

Conference for Catholic Facility Managers

G460



What a Facility Manager Needs To Know About Art Glass

SAV1509

Associated Crafts/Willet Hauser Architectural Glass, Inc.

Kathy Jordan and John Phillips

May 12, 2015

WILLET HAUSER
Architectural Glass



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Course Description

What a Facility Manager Should Know About Art Glass

This presentation by Associated Crafts / Willet Hauser Architectural Glass, Inc., will describe important background information about art glass; review potential art glass, frame and protective covering deterioration issues; explain inspection and maintenance timeframes; and discuss popular misconceptions about art glass.



Learning Objectives

At the end of the program participants will be able to:

- 1. Recognize the type(s) of art glass they have by using examples and resources.**
- 2. Identify potential problems with their art glass by using a do-it-yourself survey.**
- 3. Understand the importance of documentation and replacement appraisals by using examples and resources.**
- 4. Understand the basics of art glass repair, restoration and preservation by using examples and resources.**

Introduction: Our Studios



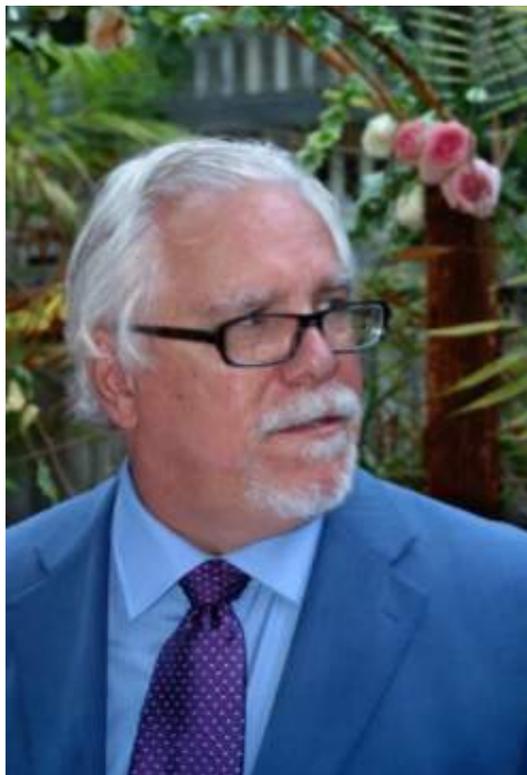
In 1997 Associated Crafts was established as a stained glass service company. Over the next 10 years it operated predominately as a sub contractor for other studios that did not have the man power to complete on-site and large projects. A reputation of high quality work spread and by 2008 Associated Crafts services were brought directly to the end user. With a reputation of quality and integrity Associated Crafts grew very quickly to becoming one of the largest and most respected studios in the country.

In 1898 Willet Stained Glass Studio and Decorating Company was founded in Pittsburgh, PA in 1898, later moving to Philadelphia. In 1946 Hauser Art Glass Co. was created and grew to become a national power house of restoration, preservation and on-site services. Hauser Art Glass and Willet Stained Glass merged in 1977. Willet Hauser Architectural Glass is considered the Icon of American stained glass, creating works of art in such famed buildings as West Point Military Academy, The National Cathedral and St. John the Divine in NY, NY.

On Jan 9th of 2014 Associated Crafts was asked to acquire the famous Willet Studios by its retiring staff. That staff wanted to ensure that the famous Willet Hauser name would continue and that the quality and knowledge it was known for would continue.

Today Willet Hauser and Associated Crafts continue to coalesce and are very excited about the future. The merger created one of the biggest stained and art glass studios in the world. This union has attracted even more talent to an already rich pool. Over the last year our family was joined by internationally recognized artist and painter Kathy Jordan. In October of 2014 the Art Department began its new reign with one of the most sought after studio painters in the industry, Melissa Janda, at the helm.

For over 117 years this studio has been the icon of the industry. With the new leadership team in place we look forward to even greater things in the next century.



Our Purpose Today

We understand that stained glass is often a very important part of the worship space both monetarily as well as spiritually. The value of these historic works of art often add up to millions of dollars. These beautiful works with the stories they tell and the dazzling use of light can help set the atmosphere for worship.

We realize that few people understand how to care for these historic treasures. In today's age of Google there is an overwhelming amount of information available. However there is no way to ensure that this information is accurate. Many so called experts dazzle the audience with information and unique facts. Rarely do they have the true experience and knowledge in all facets of the industry to provide the owner with information they need that is not skewed by their needs or abilities.

Our goal in the next 60 minutes is to help you understand the basics of art glass and its care as well as preservation.

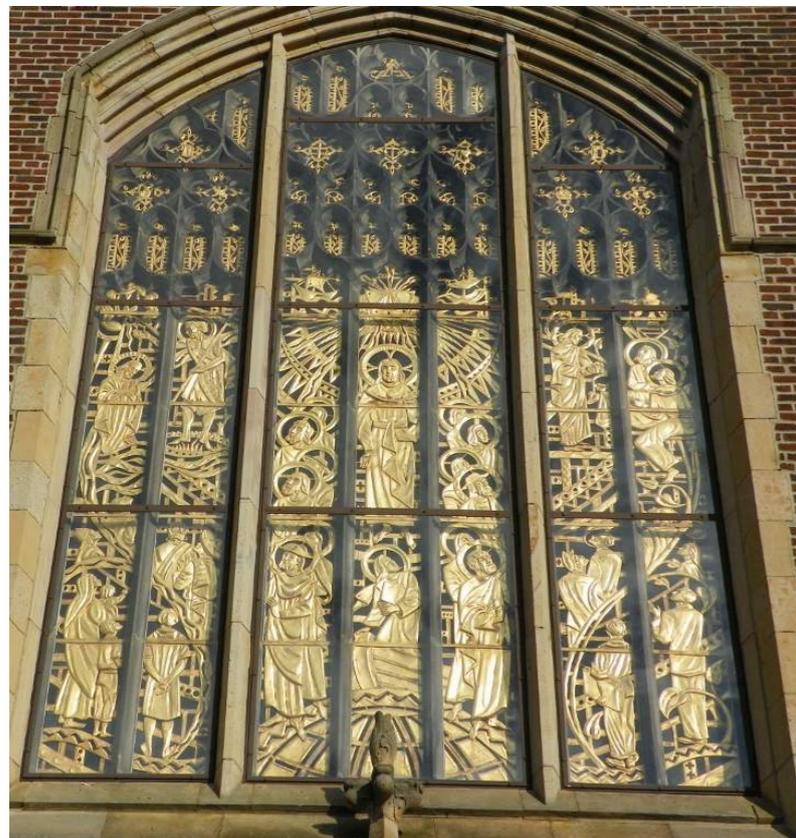
Art Glass Techniques



Sand Blasted or Etched



Faceted Glass



Sculptured Gold



Leaded and Hand-painted



Laminated Glass



Faceted Glass (Dalle de Verde)

Handcrafting faceted windows, like leaded glass, is an involved, multi-step process. Faceted glass consists of approximately one-inch thick slab of glass called dalles that are cut and broken over an anvil. These pieces of brilliantly colored glass are placed in a pattern on a table and a form is set around a perimeter of the panel. Sandy material called granules, are sprung between the glass. The next step is to pour a two-part epoxy resin between the pieces of glass. We then sprinkle another layer of granules over the epoxy resin. Once the epoxy sets, it results in a very strong load-bearing panel. Studios mainly use faceted glass for less complex designs. Faceted glass windows have higher material cost but require significantly less labor, often making it a more cost effective solution.

The design possibilities of this medium are infinite as it adapts to the smallest openings and to larger areas, even entire wall surfaces of great proportions. The medium lends itself to representational design as successfully as to abstract, and the matrix can be a mere hairline, or any desired width up to several feet. Through skillful manipulation of the negative area of the matrix, the impression of complex traditional tracery and detailed classical design can be obtained.

Faceted glass windows offer deep color and shimmering sparkle. The bold design is created by controlling the size and shape of the glasses as well as the shape and width of the dark matrix. It is a creative mosaic of light. As in all art, faceted windows can be well designed, exciting and vibrant.



