899 was installed in the transept of the Grace Chapel as a memorial to his daughter. (fig. 18) The second was installed in Grace Church as a memorial to Stanhope and Jane Callender, replacing an earlier, unloved window by Henry Sharp. (fig.16)

Figure 19: Center, photo of the interior of Christ Church Cobble Hill c. 1895, taken from the Christ Church Parish year Book of 1905, left, Henry Holiday, design drawing for Jacobs Ladder, (1885) the central light of the chancel window (collection of the Birmingham Museum and Art Gallery), right, Henry Holiday, B.V.M. (1895) the right hand sidelight of the chancel window, now located behind the baptistery.

Stewart's appreciation of Holiday's work did not wane over the years, telling Holiday that the transept windows in Holy Trinity were "the most glorious stained glass he had seen, ancient or modern."[18] Holiday greatly appreciated the compliment. He had been thrilled with the opportunity to design these two very large windows, sparing no effort, and thought they were two of the best he had ever done.

In 1925, Stewart wished to have a window as memorial to himself and asked Holiday to design it for Holy Trinity's large west window. Stewart wrote to Holiday, saying, "I have no doubt we would be excused by posterity for taking any steps we reasonably may to prevent this great window being filled with glass of inferior design and execution to that now in place in the church."[19]

Holiday decided to shut down his own studio in 1906 and transfer the production of his designs to the firm of Lowndes and Drury and their new studio and workshop in the Glass House in Fulham, London. The Lowndes and Drury studio was a hotbed of Arts and Crafts glass design, allowing independent designers to rent studio space and pay for production services.[20] Unlike the large commercial firms, the artists were able to interact with the production staff and retain artistic and quality control over their designs. This was much to Holiday's liking. It was at Lowndes and Drury that the last four Holy Trinity windows in the nave were produced. E. Liddall Armitage had trained at Powell and Sons with Holiday and worked in partnership with Drury's son during the 1920s and Armitage was chosen to complete the final two windows for Holy Trinity to designs by Holiday.[21]

Holiday died in 1927 at the age of 88 after an incredibly long career, having outlived all of his contemporaries and many

15 Holiday, Reminiscences, 136.

16 "New Holy Trinity Church," The New York Times (1 May 1899): 5; also see: J. Stewart Barney, "Holy Trinity Church Settlement, New York," The Churchman (6 May 1899): 659 -663.

17 Stewart, Grace Church, 281-282 & 377.

18 Holiday, Reminiscences, 437.

19 This letter is quoted by Winifred Holiday in the list of her father's windows that she prepared for the "Henry Holiday" issue of the Walker's Quarterly published in 1930. The list of windows is incomplete and sometimes in error but still provides the only comprehensive list of Holiday's work.

20 Peter Cormack, Arts & Crafts Stained Glass (New Haven and London, 2015): 248-250.

21 Winifred Holiday included this information in the Walker's Quarterly list.

younger artists.[22] His work spanned the development of stained glass art from the Gothic Revival through to the Arts and Crafts movement and his glorious windows still validate Stewart's high praise. William Rhinelander Stewart, Holiday's most generous patron, died in 1928. His memorial window was completed to Holiday's design by E. Liddall Armitage and was installed in the Church in 1931.[23] (fig. 16)

Preservation

Not all of Holiday's windows have survived including a large, five light transept window in St. Thomas' Church on Fifth Avenue which was lost when fire destroyed the church in 1910. Others have simply gone missing. So I would be remiss not to point out the challenges of preserving the remaining examples of Holiday's art. They are, after all, exterior windows and subject to rain, wind and snow and all the other "slings and arrows of outrageous fortune." Let me illustrate this by the sad and tragic story of Christ Church, Cobble Hill in Brooklyn.

The church was founded in 1835 and the church building, designed by Richard Upjohn was consecrated in 1842. There was a small fire in the church vestibule in 1884.[24] While the fire did not cause much damage, it may have inspired an effort to redecorate the chancel. During the summer of 1885, the rector, Rev. Dr. L. W. Bancroft traveled to England and commissioned a new chancel window from Henry Holiday.[25] The design included a depiction of Jacob's Ladder in the center light.[26] The two side lights contained figures of St. Michael and The Virgin Mary. There are indications that other windows were ordered from Holiday during Rev. Bancroft's time at Christ Church but the documentation is unclear.

Figure 20: Henry Holiday, design sketch for the Brick Church window reproduced as Figure 11 in Stained Glass As An Art.

In 1890, Rev. Bancroft's successor, Rev. Arthur Barksdale Kinsolving oversaw the installation of several Tiffany windows.[27] Tiffany also redecorated the chancel in 1895 and in 1914, Tiffany removed Holiday's chancel window, replacing it with his own Adoration of the Magi window. The Holiday figures of St. Michael and Mary were reconfigured and moved to the side aisle behind the baptistery; the disposition of the Jacob's Ladder is unknown. In 1939, the church again caught fire but this time much was destroyed including the Adoration of the Magi window.[28] The windows behind the baptistery survived along with five other Tiffany windows. Once again the church was rebuilt and all of the aisle windows were reconfigured.

The present day chancel window contains another window designed by Holiday, but clearly not the one designed for this location. (fig. 19) Where did it come from? In Holiday's book, *Stained Glass as an Art,* an illustration shows this window as

22 "Henry Holiday, 88, Noted Artist, Dead," The New York Times (16 April 1927):15.
23 "Holy Trinity Dedicates window to W. R. Stewart," The New York Times (13 April 1931): 26.
24 "A Congregation's Peril." The New York Times (22 December 1884): 1.
25 "Brooklyn – Christ Church," The Churchman (8 August 1885): 147 and (5 September 1885): 258.
26 Holiday's design drawing for this window is in the collection of the Birmingham Museum and Art Gallery. It was exhibited as part of the Henry Holiday Exhibition held at the William Morris Gallery in 1989 and curated by Peter Cormack. The catalog entry states, "the design is a re-working of an earlier one for Wolsingham church (Co. Durham, 1881), but on a substantially larger scale."
27 Arthur Barksdale Kinsolving, "Sermon Preached by the Rector on his tenth anniversary, December 17, 1889," reprinted in The Year Book of Christ Church Parish Brooklyn, New York of 1900. The sermon describes the changes that occurred during the past ten years. A selection of Christ Church Parish's Year Books are in the collection of the Brooklyn Historical Society.
28 Landmarks Preservation Commission, Cobble Hill Historic District Designation Report, (New York, 1969): 33

being for the Brick Church in New York City. (fig. 20) The window was a memorial for the ex-Governor Edwin W. Morgan and was installed in the second Brick Presbyterian Church in 1884.[29] The Brick Church sold their Fifth Avenue building in 1939 and built a new church, at which time they gave the Morgan Memorial window to Christ Church and it was reconfigured, with some poetic justice, to replace the destroyed Tiffany window.

Unfortunately, this was not the end of sorrows for Christ Church. The tower was struck by lightning and damaged in 2000, and before repairs were completed, lightning struck again in 2012.[30] This time it was tragic as stones fell, collapsing the scaffolding and killing a passing pedestrian. The New York City Building Department ordered the church closed and the church remains shrouded in netting and scaffolding; the congregation meets in the adjacent parish hall. With the staggering cost of restoration and funding sources uncertain, and in the face of overwhelming circumstances, preserving the windows is the least of the congregation's concerns. While Christ Church's example is extreme, it illustrates all the things that can go wrong, and any one of these things could happen to any of the churches and the beautiful works of art they house. *[Editor's note: while possible, we trust that the Conservancy's readers and Sacred Sites workshop attendees and grantees are doing all they can to address deferred maintenance and avert disaster: tower, fire, and otherwise, including documenting their windows and other artifacts for insurance purposes].*

We try to preserve the things that are dear to us, things we know and appreciate for their beauty and history. As you tour through the churches, remember that the majority of windows you encounter are over one hundred years old, many of which are in need of restoration at great cost. Efforts are currently underway at St. Luke's Hospital to raise over $250,000 required to restore their window, while the windows at Holy Trinity are desperately in need of restoration and will cost substantially more. (fig. 21)

The importance of Holiday's windows has long been overshadowed by the more well-known works of La Farge and Tiffany and therefore undervalued. While not all of Holiday's New York windows have survived, those that have provide a beautiful record of his career and include many of his finest works. I hope, by knowing more about the windows and stories behind them, you will share William Rhinelander Stewart's appreciation of these "glorious stained glass" windows and the see the need for their continued preservation.