FACETED GLASS INSTALLATION

Leaded & Hand Painted Glass

Leaded stained glass windows bring to mind the glories of the great gothic cathedrals. A leaded stained glass window is a mosaic made up of morsels of beautifully colored glass, cut to the desired shapes and held together by strips of grooved lead, which are reinforced and anchored in the window frame. To control the passage of light as well as add details like faces, drapery ornament and lettering, the glass is hand painted with a dark pigment, which is later permanently fused to the glass once fired. The same methods of leaded glass fabrication, perfected more than 800 years ago in Europe, are in use today. The art of stained glass is one of the few handcrafts that are still practiced much as it was during the Middle Ages. The same hand painted leaded technique is used today by our staff of highly skilled glass painters to create a special comforting atmosphere for your houses of worship and to bring our unique artistry to secular buildings and homes.

This technique of painting on glass is the process of using ground glass oxides mixed with a medium and applied to the glass surface with brushes or texturing tools. The glass pigment is fired in the kiln, fusing it permanently to the surface. The oxides come in a variety of colors and can be applied in varying densities, from translucent to opaque.

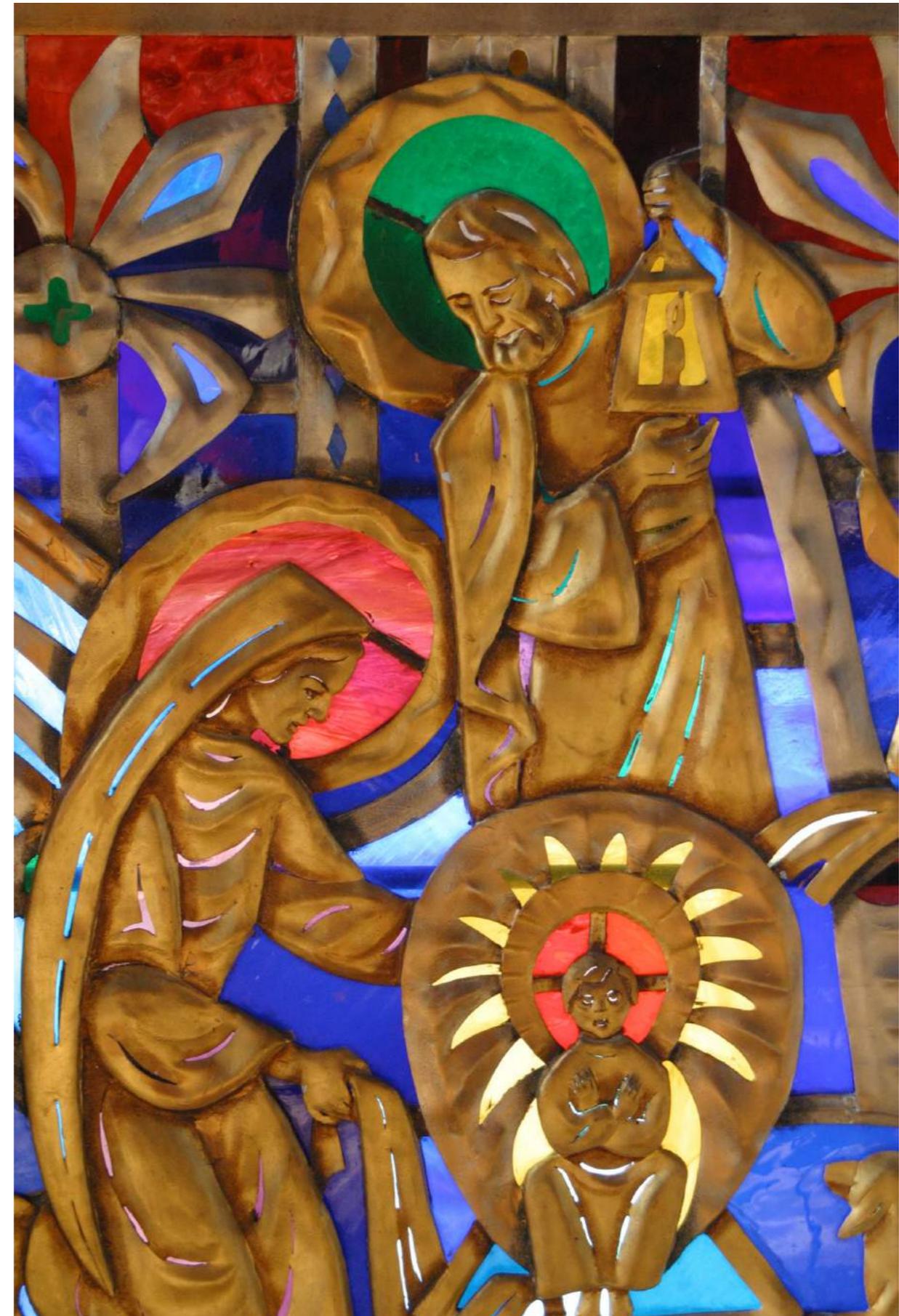


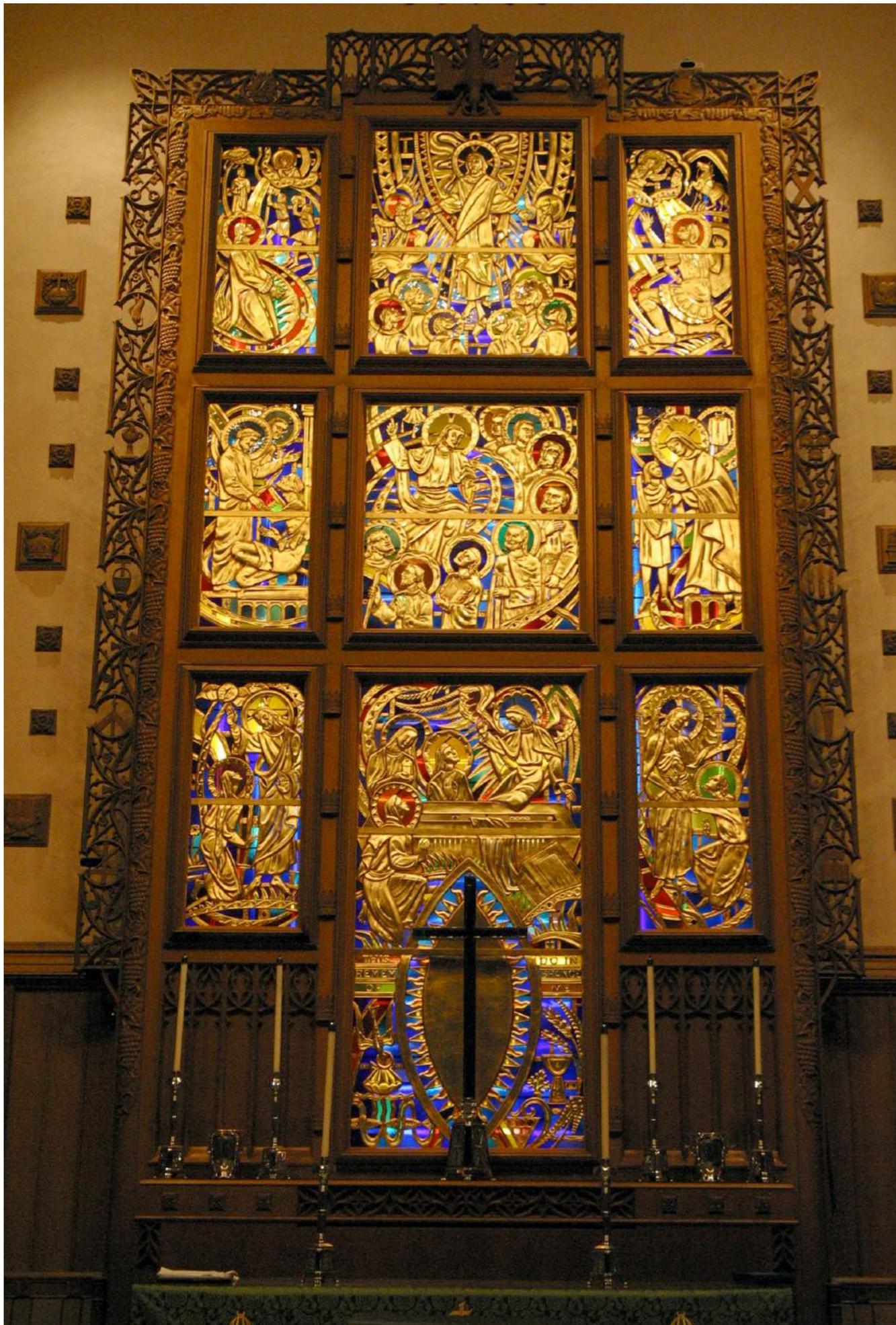


LEADED GLASS INSTALLATION

Sculptured Gold

The Sculptured Gold window is created with very special care and craftsmanship. A traditional leaded stained glass window is overlaid with a low relief sculpture fabricated of sheet lead forming figures and designs. All of the sculpture and the lead are then covered with 23-karat gold leaf. You have to personally view a Sculptured Gold window to fully appreciate the magnificence. This fabulous window is beautiful during the day and spectacular at night.





SCULPTURED GOLD



Laminated Art Glass

Over the last 117 years Willet Hauser has been proud to embrace new techniques to create art glass. The Lamination of stained glass on a large scale without the use of lead is our newest technique. This method allows the creation of art glass without lead. We are excited at the additional options this technique can allow in the creation of art.

The Laminate process uses Verifix 2k silicone to bond art glass to modern architectural substrates such as safety glass, float glass, insulated units, or to more art glass. After priming the base glass, a two-part silicone adhesive mixture is applied to this base glass. The art glass is then carefully laid onto this silicone layer following the approved design. The silicone sets solidly in 12 hours and is fully cured in 72 hours, although heat can be used to reduce the initial setting time. The Verifix 2k silicone technique has been proved for 20 plus years to be structurally permanent, UV and weather resistant and non-yellowing.

This technique utilizes crystal clear optical adhesives to adhere sheets of glass to the glass substrate surface. Glass etching and enamel painted can be combined with this techniques. Edges can be lit with fiber optics or LED's along the edge. This technique allows for the base glass to be tempered prior to lamination if code requires.





Sand Blasting and Etching

Glass etching refers to the process of abrading or roughening a piece of glass in an effort to produce a decorative design atop the glass surface. Etched glass can be an effective tool when light is limited.

Studios use various techniques in order to achieve an etched surface in glass, all with different artistic effects. Hydrofluoric acid is often used to etch specialized art glass with two or more layers of color, known as flashed glass. Hydrofluoric acid can also be used to engrave detailed designs onto clear glass. Designs can be engraved onto glass using a sandblast process, too. Additionally, we can accomplish all of these etching techniques using computer drawn designs and plotter-cut self-adhesive vinyl sheets.

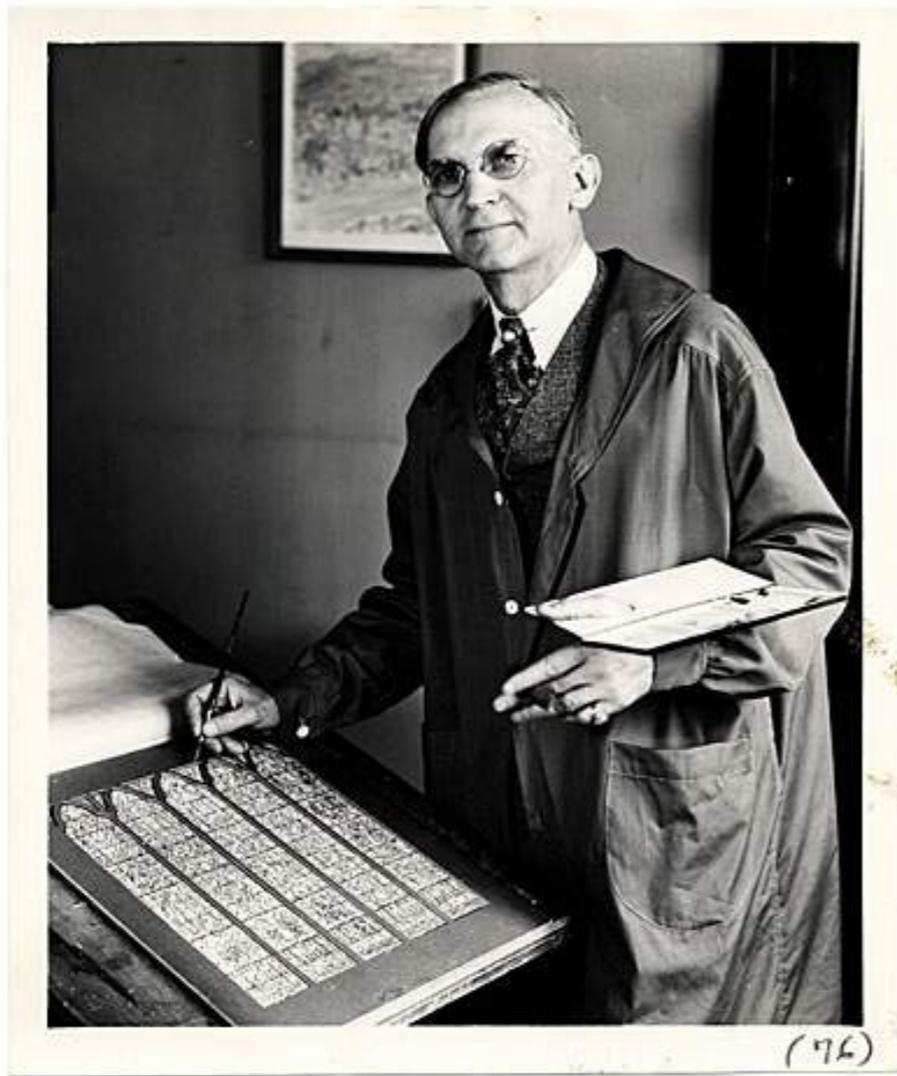
How do you Identify the Original Maker?

Stained Glass windows have been created by many different studios throughout North America. Knowing the window's original maker can often be helpful in understanding the window's special needs and values. Some of these studios have very unique characteristics, giving us hints as to their maker.

When identifying the maker, we recommend inspecting the windows themselves, first. The artists or studios that created the windows often have signed many of them. The signature are usually found painted in the lower portions of the windows with some marks being obvious and others well hidden.

Many studios or artists will sign their works in the lower portions of the windows. Some marks are obvious and some well hidden. This might mean inspecting the windows with binoculars or a magnifying glass because sometimes the signature is small and rather obscure. Additionally, some studios sign every window while others sign only in the building.

The following information is about some of the more notable studios you might encounter.