Figure 21: Detail photo of the exterior of one of the chancel windows at Church of the Holy Trinity. The deteriorating lead and accumulated staining and dirt are readily apparent. The windows are in desperate need of restoration.

An architect and architectural historian based in Philadelphia, George Bryant has researched, written, and published articles on architect Frank Furness and the development of the artistic attached house. A book on stained glass designer Henry Holiday is forthcoming. Continuing research interests include: architects John Arthur Walker and Harold Thorp Carswell, the Gothic Revival and the Arts & Crafts Movement and regional influences on housing design.

29 I am indebted to Ellsworth G. Stanton III, Clerk of Sessions and Archivist for the Brick Presbyterian Church for this information.

30 Joseph Berger, "Lightning Shatters Tower at a 19th-Century Church", The New York Times (1 August 2012): A19.

Technical Spotlight:
WHAT'S WRONG WITH MY WINDOWS?

by Art Femenella

The American Industrial Revolution, beginning in the early 19th century, yielded a level of prosperity for the American entrepreneurs that rivaled the riches of European royalty. By the mid to late 19th century, the nouveau-riche railroad barons, industrialists and prosperous merchants were spending millions of dollars building sumptuous mansions, classical public buildings and monumental Churches. To further embellish these buildings, over one-hundred thousand beautiful stained-glass windows were produced, many of them of very high quality.

Stained glass is a material that many stewards of buildings are unfamiliar with. Glass is magical, it is precious and it can be a daunting task for building owners to determine if their stained glass is in good condition. The matrix that holds the individual pieces of glass can be made from a variety of materials, but lead is the most common. There are leaded windows that are 400 years old and still in good condition and there are leaded windows that are 50 years old and in very poor condition; age alone is not the determinant factor. Owners can often be convinced to pay for repairs that are unnecessary. How do building stewards determine if a window is in bad shape? If there are problems, how serious are they? Does the level of deterioration warrant removal of the window, or can the problems be addressed in situ? How can an owner or project manager navigate the proper course of conservation when the waters are muddied with myriad opinions of what is wrong and what is the proper solution? If conservation funds are limited, what is the best way to spend the money available?

"An important concept to understand is that we are dealing with a system, not an isolated or singular material."

Our great American stained glass heritage is at risk of being damaged or lost. This may be the result of the typical forces of deterioration or inadvertent damage by well-meaning but misinformed craftsmen. Magnificent jewels of light, line and color could be rendered into lumps of putty, lead dust and glass shards. This article will explore the questions posed above, and offer information to assist decision makers to understand the problems with their windows and the most appropriate conservation solutions. These are complex issues. This article is intended to provide basic information; not specifications for an actual project.

The Problem

Due to a combination of factors, such as: the inherent limitations of the materials used, the damaging effects of sun and weather and the well-intentioned but often ill-informed actions of owners and craftsmen, thousands of windows are imperiled and at risk of

being permanently lost or damaged. Horror stories abound: As an example, in New York City, the screws that attached the frame of a ventilator from a clerestory window to the masonry surround had rusted away to nothing. The ventilator, with its stained glass panel intact, fell fifty feet crashing onto the stone floor of the sanctuary and nearly struck the sexton of the church.

It is not uncommon to see scores of windows that have deflected from the original design plane, bowing and bending to the point where they look more like free-form sculptures than windows. As the deflection worsens, glass breaks and falls out from the retaining lead matrix. A church in Connecticut housed a beautiful Tiffany figure window in need of repair. The condition of the window was serious enough to warrant removal to a proper studio for conservation. The church was convinced by a studio that the window could be restored without removal to the studio, thereby appearing to save the church money. The workers proceeded to smear the windows with silicone, in an attempt to glue a support bar to the lead cames and to cover cracks in the glass. Original broken Tiffany glass was discarded and replaced by poorly matched modern glass. Broken solder joints were also "glued" together with silicone. The church lost hard to acquire funds and the window was permanently damaged. The conditions that have placed thousands of art glass windows at serious risk of permanent damage or loss are physical, professional and institutional.

Broken Glass. On the left is an example of an impact crack. On the right is the same piece after gluing and touch up with acrylic paint. (Basilica of Saint Adalbert, Grand Rapids, MI). All Photographs courtesy of the author.

Physical Damage

Discounting modern windows made in the last sixty years, the majority of the stained glass windows that still exist in this country were fabricated here or imported from Europe between 1830 and 1925. Many of these windows are now failing as their individual elements age (particularly the lead came and support systems). Factors particular to American windows accelerate the normal aging cycle.

Design - Architectural trends and the emerging opalescent stained glass era gave way to ever-larger stained glass panels with little or no intrusion of Tee bars and other supporting armatures. Individual panel sizes were two to four times larger than medieval panels. Plating (the multiple layering of glass) in opalescent windows increased the windows' weight and overtaxed the frames and support systems.

Supporting Matrix - The advancements in metallurgy during the early part of the 19th century produced pure lead cames and while these were considered progressive, they were actually much weaker than earlier lead came alloys that contained small amounts of copper, tin, antimony, silver and other impurities. Copper adds resistance to fatigue damage through the formation of homogeneous crystal size as lead moves from the molten to solid state. Tin and antimony add to the tensile strength thereby resisting creep (plastic deformation) and deflection of the panels. Tin also adds resistance to corrosion. During the manufacture of modern restoration grade leads, these trace elements are added back to the mix, resulting in an alloy that is more resistant to creep, deflection, fatigue damage and corrosion.

Glass and Paint - Some experimental stained glasses that were developed by American glass makers were more art than science, and, as such, are chemically unstable. Exposure to changes in temperature and humidity can result in the breakdown of the covalent chemical bonds that hold the molecules of glass together, resulting in the total failure of the affected glass. Improper firing, chemical incompatibility of the paint and the substrate glass, and certain fluxes that were used to lower the fusing temperature of the paint, can lead to deterioration and loss of the applied vitreous paints that were commonly used on stained glass windows from this period.

Exterior Glazing - Protective glazing has been around since the late 19th century. In the 1960s, fueled by fears of damage from protesting political factions and the higher cost of heating oil, many congregations began to install "protective glazing" on the exterior of their stained glass windows. Much of this glazing was comprised of polycarbonate or acrylic plastic held in aluminum frames, or attached directly to the frames that supported the

stained glass windows. This material was sold as a panacea for stained glass: windows would not have to be restored if they were covered with polycarbonate glazing. While this will protect windows from impact damage, it will not protect from deterioration resulting from the expansion/contraction cycle, fatigue of the lead cames and corrosion of the lead. Ironically, if protective glazing is installed improperly, and in most cases it is, the rate of deterioration of the stained glass is increased. This is a result of the increased temperature range and higher levels of humidity that the window components are subjected to with the installation of protective glazing.

Professional Responsibility

To date, the traditional stained glass studios in the United States have not pooled their resources. Many have thought it wiser to protect restoration techniques as if they were family recipes, teaching employees only specialized steps in the window-making process. Research and development occupy a very low priority with studio owners and all too often, methods and materials are used to restore windows simply because "we have done it that way for years" with little understanding of what long-term effect the procedure or material may have on the window under restoration. Few standards exist to guide restoration or to ensure competence among craftsmen. The deficiency of these standards and the complete absence of a national standard of competence for craftsmen often results in restoration plans that are based on ill-informed opinions or expedience rather than on expertise and experience.