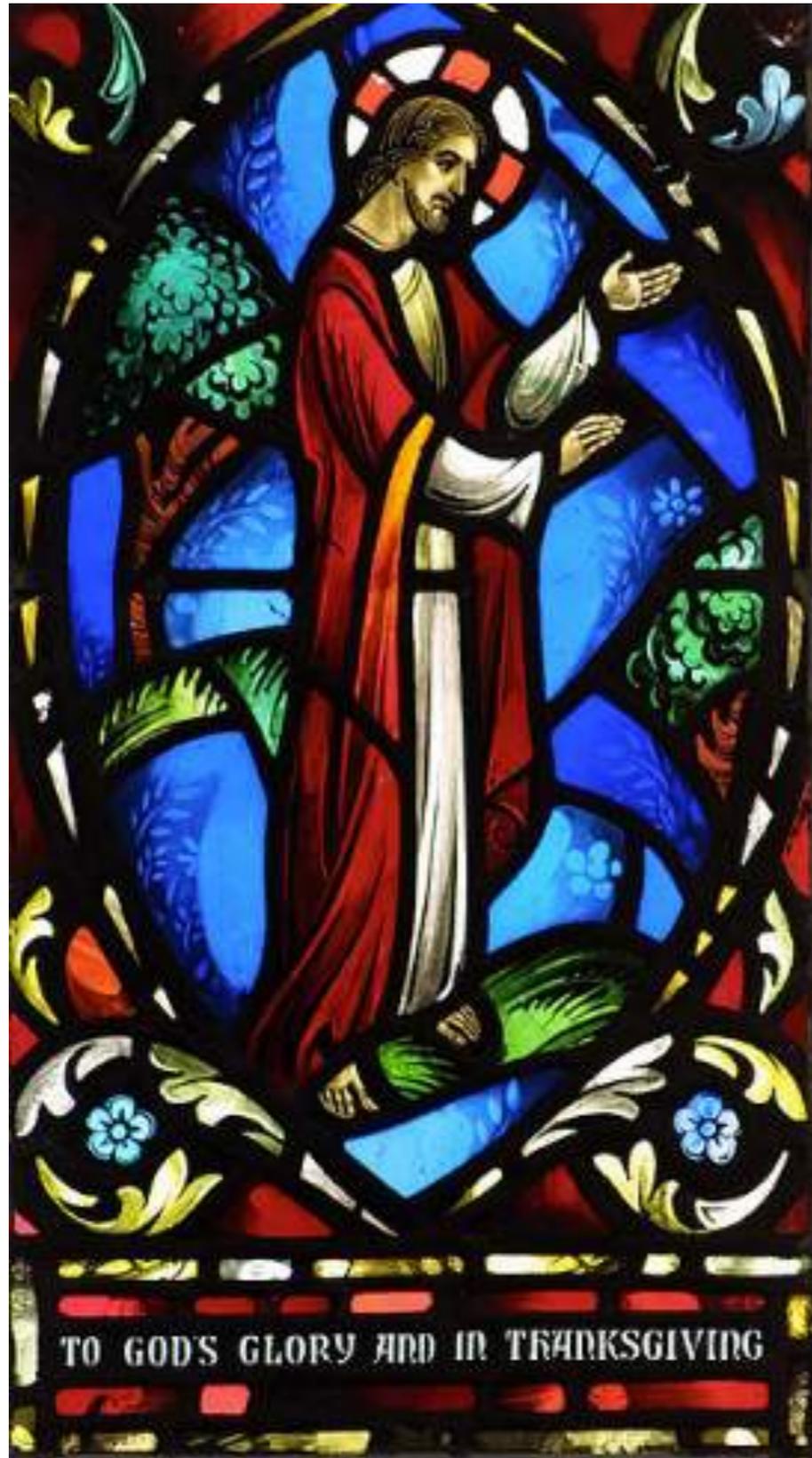


Charles J. Connick

One of the best known of the American traditional designers was Charles J. Connick of the famed Connick Studios of Boston. Connick quit his job as a cartoonist for a Pittsburgh newspaper to learn stained glass with William Willet, who had a studio in Pittsburgh at the time. He also studied stained glass in Europe before permanently settling in Boston in the early 1900s. There he quickly became friends and an associate of the famed Gothic architectural designer Ralph Adams Cram. Sharing the same passion for the architecture and stained glass of the Middle Ages as Connick, Cram helped Connick organize his studio in Boston in 1912, later commissioning him to design many of the windows for his churches.

Connick firmly believed that only by strictly following the medieval methods could the art of stained glass regain the beauty and glory that it held in the twelfth and thirteenth centuries. Consequently only the finest of mouth-blown antique glass was used. Because Connick adhered to a belief that blue was the active agent in medieval windows it was prominent in most of the windows of his studio. The term "Connick Blue" is often used in the description of a Connick window. His tome *Of Light and Color* was a must for any serious student of stained glass in the first 50 years of the twentieth century.

After the death of Mr. Connick in 1945, the studio continued under his longtime associate, Orin E. Skinner, who made sure that the studio continued in the Connick tradition. In the 1980`s the studio ceased operation after completing windows for over 5,000 churches.



Above, a Connick Associates signature

Left, detail of a Connick window

Heaton, Butler and Bayne

The English studio of Heaton, Butler and Bayne was founded in 1862 when Robert Turnill Bayne joined Clement Heaton and James Butler (who had been partners since 1855). Butler excelled in the manufacture of leaded glass and Heaton in pigmentation and glass painting. As partners they were noted for their excellent craftsmanship, but their designs lacked artistic appeal. For a few years they employed two new artists, Clayton and Bell (who would go on to form their own stained glass studio). Robert Turnill Bayne was employed by the studio and trained under Clayton. Bayne's talent soon showed and the apprentice became the master. He was then offered a partnership.

At its peak at the turn of the century, Heaton, Butler & Bayne was one of the largest and most well respected studios in the world, with representative windows through out the United Kingdom, the United States, Canada and Australia. It designed in all of the styles of its time from Pre-Raphaelitism to Art Nouveau.

Heaton, Butler & Bayne enjoyed growing success, especially in the United States. In 1886 they hired the Gorham Manufacturing Co. of New York City as their American agents. There are still windows created by the firm but bearing the "Gorham" trademark. The contract was terminated in 1908 when Heaton, Butler & Bayne opened their own offices in New York. Their windows can be found in almost 300 churches in the United States.



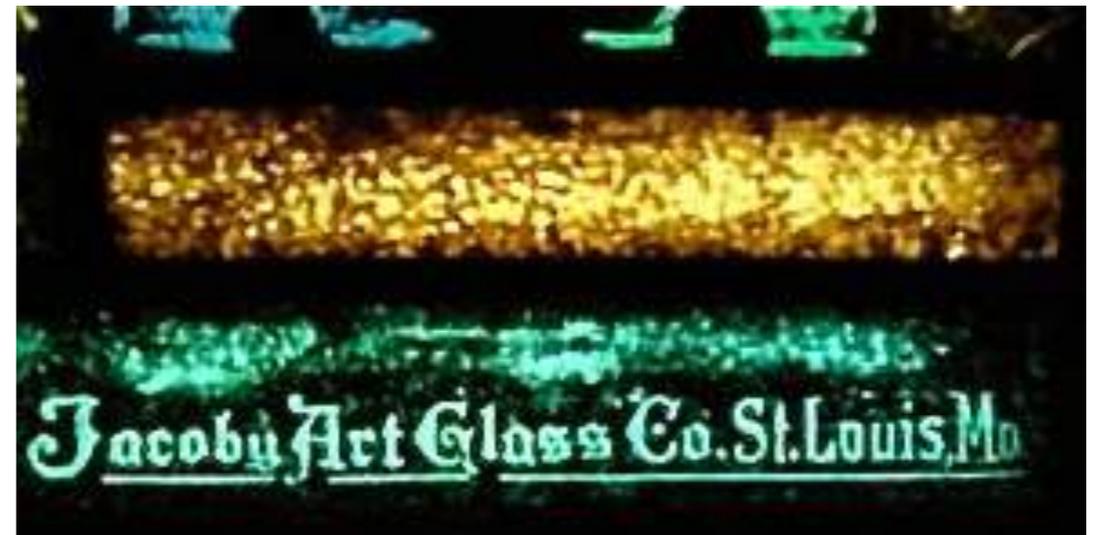
Signature from the collection of Morningglass designs, Scotland, UK

Jacoby Art Glass Company

Not much is known of the early years of the Jacoby Art Glass Company, as most of the records have been lost or destroyed. It is said that G.A. Spies founded a small art glass shop in 1896 in St. Louis, MO. In search of more capital, Spies partnered with businessman H.H. Jacoby and together the pair founded the firm Jacoby-Spies Manufacturing Company.

By the turn of the century the firm changed its name to Jacoby Art Glass Company, incorporating as such in 1907. It remained in existence for 75, during which time the firm created both leaded and faceted art glass through much of the midwest.

The Stained Glass Association of America (SGAA) has a 90% complete list of Jacoby installations. The remaining 10% were lost in a fire.



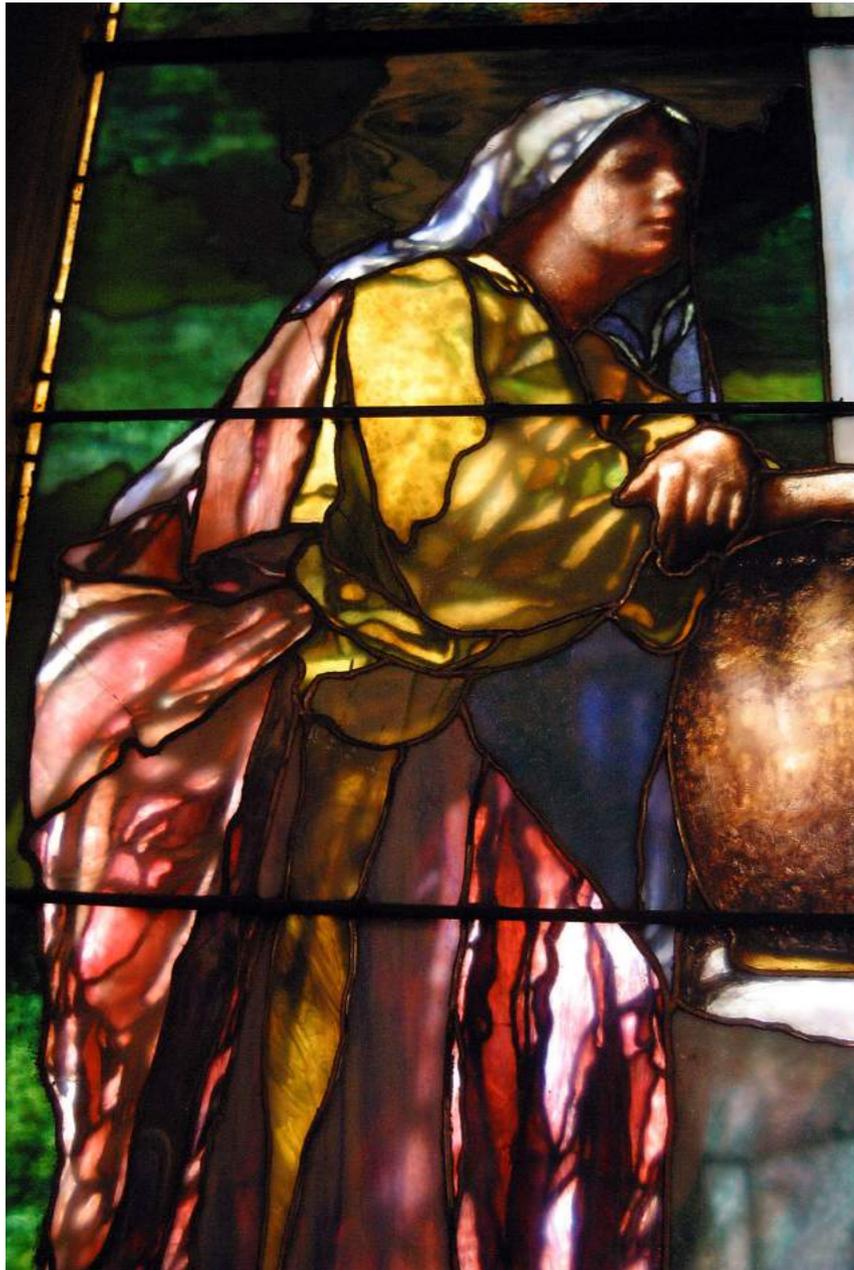
John La Farge

John La Farge is considered one of the most significant innovators in the history of stained glass., was an American painter, stained glass window maker, decorator, and writer.

A man of many talents, La Farge was also a talented painter, decorator and writer. He also lectured and wrote on the subject of art, and is known for his friendships with many artists and intellectuals of his day.

His contributions to stained glass technique include:

- The development and use of opalescent glass, which he first patented in 1880
- Incorporating molded glass embellishments into his creations, usually in the shapes of jewels or flowers.
- Plating, a method of layering glass pieces directly on top of each other to achieve detailed depth as well as minimize the need for painting.



Note the use of drapery glass



JOHN LA FARGE WINDOW

Munich School Studios



History

The Munich Pictorial Style was developed out of the Royal Bavarian Stained Glass Manufactory, a glassworks established by King Ludwig I in 1827 who sought to turn his city of Munich into an unrivaled center of German art and culture. During the latter half of the 1800's and the first part of the 1900s many churches in the United States, especially Catholic churches, imported their windows from studios that grew out of the Munich School.

These "Munich" windows, as they were called, became so popular in the United States that some of the studios opened branch offices in Chicago and New York City. The most well known of the Munich School studios were the Mayer Studios, the F. X. Zettler Studios, the Royal Bavarian Establishment for the Stained Glass of Gustave van Treeck, the Innsbruck Studios and the Tyrolese Art Glass Studios. Some American studios also had principals that were trained in Munich and/or designed in the style of the Munich School. They were the Munich Studios of Chicago, the early Emil Frei Studios of St. Louis, the studios of Flanagan and Biedenweg of Chicago and the Ford Brothers Studios of Minneapolis.

The Munich School windows imported from Germany seldom used the enamel based glass painting technique, but it was used by some of the American studios, most notably Ford Brothers of Minneapolis and Flanagan and Biedenweg of Chicago.

Typical "Munich" School style window with columns and canopies.

Characteristics of the Munich School

Most Munich School windows have very distinct characteristics. The figures are highly realistic, painted in a German Baroque style on antique glass utilizing the traditional trace and matte technique of glass painting. If the theme was a scene, it often extended from one lancet to another.

Usually, but not always, the figures are set in a realistic scene framed by elaborate white and gold columns and canopies. Unlike the medieval windows, where the line formed by the lead is an important part of the design, the lead becomes subordinate to the highly painted glasses.

The Munich School windows had great success with German, Bohemian, Polish and other European ethnic congregations. They had the sensitive understanding of the subject matter these congregations desired. The style was also very similar to the styles of the windows of the churches in the "old" country. Munich style windows also can often be found in the eclectic collections of Episcopal churches.

Because of the elaborate and detailed glass painting, staining and etching that is found in Munich School windows they are of the quality that, because of today's high labor costs, would be extremely costly to duplicate. Also, today there are only a handful of studios throughout the world that employ the highly skilled glass painters that can execute this type of realistic figure painting.



(Left) Detail of Angel. Note use of acid etching on wings with silver stain applied for yellow coloring. (Right) Detail of gown with delicate detail painting and silver stain applied (yellow).



Franz Mayer & Co.

Franz Mayer Studios of Munich

Franz Mayer & Co. (Mayer & Co. of Munich) is a famous German stained glass design and manufacturing company, based in Munich, Germany, that has been active throughout most of the world for over 150 years. The firm was very popular during the late nineteenth and early twentieth century and was the principal provider of stained glass to the large Roman Catholic churches that were constructed throughout the world during that period. Franz Mayer and Co. were stained glass artists to the Holy See and, consequently, popular with Roman Catholic clients

The artistic style of Mayer windows can be considered romantic, owing much to the revival of religious painting - especially fresco painting in the tradition of the Italian Renaissance masters, especially Masaccio, Raphael, and Michelangelo - in Germany early in the 19th-century.

Windows are recognizable and respected for their elaborate, finely executed painting. The style is composed of painting on relatively large glass panels (as opposed to the medieval technique of smaller pieces of colored glass) held in a leaded framework. Windows are made up of small colored glass pieces that were coated with overlay color and tracing lines before being fired and leaded.

Christ, saints, heavenly hosts, and ordinary people are attired in jeweled tones and richly embroidered fabrics. Backgrounds contain intricately woven tapestries and finely laced cloths. Throughout the narrative scenes are lush plantings and a multitude of flowers each so well rendered that botanical identity is possible. The abundant landscaping is reflective of the Romanticist's belief that nature can be the source for the spiritual experience.



MAYER & CO. OF MUNICH

Ford Brothers Glass Company

The Ford Brothers Glass Company was Minneapolis, MN. Though the studio was quite popular around the turn of the century it went out of business during the depression.