Apprenticeship programs are few and far between and where they do exist, very few craftsmen can afford to enter a traditional apprenticeship program, which can mean years of work at low wages. In order to survive, the studio must get a high level of production from anyone being paid the full journeyman's rate. The lack of accredited alternative education drives many craftsmen to open studios and accept work that they may not be qualified to perform.

Institutional Responsibility

The stewards of our great stained glass windows are often the vestries or board members of churches or synagogues. Many of them may have a basic understanding of the masonry, wood and roof components of their buildings but to most, stained glass is a mystical and lost art. While they may be committed to caring for their buildings with the greatest of intentions, financial pressures and/or the opinions of the congregants can sometimes make cheap, short-term solutions to window problems very attractive. Church board or vestry members often do not understand that the more expensive, long-term restoration procedure offered by an expert is actually more cost effective. Unfortunately, unscrupulous members of the profession can sometimes leave the client with false expectations of how effective the less expensive proposed restoration plan will be in order to close a sale.

The relative strength and condition of a stained glass window is determined by several factors including the condition of different elements or systems that interrelate to form the whole window. These systems are: the glass-retaining matrix, the glass, the weatherproofing (often referred to as cement), the support system and the method of installation. The breakdown of one or more of these systems tends to hasten the breakdown of the remaining systems and may ultimately result in the complete failure of the window. Unfortunately for the untrained eye, the failure of a stained glass window occurs over time; stained glass windows can look beautiful and be the picture of good health until the moment glass starts to fall out onto the sidewalk. It is not unlike the long distance runner suffering a massive heart attack 100 yards from the finish line.

The Glass Retaining Matrix

Beyond its decorative nature, the primary purpose of the matrix is to hold the individual pieces of glass together. It is understood that the matrix will ultimately fail and have to be replaced. Most stained glass windows employ lead cames to form the matrix. To a far lesser degree, copper-foil and zinc or brass cames are used. The lead cames are produced in a myriad of profiles. In cross-section, they resemble an "H" or a "U." The cames are cut and hand-formed to follow the lines of the design. The glass is inserted

Deflection. Deflection is the bowing or bending of a leaded glass window away from its original design plane. (Putti Window by John LaFarge, The Biltmore estate).

into the channel that is formed by the leaves (vertical sides of the H) of the came, on either side of the heart (horizontal web of the H). The cames are soldered together where they intersect. If the leads are flat they should be tucked, meaning the end of one came is inserted into the leaves on the lead it intersects. This results in a soldered joint when soldered. If half round leads are used they must be cut flush to the intersecting lead. The following are the most common forms of deterioration that may be found when inspecting the matrix.

Deflection - With the exception of very few installations (e.g., stained glass domes and panels set into curved sash), stained glass windows were always made and installed flat. Deflection is the bowing and bending of the individual leaded panels away from their original, flat design plane. Contrary to common belief, gravity and wind-loading play minor roles in the deflection of stained glass windows. The primary cause is the force generated by the expansion/contraction cycle. It is a law of physics that all materials expand or contract as they gain and lose heat but the degree to which any material expands for a given change in temperature (heat gain or loss) is referred to as its coefficient of expansion. Lead has a very high coefficient of expansion. This produces powerful stress within the stained glass window and this force is distributed throughout the window as a function of the concentration of lead cames present in an area and the temperature range (degrees of fluctuation from high to low temperature) that the window experiences. If the window is set too tightly in its frame, the window cannot dissipate the stress in a linear (flat) direction. The stress must be dissipated, so the window deflects three-dimensionally, resulting in bends and bulges. The degree to which any specific part of the window deflects is a function of the strength of the local force exerted, and the ability of that area of the window to resist deflection. The ability of the window to resist deflection is determined by many factors including:

Pattern of the lead lines. Weak patterns are straight lines that form hinge joints, or multiple thin borders that allow the panel to fold; concentric circles that allow the centers of the circles to telescope in or out; many small pieces of similar shape, this encourages deflection throughout the design;

Insufficient or poorly applied support bars;

The use of hard-setting sealant compounds at the perimeter of the panel. This inhibits the ability of the panel to expand within a flat plane;

The use of lead cames that have flat, thin leaves. These are more subject to bending than half-round profiles; and

The use of a soft alloy to fabricate the lead cames, which are more subject to bending than alloys containing 1.3 - 1.9 % tin, antimony and copper.

Deflection is often a sign of serious trouble in a window, however, the degree to which the window is deflected, and when the deflection occurred, are the most important factors to consider. If the deflection is minor (less than 1" over a twelve-inch linear distance) it should be noted, but it is not necessarily of great concern. Moderate deflection (1" to 2" over a twelve-inch linear distance) should be monitored carefully, and is of great concern if coupled with other signs of failure in the window. Severe deflection (over 3" over a twelve-inch linear distance) is usually a sign of serious trouble in a stained glass window. When inspecting deflection, it is important to look for broken glass in the same area of the window. If there is impact damage, the deflection may be the result of said damage, and be considered a one-time trauma to the window. If the broken glass appears to be tension stress, the deflection should be considered a failure of the system and the window should be stabilized or conserved as soon as possible. All deflection found during periodic inspections should be noted as to location and severity. These areas should be closely monitored over time to determine if the forces causing the failure have reached equilibrium, or if they are continuing to deform the window.

Lead Corrosion - There are two basic types of corrosion generally found on the lead cames of stained glass windows. One is caused by inorganic acids and the other is caused by organic acids. The inorganic corrosion is typically the result of attack by a mild form of sulfuric acid, such as acid rain. This corrosion appears as a dark gray patina on the surface of the lead and is self-sealing similar to the green patina that forms on copper that is exposed to the elements. This corrosion does not need to be treated as is not harmful to the lead and is commonly accepted as being more esthetically pleasing than the look of bright new lead.

Organic acid attacks can result in myriad surface corrosion but the most common is a white powdered appearance on the surface of the lead. As the corrosion continues, the white powder grows into larger white chunks and falls away from the window. The corrosion can attack the hidden surfaces of the lead came as well as those that are visible. One must be very careful when assessing lead came matrices that have been tinned (floated with

Extreme Corrosion. The white deposit on the lead cames is from attack by organic acids. This is caused by the incorrect installation of the protective Glazing.

a thin layer of solder), such as those found on Tiffany windows. The surface may look solid due to the corrosion-resistant tin in the solder alloy, while the underlying lead cames have corroded away. This type of attack is not self-sealing and will eventually destroy or diminish the strength of the lead cames to the point that they will suffer catastrophic failure.

There are a number of microenvironments that will encourage attack by organic acids. English oak, and certain other wood species, release a high level of tannic acid as they age. If leaded glass is set in this type of frame, the leads near the perimeter will be attacked. Acid-cure silicone caulk releases acetic acid (vinegar smell) that will attack the lead. If silicone is used, it must be a neutral-cure type that release alcohol during curing. Moisture tends to collect in the interstitial space of unvented protective glazing systems. Carbon dioxide, a common component of our atmosphere, can dissolve into the moisture and form carbolic acid. This can attack the lead matrix.

If the level of corrosion is minor (a light, smooth layer of white, covering portions of the window) and the agent producing the organic acid is removed from the proximity of the window, the corrosion can be cleaned off the window with stiff, natural bristle brushes in situ; or left in place and closely monitored. If the corrosion is severe (heavy accretion of powder throughout, large chunks of salt falling off the lead) the matrix may be approaching failure. A portion of the window should be removed to facilitate closer inspection of the lead cames. If corrosion has seriously weakened the came, re-leading is in order. Abrasive techniques should never be employed to remove the corrosion. Regardless of the level of intervention to the panels in question, the source of the acid must be found and ameliorated. Corrosion resistance of the lead came alloy can be increased with the addition of tin.