Ford Brothers



H. Muench Stained Glass

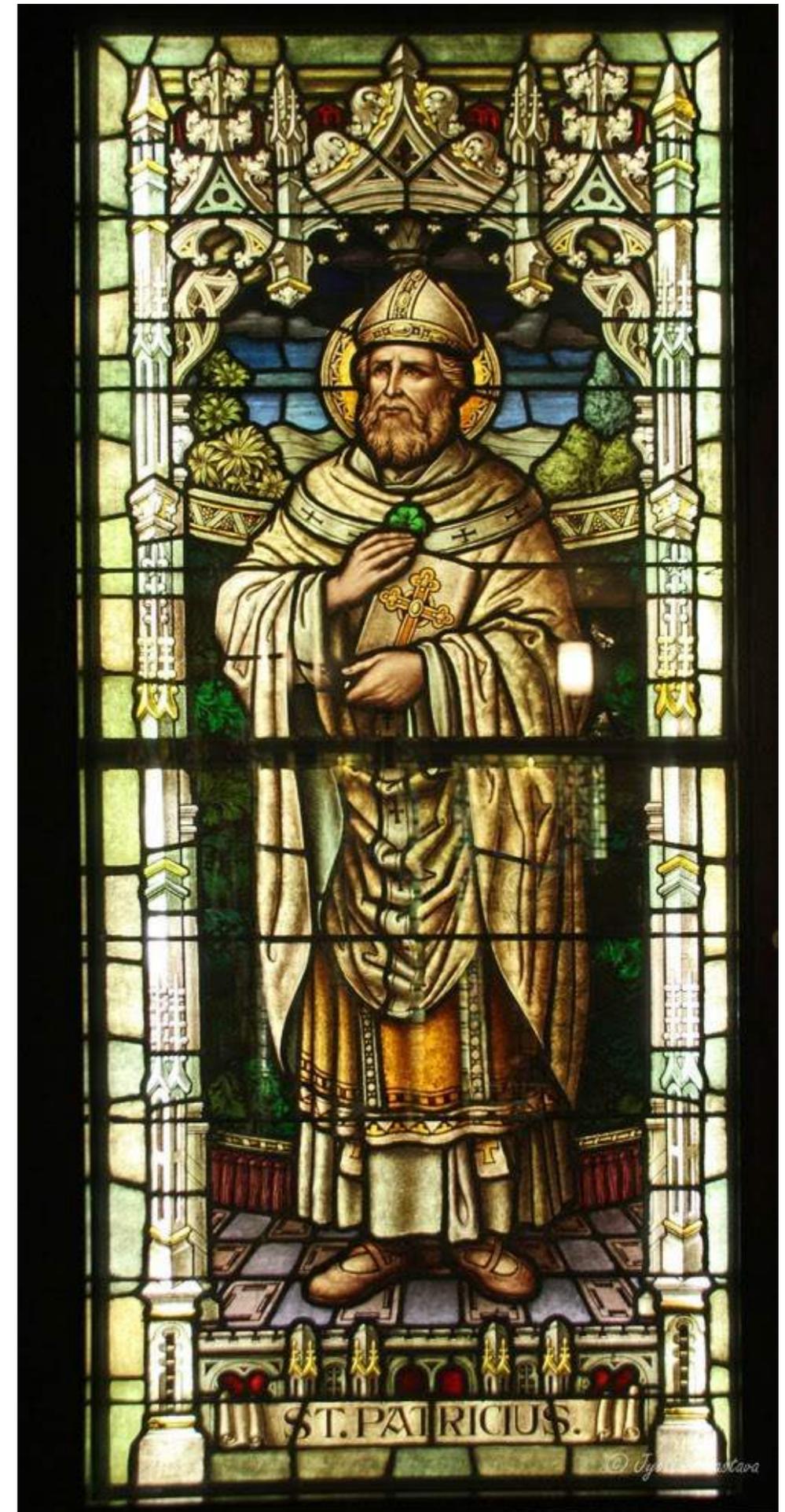
There is very little information known about H. Muench Stained Glass. The *Biographical Index of Historical American Stained Glass Makers* states that the studio existed in 1945. A search of church records finds that a Hans Muench of H. Muench Stained Glass worked for the Munich Art Glass Company of Chicago in 1916 when he installed their windows in a church in Kansas.

Munich Studios of Chicago

A master of the Munich School style was Max Guler, who founded the Munich Studio in Chicago in 1903. Guler had studied painting in Munich, Germany and, not surprisingly, his work shows the influence of the German Baroque style in his use of elaborate ornamentation, asymmetrical figure groupings, strong contrasts between light and shadow, and abundant architectural detail.

Guler's art, which was essentially Baroque, reflects that style's dramatic contrasts of light and shadow, attention to realistic detail, asymmetrically planned groupings of figures, an abundance of architectural forms, and intricate decorative elements.

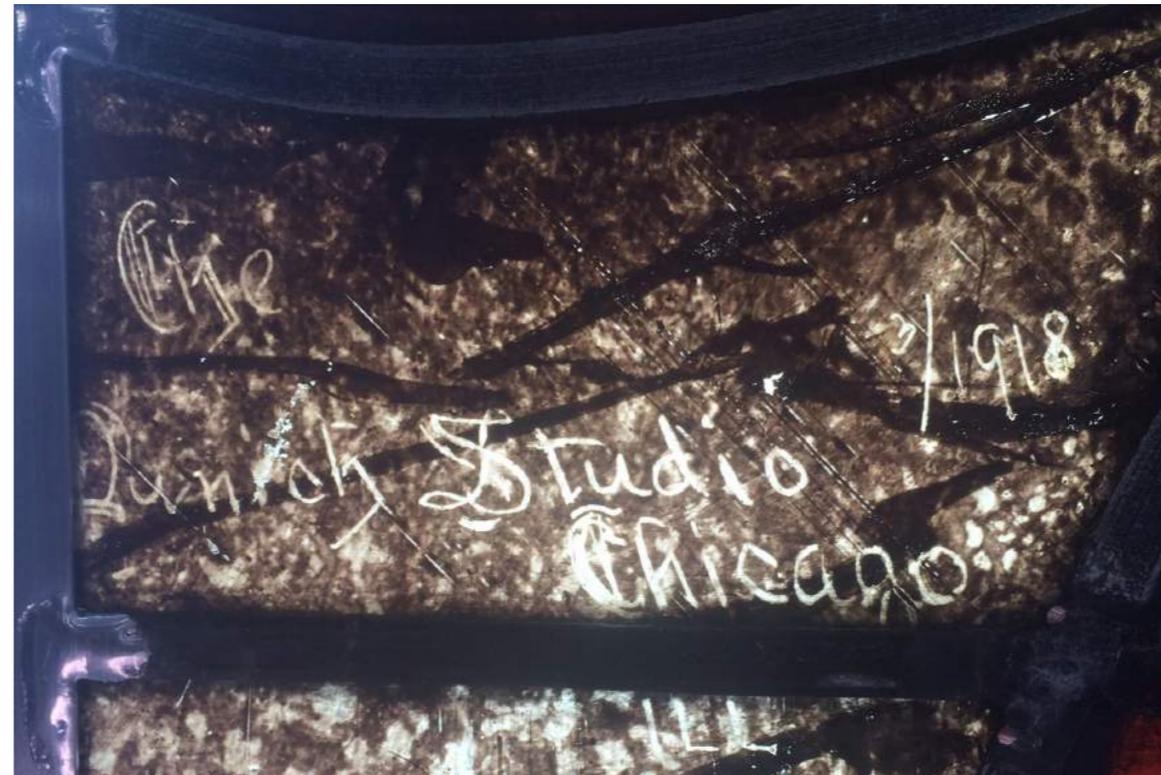
St. Patricius/ Saint Patrick
Max Guler, Munich Studio, Chicago
Smith Museum of Stained Glass Windows
at Navy Pier, Chicago



Although The Munich Studio did make some domestic windows, its business dealt primarily with churches and its advertisements and brochures were directed to the attention of the clergy. Partial catalog listings from 1910 to 1925 note thirty-two major church installations in Chicago; and ninety-six in out-of-state cities. In 1913 the company employed over 30 craftsmen, seven doing only glass painting. *The Munich Studio* imported most of its glass from France and Germany. Domestic glass was supplied by several firms in Indiana and West Virginia. Like medieval stained glass, these glasses were painted only with iron oxide and "yellow stain" and then fired in ovens.

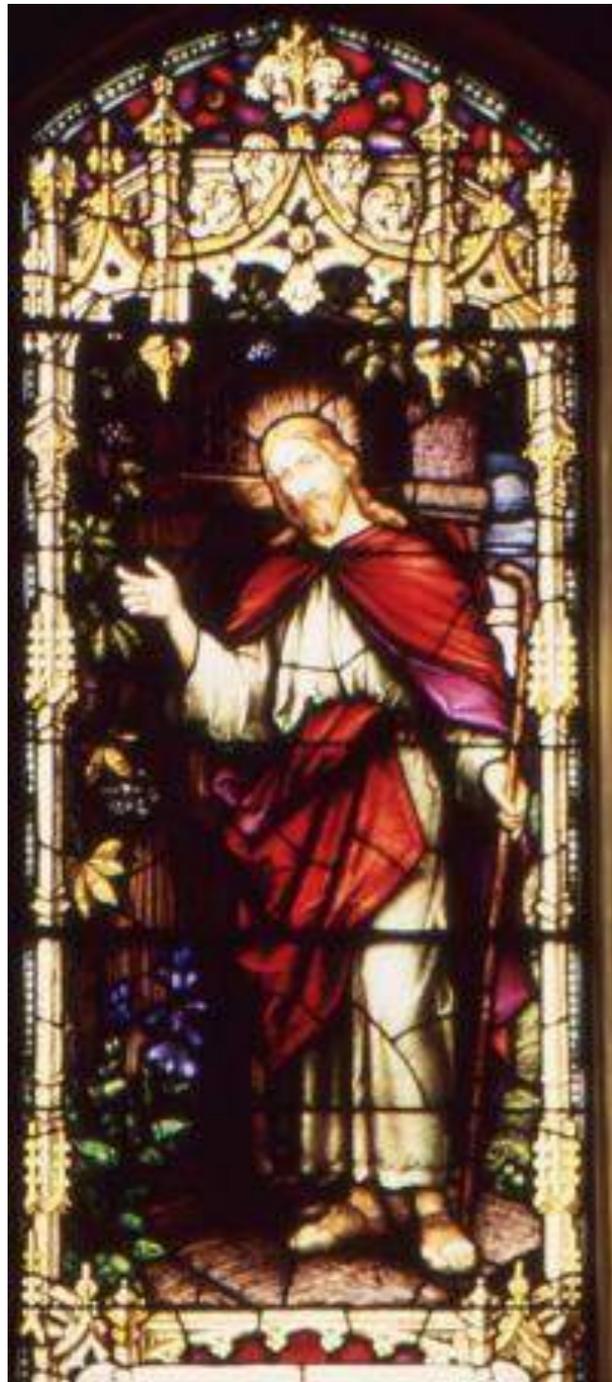
The Munich Studio continued to prosper until 1930 when the Great Depression brought all building to a near standstill. Since it depended primarily upon the construction of new churches for its business, this blow, coupled with the sudden death of Shanahan upon whom Guler relied for all business matters, forced the company's closing.²⁴ *The Munich Studio* ceased operating in 1932.