Metal Fatigue - Metal fatigue is a weakened condition induced in the lead cames by repeated stress from the expansion/contraction cycle and the flexing of the lead came matrix due to wind or other localized loading conditions. Metal fatigue results in fracturing of the lead cames under forces much weaker than those necessary to fracture new material. Metal fatigue in lead cames is evidenced by irregular, jagged cracks in the lead came perpendicular to the came's long dimension. The cracks are first seen at the perimeter of solder joints. As came continues to fatigue, cracks occur throughout the lead, away from the solder joints. A precursor to the cracking of the lead cames is a change in the surface character of the lead. The lead acquires a rougher texture and a series of small bumps form, possibly the result of internal cracking and oxidation. This condition is very severe and is irreversible. It cannot be solved by soldering over the broken area of lead, re-cementing the window, rubbing the lead with linseed oil or adding support bars. It is a systemic condition and will eventually result in the catastrophic failure of the lead came matrix. If it is found in less than five percent of the leads, and the remaining systems appear to be in good condition, the failure is not yet at emergency levels but should be closely monitored. The resistance of the lead came to fatigue failure can be greatly enhanced by adding trace amounts of copper and/or silver to the alloy during manufacture. The presence of these elements as the lead cools from a molten to a solid state encourages the formation of equal-sized crystals within the lead. The forces imparted onto the lead during its lifetime are then more evenly distributed and fatigue failure is delayed.

The Glass

Aesthetically, the glass is the most important part of any stained glass window. The more important the window, the more important it is to save and reuse as much of the original glass as

possible: glass should only be replaced for compelling reasons. When chemically stable, glass is very durable and will last many millennia while the applied decoration (vitreous and unfired paint) is sometimes less durable. The following are the most common forms of deterioration that may be found when inspecting the glass and applied decoration of the window.

Broken Glass - Broken glass falls into two major categories, impact damage and stress fractures. A minor category is crizzling. Crizzling is the breakdown of the chemical nature of the glass, often due to an excess of alkali in the original batch, or dry mixture of compounds from which the glass was made. This type of failure is greatly accelerated by standing water on the glass.

Impact damage can be caused by any number of objects and is easy to identify. There will be a pattern of relatively straight cracks or breaks radiating from a clear point of impact. Sometimes the point of impact is on the lead matrix, between two or more pieces of glass. In severe cases, the glass at the point of impact may be crushed into powder but most often, broken glass found in stained glass windows is not the result of impact damage, but from stress breaks.

Crizzling. The result of chemical instability in glass caused by an imbalance in the ingredients of the batch, particularly an excess of alkali or a deficiency of stabilizer (usually lime). The instability of the glass results in an attack by atmospheric moisture, which produces a network of cracks. Crizzling can be slowed or perhaps even halted, but it cannot at present be reversed.

Stress breaks have several causes. Thermal stress breaks, for example, can be the result of quickly cooling hot glass (like dropping cold water on a hot light bulb) or heating glass quickly and unevenly. Thermal stress breaks can be identified as single, meandering cracks that twist and turn through the broken piece, following the internal path of least resistance. Sometimes these cracks only partially extend through a piece of glass, and are referred to as runs. They are usually very well-defined cracks that run at right angles to the glass surface, with little or no powdering of the glass. Thermal stress breaks also occur when glass was not annealed properly during the manufacturing process. This builds stress into the glass. When additional stress is added at a later time from heat, vibration or tension, the glass breaks.

Tension stress breaks occur when glass is stressed beyond its tensile strength limitations. Think of a force pushing against the middle of a long, thin piece of glass. As the force increases, the glass will bend slightly. Once the glass is pushed beyond its tensile strength, the glass will break, usually at the point at which the pushing force was centered. Tension breaks tend to be straight and can often have splinters of glass expelled from the area under greatest stress. In typical stained glass windows, this type of force is exerted on glass when an operating ventilator (the section of the window that opens) is forced closed or slammed shut. Tension stress breaks also occur when a window deflects. As a window bows away from its flat plane, the edges of glass are retained by the lead cames, thereby forcing the glass to bend. Eventually, something must give and the glass breaks.

When broken glass is seen in a window, it is important to determine the cause and time period in which the breakage occurred. If it is the result of a single incident, it can be stabilized or sometimes repaired in situ. If the cracks are the result of systemic failure, such as severe deflection, the situation becomes more serious and the window should be removed and addressed quickly. Since glass has a very high modulus of elasticity (resistance to bending), this physical characteristic helps to make the stained glass panel more rigid. As more glass breaks, it weakens the overall matrix of the window, accelerating the rate of deterioration.

It is important to stabilize or repair cracks, especially if they are found on painted glass or irreplaceable types of glass. If a crack is left to its own devices, edge damage will occur along the line of the crack. When the window flexes or vibrates, the edges of the glass along the break work against each other, resulting in conchoidal fracturing of the glass surface. This will chip paint off the piece and make the crack more noticeable and more difficult to properly restore in the future.

Paint Problems- The process of applying painted and fired decoration on glass objects was documented as early as the 15th century B.C. in Egypt. Examples of glass painting on architectural glass as we know it today date back to the 9th century A.D. and

possibly earlier and the process has remained basically unchanged since the 11th century.

Many of the stained glass windows in the United States have some degree of glass paint on them. Most of this paint is vitreous or paint that is fired in a kiln and fuses with the glass substrate. The paint is made from ground glass, metallic oxides and a flux, used to lower the fusing temperature of the paint. Problems with the applied painted decoration that may be encountered: missing trace lines; degradation of the matte or applied stencil work; lifting of enamels; accretion of dirt; or loss of cold (unfired) decoration. The painted pieces can appear as though they have faded, but this is not the case. Virtually all visual problems with paint are the result of the particles of the paint separating and/or falling off from the glass surface. Painted decoration can become unstable as a result of one or more of the following reasons:

Insufficient firing of the glass. Temperature controls and apprentices were not always accurate. If the glass was under-fired, the paint would fail to properly vitrify and remain unstable;

Incompatibility. This instability is more common with enamels and certain types of glass such as opalescent. Enamels are fired at lower temperatures and usually adhere to themselves better than they do to the glass and if the coefficients of expansion of the glass and the enamel differ enough, they may become unstable, peeling off the glass in sheets as the window experiences changes in heat gain or loss. This may also occur on a smaller scale with trace and matte paints. The loss of enamel is common problem in Tiffany windows; and

Composition of the flux. It is thought that a number of late 19th century glass painters used borax as a flux in their paint. Borax lowers the firing temperature of the paint, allowing the painter to more easily apply multiple layers of trace, matte and enamels during the painting process. However, it appears that the addition of this flux results in a painted surface that is very susceptible to deterioration by water.

All paint loss is further accelerated by the attack of water. Condensation that is allowed to sit on the glass promotes corrosion. The glass and the paint adsorb water resulting in the loss of free alkali ions. This leads to the breakdown of the molecular matrix of the glass. If the paint is not composed of a durable glass base, it will quickly deteriorate. If unstable paint is found or suspected, it is critical to engage the services of a professional who has had experience with fragile paint to determine the extent of the problem.

From Top: Broken Glass. On the left is an example of serious damage due to impact. On the right, after gluing and in fill painting, is the restored piece. ("The Good Samaritan" window by Tiffany Studios, Newcomb Art Museum, Tulane University, New Orleans, LA).

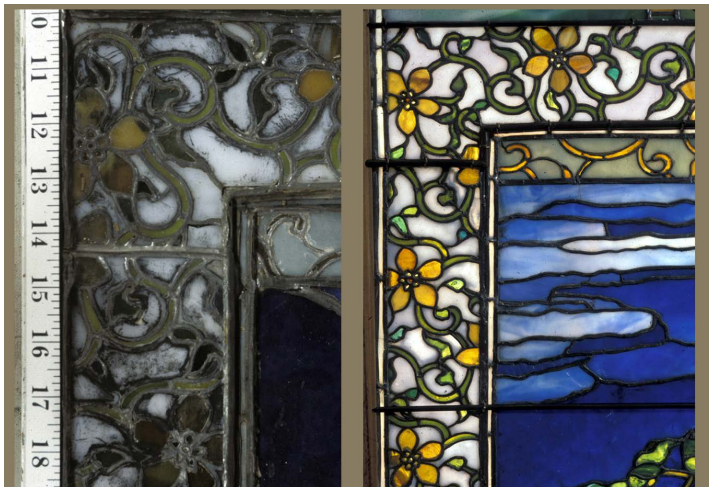
Dalle de Verre failure. The glass is internally fracturing due to both physical strain and attack by water. (Bacardi Jewel Box, Yong Arts National Headquarters, Miami, FL).

Dirt - There is often an accretion of dirt on all surfaces of the glass. This may be a combination of soot from the furnace, candle smoke and other air-borne contaminants. The dirt mixes with the petrochemical components and forms a varnish like substance that adheres to the glass. Depending on the exact chemical composition of the deposit, it may become hygroscopic, absorbing moisture from the air. Localized concentrations of moisture on the windows can result in deterioration of applied paint or the surface of the glass itself.

Weatherproofing

This process is often referred to as cementing in the trade, although the phrase is a bit misleading. The cementing process is one whereby the window is waterproofed by forcing a putty compound under the leaves of the leads to fill any void that may be left between the lead cames and the glass. Putty should be used on lead or metal came windows only. The space between

Paint Loss. Glass paint does not fade, however, if it has not fully vitrified on the surface of the substrate glass, it can come off in a pattern that looks like it is fading. This loss is exacerbated by standing moisture. While the process cannot be reversed, the lost detail can be reverse painted on a thin piece of glass that is mechanically attached to the original. The result of this process is seen on the right. No permanent change is made to the original piece, the applied plating can be removed easily. (Window by Phipps & Slocum, First Church of Christ, Scientist - The Mother Church, Boston MA).



Dirt. On the left is an example of dirt accretion on a window. At the right is the same window after cleaning. ("Peonies in the Wind" by John LaFarge, Nelson Atkins Museum, Kansas City, MO).

copper-foil and glass is too small to adequately waterproof with putty, (although it is large enough to allow for the passage of wind-driven rain). While the process of cementing a window will lend it additional structural integrity, the primary function of this process is the prevention of the infiltration of water and wind through the panel. The major portion of the structural integrity should be derived from a properly designed lead matrix; careful cutting of the glass; skillful leading and a well-designed support system. The use of a hard-setting putty to make up for deficiencies in the above-described areas is akin to wearing hard socks instead of shoes. It works for a while, but indicates a basic misconception on the part of the wearer.

To be successful, the cementing compound should form a skin on the surface and remain pliable below to allow for the independent movement of the glass and the lead. The properties of the compound should be limited to an organic oil (such as linseed or soybean); calcium carbonate (whiting); and a coloring agent such as lampblack or another tinting agent that is compatible with the particular oil being used in the mix. In the past, oxides of lead were added to enhance adhesion but these are no longer available due to environmental concerns.

Failure of the waterproofing system occurs over time as the binding oil leaches out from the putty or fully polymerizes, leaving the dried out calcium carbonate behind. The dry material powders and falls out from under the leads. As the condition worsens, the panel will rattle when lightly tapped with the fingertips. When the condition becomes severe, water and wind begin to blow through the window and leak onto the floor. In the early stages, waterproofing failure can be addressed by the spot application of new putty. However, this should be understood to be a stop-gap and not a solution. Ultimately, the window must be removed. Proper waterproofing can only be accomplished with the panel flat on a bench. The old putty must be removed and new material forced under the leads. The panel should remain in a flat position for at least 14 days prior to reinstallation to allow the initial skin to form on the new waterproofing. If the lead matrix is failing, waterproofing, no matter how expertly done, will never strengthen the panel sufficiently enough to avoid releading. Unfortunately, it is a common practice by unknowing studios to promise otherwise.

Support System

Proper support is the result of the careful execution of many individual facets of the window fabricating process. There are three primary elements of the traditional support system:

1. Tee bars provide lateral (wind) resistance and serve a load-bearing capacity. Tee bars must be firmly attached or inserted into the perimeter frame. Failure to do so greatly diminishes the positive effect they may have to support the window. The horizontal web of the Tee should face to the exterior. In this way, it sheds water more effectively than if it is turned to face the interior. Windows should not be removed simply because the Tee bars are installed incorrectly. However, if the Tee bars have begun to rotate and the horizontal web is no longer horizontal, a serious condition has developed. The stained glass panels can now slip off the Tee bar and serious damage will result. This condition should be remedied if the windows are removed for any reason.

2. Flat bars and saddle bars provide resistance to lateral pressure only; they do not act in a load-bearing capacity. Saddle bars are round, or less often, square iron, steel or bronze bars that

are firmly attached or inserted into the perimeter frame. Failure to do so greatly diminishes the positive effect they may have to provide support to the window. Saddle bars are attached to the lead matrix of the window with copper tie-wires that are soldered onto the matrix. Upon installation, the wires are pulled around the saddle bar, twisted snug, cut to a uniform length and folded over the bar. This system is a thousand years old. The weakest point of this system is the connection between the tie-wire and the matrix. Most common failure is the wire pulling out from the solder joint. Rarely does the copper wire break. One or two failures intermittently found in the window are of little concern. When over 10% of the wires separate, it is a more serious affair and bears close monitoring. As more wires break and the panel begins to deflect away from the bar, the situation is serious and may result in glass breakage and ultimate failure of the panels.

3. Flat soldered bars are of a more modern age, and are soldered with their wide dimension perpendicular to the panel directly at the solder joints in the studio prior to installation. Again, the weakest point in the system is the connection between the bar and the matrix at the soldered joint. As the system breaks down, the lead at the perimeter of the solder joints tears and allows the panel to deflect away from the bar. This condition cannot be remedied in situ. While it may be possible to affect a temporary repair in place, the panels must be removed to complete a proper, long-term repair. Tie-wires should not be used with flat bars. Saddle bars should not be soldered directly to the panel. Horizontally installed panels (domes, skylights) should always have the support bars attached to the underside. This way gravity tries to pull the panel through the bars, rather than away from them.

Deflection. First Presbyterian Church of Far Rockaway

Method of Installation

An important concept to understand is that we are dealing with a system, not an isolated or singular material. The installation system is comprised of the sealant, the material of the frame, the design of the frame, and the panel to be installed. Other factors, such as the degree of roof or building overhang, the orientation (north, south, etc.) and the degree of exposure of the window and drip detailing of the building will also affect the success or failure of the installation system. It is crucial to view the window as a moving part of the living fabric of the building,and not an isolated, static element.

Stained glass windows are installed in a variety of ways. Stone settings in grooves are the most difficult and arguably the best way to install stained glass windows. Some stone settings are into rebates in the stone, greatly simplifying the process. Open mortar joints allow water to enter around the stained glass and into the building. The best time to repoint is when the windows are removed for conservation. This installation will have saddle bars and possibly Tee bars. Make sure all support bars firmly engage the stone and are not just floating in the groove. Traditional stone settings were done with putty. Due to the absence of lead oxides in modern putty and the developments with flexible caulks, a caulk/backer rod system is the best for stone settings. This system also allows for the easy removal of panels from the stone down the road with little risk of damaging the stone surround.

Metal frames have to be checked for corrosion and deformation of the metal members. For example, galvanic corrosion can be the result of dissimilar metals coming into contact. This can occur when the wrong type of fasteners are used, or within the flashing details of the window and can only be remedied by replacing the offending fastener with one of the proper type or insulating the dissimilar metals.

Wood frame and sash installations are quite common but due to lack of maintenance, many are in poor condition. The paint is flaking off, sills are split and checked, an overall deplorable appearance. However, it is important to resist the apparent obvious replacement of these frames with new aluminum or new wood. It is difficult to get a smooth transition from a wood window to an aluminum one and it is highly unlikely, even with proper maintenance that the aluminum frame will be in good condition 70 to 100 years from now, especially if the aluminum is exposed to a marine environment. To the contrary, properly maintained wood has been proven to last centuries. If the quality of the original wood was good, restoration

Condensation. The white deposit on the lead cames is from attack by organic acids. This is caused by the incorrect installation of the protective Glazing. (Student Dormitory, Yale University).

is usually better than replacing with new. Old growth lumber has tight growth rings and is more resistant to rot and deflection than new forced-growth trees.