Glenn Sobola, parish historian. Immaculate Heart of Mary, Cleveland, OH parish historian

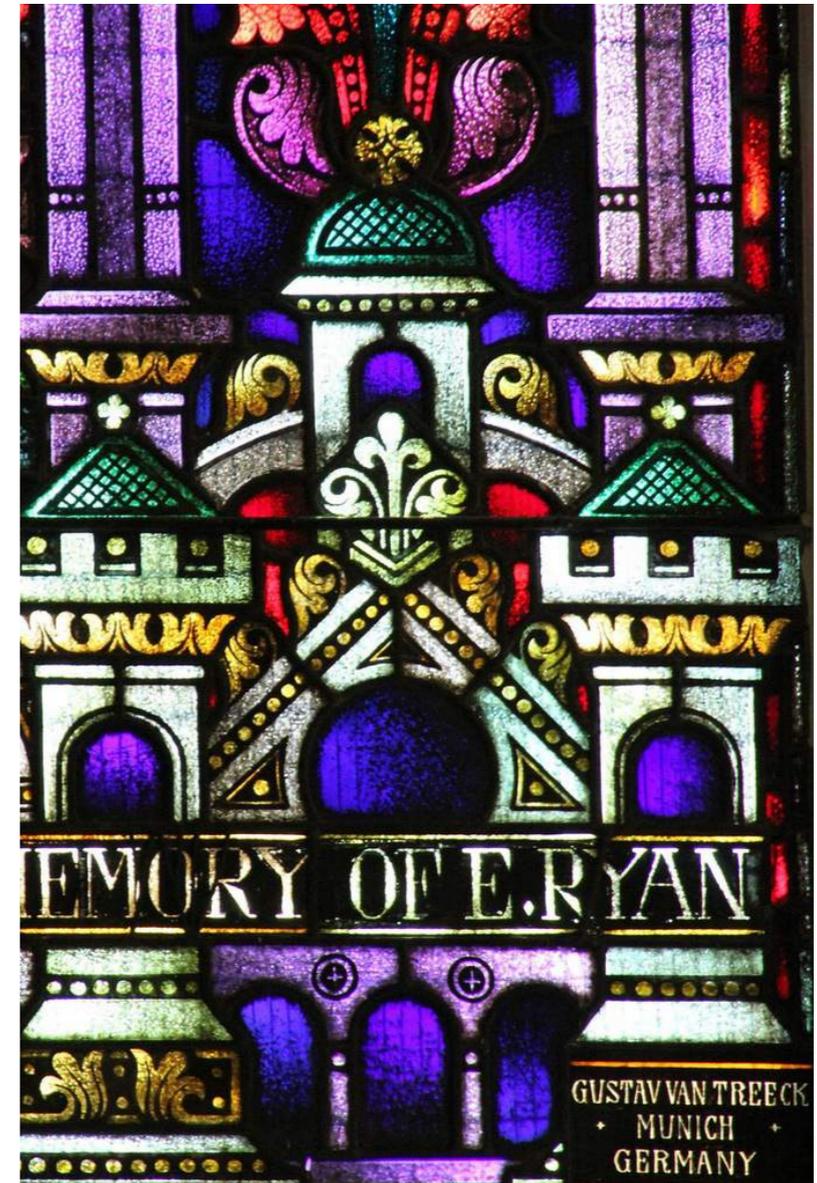


Gustav van Treeck of Munich

One of the Munich School studios, the Gustav van Treeck GmbH corporation was founded in Munich, Germany in 1887. In 1903 it was appointed as a Royal Bavarian Studio for Glass Painting by the Bavarian royal court in 1903. The studio is still in existence today.



Gustav van Treeck of Munich



Von Gerichten Art Glass Company

The Von Gerichten Art Glass Company was founded by the von Gerichten brothers who emigrated from Germany to Alabama in 1891. They later moved to Columbus, OH, in 1898. In an effort to compete with European studios, they had a branch studio in Munich, Germany. Their work is found in over 1,500 American churches, mostly in the eastern United States. The studio closed in 1939.

Von Gerichten Art Glass Company

F.X. Zettler Studios

The F.X. Zettler Studios of Munich, Germany is a direct descendant of the Munich School and often signed their windows as the Royal Bavarian Institute of Art.

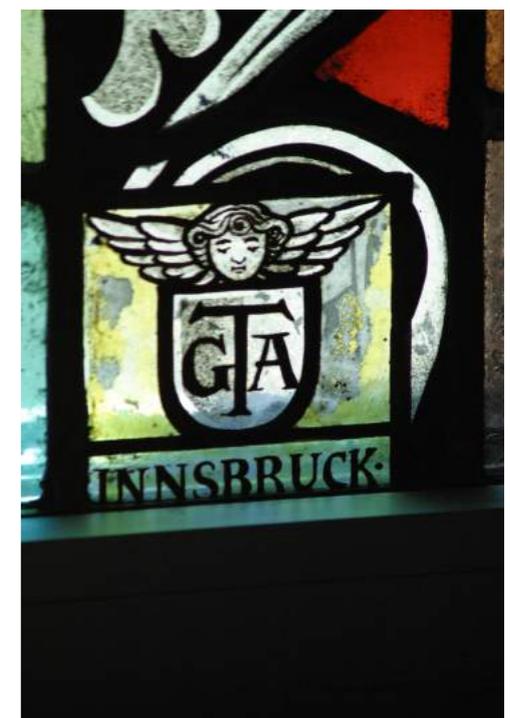
At the beginning of the twentieth century, Zettler operated an international business with over 500 employees, and shipped his windows to churches across the United States, Russia, Australia, and South America.



Tyrolese Art Glass

Trioler Glasmalerei und Mosaik-Anstalt was the official name of the studio more popularly known as the Tyrolese Art Glass Company. (Its signature mark is usually GTA). The company, located in Innsbruck, Austria, was founded in 1861. By 1884 it had developed a special "American" style to meet American church demands. The firm provided many windows for the American market from the late 1870s until the beginning of World War I, with offices in New York and Chicago. At its peak, in Europe, the company employed about 110 people in Innsbruck and Vienna. At one time it was estimated there were about 3,000 installations of the windows of the Tyrolese Art Glass Company worldwide. It is unknown how many windows from this period survive today.

The firm's windows employed the painterly Munich Style associated with studios such as those of Franz Mayer and F.X. Zettler in Munich. It continues in Innsbruck today, under the direction of Konrad Mader, a descendant of one of its founders.



Tiffany Studios



Although many studios of the period utilized opalescent glass, it was the Tiffany Studios that used it the most creatively. The Tiffany Studios also created new glasses and glass techniques for their very special windows. One example is drapery glass, where glass while still in a molten state would be manipulated with paddles to form folds in the glasses. The drapery glasses would then be used in the gowns of the biblical figures.

By the turn of the century the Tiffany Studios became the most famous American studio and many of the finer churches and wealthier homes were proud to boast that they had at least one Tiffany window. After the disbanding of the Tiffany Studios in the 1930s, the use of opalescent glass in church windows declined significantly.

Louis Comfort Tiffany, born in 1848, was the son of Charles Lewis Tiffany, a successful merchant in silver and jewelry who had earned a great deal of money supplying the Union Army with swords and medals during the Civil War. It had been hoped that he would follow his father and take over the family business, but Louis had developed a compelling interest in art. He was a great lover of nature, which certainly showed in his early landscape paintings and later in his landscape windows.