Sealant Materials - The traditional material for setting stained glass has been linseed oil putty. This system still works, but has its drawbacks. The putty may set hard and does not allow for the expansion and contraction of the panel, or the movement of the building. Look for cracking of the putty bevel and separation from the frame or panel where water can enter. As the original putty system failed in the past, it was common to caulk over the putty. This may have worked in the short term, but this approach is destined to fail. If the sealant system is failing, it must be completely removed, the panel and substrate carefully cleaned and a new system installed. If the stained glass is in good condition, there is no need to remove it to properly do this work. It is important to the long-term health and welfare of the window, and to the interior walls and finishes, that the perimeter sealant be checked on an annual basis.

Protective Glazing - A very destructive force that adversely affects the lead came matrix of the window is heat gain from the sun. Numerous studies in Europe and in the United States have concluded that unvented protective glazing systems create a super-heated environment for the windows that they were intended to protect and actually accelerate the rate of deterioration of the windows.

Condensation can form in the unvented interstitial space between the protective glazing and the stained glass. The condensation is conducive to the growth of microorganisms whose by-products attack the lead cames and the stained glass. In addition to the direct damage to the stained glass, the condensation rusts the steel support bars and encourages the rot of the wood frames.

When inspecting the installation, if protective glazing is installed, look at the possibility of removing it permanently. If the exterior covering cannot be removed, make sure it is copiously vented to allow a free flow of air into the interstitial space. If the covering is plastic, holes can carefully be drilled at the top and bottom of sealed chambers to ventilate them.

If protective glazing is desired, the best system is an isothermal system. An isothermal system is designed such that the exterior and interior surfaces of the stained glass are subject to the same temperature and humidity levels as found on the interior of the building. This is the best microenvironment for stained glass.

Arthur Femenella is the President of Femenella & Associates, Inc., a full service stained glass and historic window conservation studio. Mr. Femenella began as an apprentice in 1968 at the Greenland Studio of New York and later became co-owner. In 1988 he joined forces with Jack Cushen and developed the Jack Cushen Studio. He formed Femenella & Associates in 1993 to address a new way to approach conservation projects. The firm has expanded to include historic wood and steel window restoration. He has been responsible for the restoration of thousands of windows, doors, panels and artifacts, including hundreds of works by John La Farge, Louis Comfort Tiffany, Frank Lloyd Wright, Maitland Armstrong, Mary Tillinghast and other artists of equal importance. Mr. Femenella is active in a number of preservation groups and he lectures across the country. The firm is an approved provider of AIA/CES learning credits.

Mr. Femenella is a founder, past President and Vice-President of the American Glass Guild, LLC; a past Chair of the Restoration Committee, former Board Member and former Treasurer of the Stained Glass Association of America. In this capacity, He was the primary author of the booklet Standards and Guidelines for the Preservation of Historic Stained Glass Windows. Mr. Femenella sat on the Board of Governors of the Census of Stained Glass Windows in America, and was the primary author of the technical section of the booklet produced by the Census titled, The Conservation of Historic Stained Glass: An Owner's Guide. He is a Board Member of APTI, a member of the National Trust and the AIC, with a pending application for Professional Associate status. He has written over forty articles on subjects specific to stained glass and historic window restoration. He has presented papers at numerous international and national symposiums and conferences. Art was the consultant to the Protective Glazing Task Force. This was a group of architects, engineers, and preservationists charged by the Department of the Interior to develop national guidelines for the fabrication and installation of protective glazing.

Glossary of Terms

Coefficient of Expansion (COE): The ratio of change in length or volume per unit change in temperature. Used to help determine compatibility of different glasses for the fusing process

Came: Channeled strips of lead, zinc, or other metal used to bind glass pieces within a design.

Dalle de Verre: *from French "glass slab",* a glass art technique that uses pieces of colored glass set in a matrix of concrete and epoxy resin or other supporting material.

Flux: Chemical agent used to facilitate the flow of solder and prevent formation of oxides during soldering.

Frit: Ground glass, ranging in particle size from gravel-like to a fine powder. Frit is sometimes used as a raw material in glass manufacture, and sometimes as a coloring agent or for decorative effect in hot glass crafts like blowing and fusing

Iridescent: Surface treatment in which a layer of metallic oxide is bonded to the hot glass surface just after sheet-forming, resulting in a colorful, shimmering effect.

Inorganic Acid: Also referred to as Mineral Acid, an acid derived from one or more inorganic compounds. They differ from ***Organic Acid*** solely in that they do not contain carbon.

Opalescent: Opacity in glass created by crystallization during the manufacturing process. Degrees of opacity vary depending upon the materials and temperature used.

Painted Glass: Glass on which special paints (containing frit) have been applied in illustration or decorative pattern and then heated in a kiln to a temperature high enough to fuse the pigments permanently to the glass surface.

Solder: a fusible alloy, usually tin and lead, used to join metallic parts, or the act of applying it. Used to bond metals in both leaded and copper foil techniques of stained glass work.

Stained Glass: Commonly used to describe any colored flat glass or object made of such glass joined with metal strips (cames). Originally applied to the specific manufacturing process of coloring glass with metallic salts.

Additional References

An informed steward will make better decisions when formulating a plan for the conservation and long term care of stained glass windows. In addition to the information contained in this article, there are a number of sources for additional information.

Additional sources of information are:

1. "Conservation and Restoration of Stained Glass: An Owner's Guide," published by the Census of Stained Glass Windows in America, 1988.

2. "Stained Glass in Houses of Worship," Inspired Partnerships, Chicago, IL 312-294-0077

3. Preservation Brief # 33 "The Preservation and Repair of Historic Stained and Leaded Glass," published by the U.S. Department of the Interior, National Park Service, Cultural Resources Division.

4. "Protective Glazing Study," National Center for Preservation Training & Technology in Natchitoches, LA 318-357-6464

5. "Conservation of Glass" by Roy Newton and Sandra Davison, published by Butterworths of London.

6. "Corpus Vitrearum Medii Aevi" This organization is concerned with the preservation of all stained glass with a focus on medieval stained glass. http://www.cvma.ac.uk/index.html

7. "The American Glass Guild" This is an organization devoted to the dissemination of information about stained glass and its care. www.americanglassguild.org

CTA ARCHITECTS P.C.
Preserving sacred spaces for 30 years
www.ctaarchitects.com

TOBIN | PARNES

DESIGN

For over 30 years, Tobin Parnes Design has completed a diversity of project types in all market sectors. Our team of talented, award-winning professionals offers expertise in a wide range of disciplines that span multiple industries and building types. We maintain a design studio that pursues and participates in projects where we can make meaningful contributions and attend to every project properly. Whether working within a modest budget or complex multimillion-dollar contracts, we approach every project with the same focused sense of commitment, responsibility and excitement.

Ss. Peter & Paul RC Church - Interior View at New Entry

We build strategic partnerships with our clients to foster trust, knowledge, quality and innovation. Passion and creativity - coupled with dedication and the highest level of client service are the core values of our practice.

HISTORIC RESTORATION •
INSTITUTIONAL •
HEALTH CARE •
HOSPITALITY •
WORKPLACE •
RETAIL •
LEED •

Ss. Peter & Paul RC Church - Restoration, Renovation & Addition, Brooklyn, NY - In Progress

Tobin Parnes Design proudly supports
The New York Landmarks Conservancy and the Sacred Sites Program.

304 Hudson Street, Suite 500 | New York, NY 10013 | T 212.462.4200

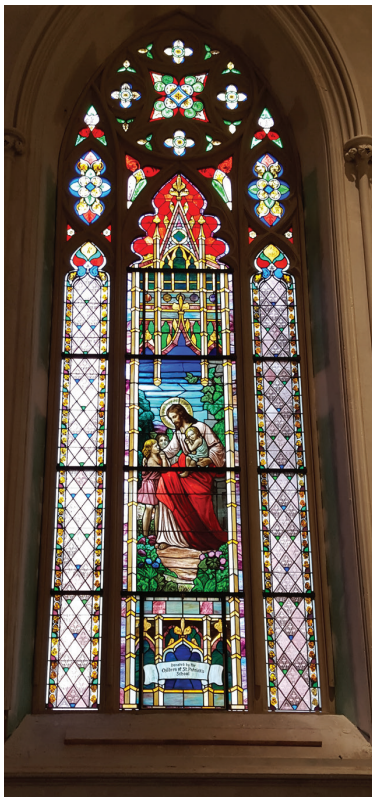
www.tobinparnes.com

CONSERVING ONE OF AMERICA'S OLDEST CATHEDRALS

The Basilica of St. Patrick's Old Cathedral
New York, NY

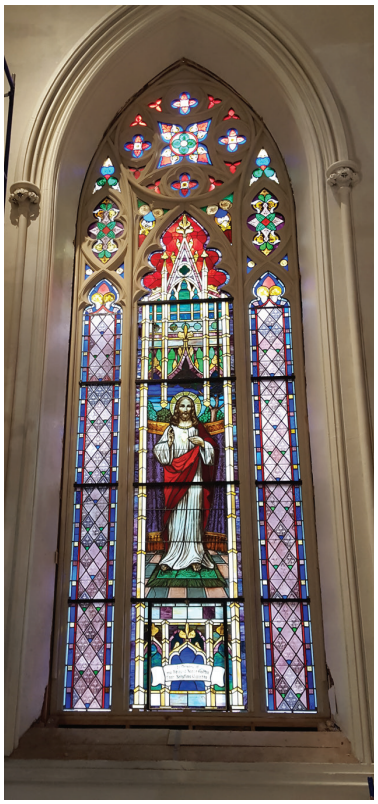
CELEBRATING 200 YEARS OF HISTORY

Rohlf's Stained & Leaded Glass Studio, Inc. has been entrusted with the removal, total restoration and installation of ALL 17 Stained Glass Windows. New double-glazed steel ventilators, tee bars and 1/4" safety glass are also a part of our scope of work.



Acheson Doyle Partners Architects, P.C.

Wood Replication



Contractor: M.J. Fitzgerald Contracting Corp.

REPLICATION, CONSERVATION & RESTORATION ARE AN IMPORTANT PART OF OUR SERVICES

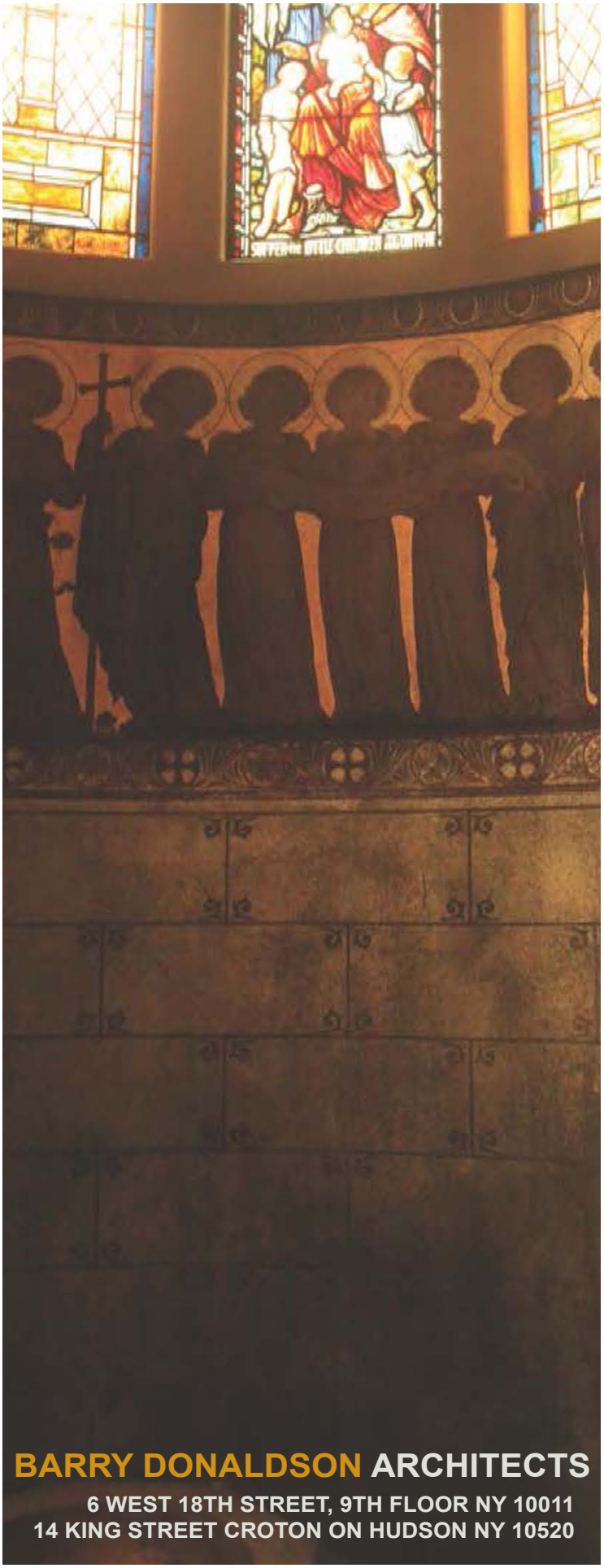
PAYNE STUDIOS OF NEW JERSEY
An Affiliate of Rohlf's Studio, Inc.

ROHLF'S STAINED & LEADED GLASS STUDIO, INC.

783 South Third Ave.
Mount Vernon, NY 10550

1-800-969-4106 • 914-699-4848 • FAX: 914-699-7091
ROHLF1@AOL.COM • ROHLFSTUDIO.COM

EST. 1920 ROHLF STUDIO



BARRY DONALDSON ARCHITECTS
6 WEST 18TH STREET, 9TH FLOOR NY 10011
14 KING STREET CROTON ON HUDSON NY 10520

THANK YOU TO OUR 2017 OPEN HOUSE SPONSORS

Acheson Doyle Partners Architects
Architecture Design Planning Preservation

AIANY
Historic Buildings Committee

ART DECO SOCIETY OF NEW YORK

CORNING MUSEUM OF GLASS

FAITH & FORM
THE INTERFAITH JOURNAL ON RELIGION, ART, AND ARCHITECTURE

EVERGREENE
Architectural Arts

AARCH

HISTORIC DISTRICTS COUNCIL
THE ADVOCATE FOR NEW YORK CITY'S HISTORIC NEIGHBORHOODS

FRIENDS of the UPPER EAST SIDE HISTORIC DISTRICTS

East Village Community Coalition

gvshp
Greenwich Village Society For Historic Preservation

HISTORIC ALBANY FOUNDATION

LANDMARK SOCIETY of WESTERN NEW YORK

OTSEGO 2000

HISTORIC ITHACA
Est. 1966

LANDMARK WEST!
THE COMMITTEE TO PRESERVE THE UPPER WEST SIDE

EXPLORE BUFFALO

L. E. S. P. I.
Lower East Side Preservation Initiative

LOWER EASTSIDE JEWISH CONSERVANCY

SOCIETY FOR THE PRESERVATION OF LONG ISLAND ANTIQUITIES

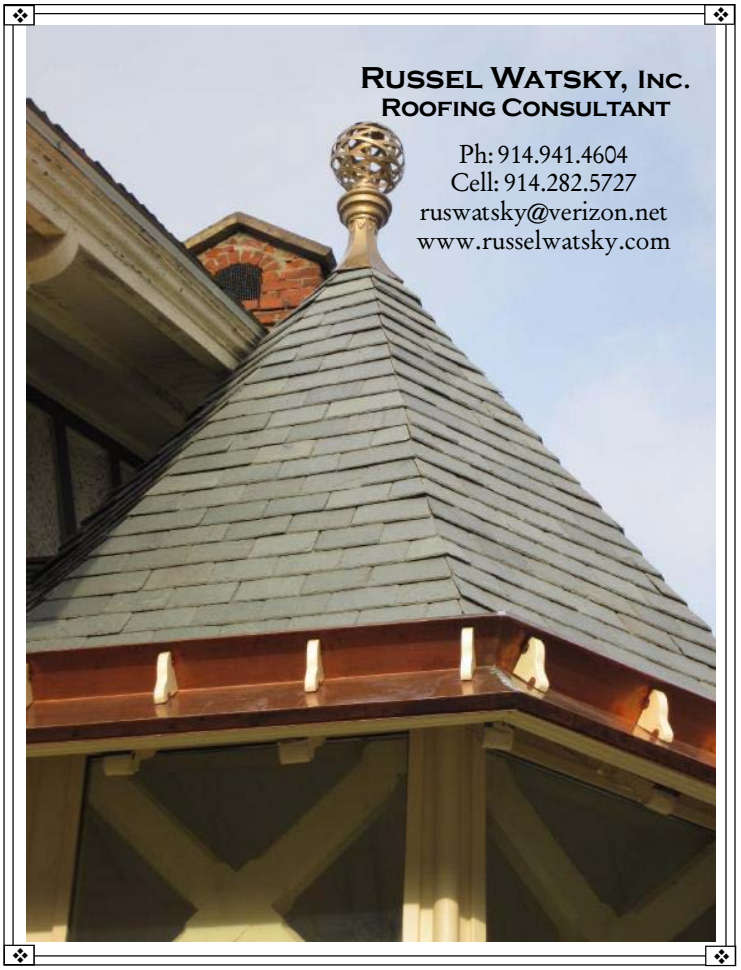
PACNY
PRESERVATION ASSOCIATION OF CENTRAL NEW YORK

PRESERVATION Buffalo Niagara
Building on the past for our FUTURE

Hudson Mohawk Industrial Gateway

PAST

WE DIDN'T GET
INTO THIS
BUSINESS
FOR THE
GLAMOUR
Wherever your survey needs take us,
JBC doesn't mind getting our hands dirty.
JBC
JABLONSKI BUILDING CONSERVATION, INC.
ARCHITECTURAL CONSERVATORS
WWW.JBCONSERVATION.COM | NEW YORK | 212.532.7775


RUSSEL WATSKY, INC.
ROOFING CONSULTANT
Ph: 914.941.4604
Cell: 914.282.5727
ruswatsky@verizon.net
www.russelwatsky.com

OLD STRUCTURES
90 Broad Street
Suite 1501
New York, NY 10004
www.oldstructures.com
Donald Friedman
Marie Ennis
Michael Lo
212-244-4546
information
@oldstructures.com

DANIELLA PELTZ
STAINED GLASS
CONSULTATION ✧ CONSERVATION ✧ DESIGN
& FABRICATION

- Advice
- Guidance
- Conservation Services
- Design
- Fabrication

For owners of religious, secular and municipal stained glass, including private clients, studios and museums

PHONE: (917) 754-5225
WEBSITE: www.daniellapeltz-stainedglass.com
EMAIL: contact@daniellapeltz-stainedglass.com
TWITTER: @glassolalia
FACEBOOK: DANIELLA PELTZ STAINED GLASS

Donate to the Sacred Sites Program Today!

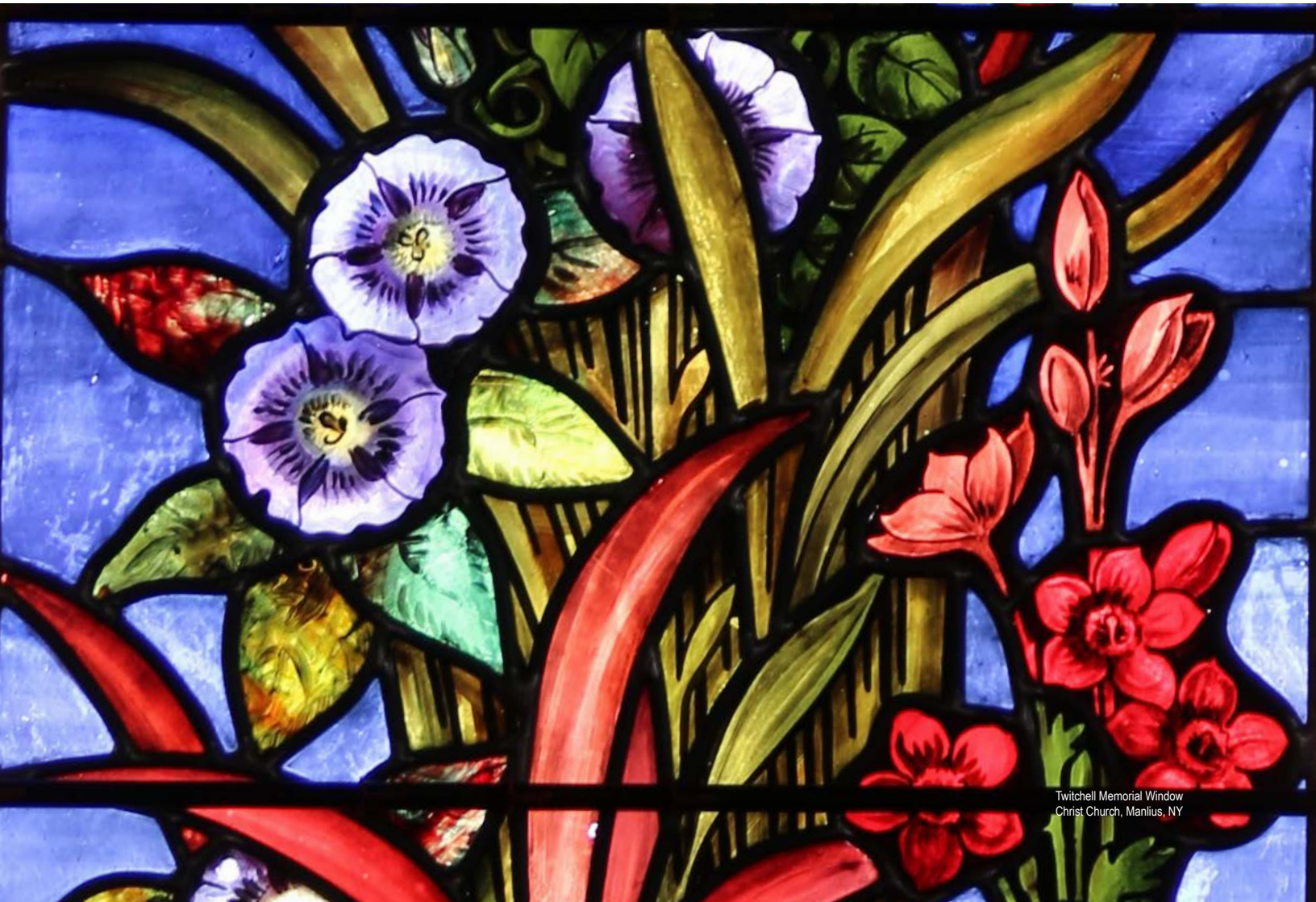
The Conservancy's Sacred Sites program was launched in 1986 and is the only statewide nonprofit program in the nation responding to the preservation needs of historic religious properties. Since its inception, Sacred Sites has awarded over 1,300 grants totaling more than $9.9 million to 760 congregations throughout New York State, regardless of denomination. These grants have leveraged restoration projects totaling more than $620 million.

Follow this link to our online donation form by clicking on this page, or call our office at 212-995-5260 to make a donation or advertise in future editions of Common Bond

Brown Memorial Baptist Church Brooklyn, NY
Former program grantee and Open House participant

THE NEW YORK
LANDMARKS
CONSERVANCY

One Whitehall Street
New York, NY 10004
212-995-5260
nylandmarks.org
sacredsites@nylandmarks.org



Twitchell Memorial Window
Christ Church, Manlius, NY