By the time he was thirty he was a successful artist and painter. His work was exhibited in Philadelphia in 1876 and in Paris in 1878. Around this time he started experimenting with glass as a medium for painting, and in 1879 he began to make stained glass windows for the homes of some of his father's friends. In 1883 he was invited by President Chester Arthur to redecorate the White House. After this his decorating and stained glass business really took off.

In 1886, a year after his wife died, Tiffany remarried. His new wife was the daughter of a Presbyterian minister and he soon became increasingly involved with the design and creation of church windows and interiors, responding to the unprecedented explosions of church construction in the decades following the Civil War. In 1875 alone, over 4,000 churches of various denominations were built. By 1910 there were Tiffany windows installed in churches in forty states, Canada, Australia, England, Scotland and France.

The production of windows by the Tiffany Studios continued until 1938, five years after Tiffany's death, when the company closed. Since that time, because of changing conditions and the growth of cities, many of the churches housing Tiffany windows were demolished. Unfortunately many of the Tiffany windows were destroyed also. It is estimated that 50% of the windows created at the Tiffany Studios are still in existence.



Drapery Glass

Another favorite technique of the studio was to utilize extensive plating for special visual effects. In this technique, layers of different glasses were attached to certain areas of the window to create these special effects. Sometimes these plates may be as much as four or five layers thick.



A Plated Tiffany Window with Five Layers of Glass (base plus 4 plates in center area)

By the turn of the century the Tiffany Studios became the most famous American studio and many of the finer churches and wealthier homes were proud to boast that they had at least one Tiffany window. After the disbanding of the Tiffany Studios in the 1930's, the use of opalescent glass in church windows declined significantly.



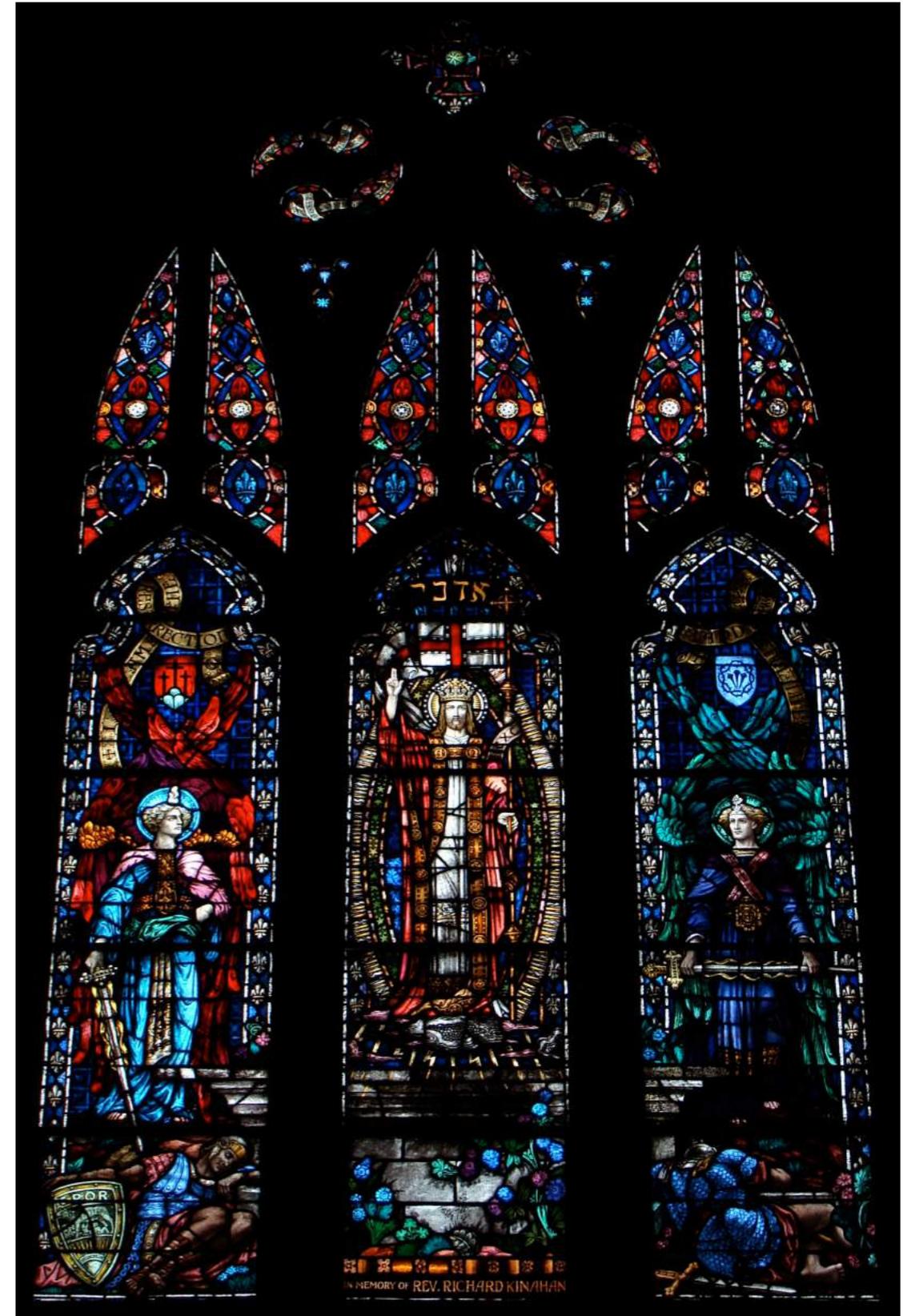
Tiffany Studio Signature Examples

Willet Studios

William Willet, an artist and leader in the American Gothic Movement, founded Willet Studios in 1898 in Pittsburgh, Pennsylvania. The studio was later moved to Philadelphia.

Working with noted architect Ralph Adams Cram, William Willet created traditional designs that rivaled the works found in the finest European Cathedrals. In 1910, William Willet was invited to compete for the large chancel window in the Cadet's Chapel at the United States Military Academy at West Point. After winning the competition, Willet Studios was selected to design and fabricate all of the stained glass windows in this large cathedral-like building. In that the cadets desired to give the window sections as class gifts, the commission lasted 66 years and became the longest continuing stained glass commission in American history.

William's son, Henry Lee Willet, took over the studio after his father's death. Under Henry Lee's guidance, the company expanded from a regional studio to a national studio, with completed projects in all 50 states and 14 foreign countries. Willet Studios experimented with new techniques, and in the 1950s, Willet Studios was one of the first American studios to design and fabricate faceted glass windows. Willet also developed the famous sculptured gold window technique and experimented with different methods of laminating stained glass. Under Henry Lee's leadership, Willet Studios became known and respected throughout the stained glass world.



In 1965, E. Crosby Willet, the son of Henry Lee Willet, became the President of Willet Studios. Under his leadership, Willet windows were created for many of the major churches and cathedrals in the United States including the National Cathedral in Washington, D.C. and Grace Cathedral and Saint Mary's Cathedral in San Francisco.

In 1977, Willet Studios became a division of the Hauser Art Glass Company, creating the largest stained glass company in the United States. In 2005, the company changed its name to Willet Hauser Architectural Glass, Inc. to more accurately reflect the long-term direction of the business. Also, please note the attached additional biographical information about the Willet Studios and visit our website at www.willethauser.com



Henry Lee Willet



E. Crosby Willet

J. Wippell and Co LTD

TJ. Wippell and Co. LTD was founded in 1851 from a long established supplier of cloth and clothing in Exeter, England. Their earliest glass dates from 1896. G.B. Cooper-Abbs served as chief designer; other designers included F.W. Cole and R. Coomber. Most of their work in the first half of the 20th century remained gothic. In the 1970s Wippell's acquired the church fittings business of A.R. Mowbray and. The joint stained glass workshop became known as the Wippell, Mowbray Studios. They are known for vestments today.



The Willet Hauser Library



The historic Willet Hauser Library is helpful resource to assist churches research the designers and creators of their valuable stained glass windows. Staffed with a full time librarian churches can call or email their photos and receive a report of the library findings. The library contains over 25k designs and slides by both Willet and Associated Crafts as well as a full collection of industry magazines, books and research on other windows and studios.

The library offers these services free of charge and obligation.

Documentation & Why

- Stained glass studios understand the need to educate each client on the art of stained glass. It's a large decision for the church community and the church's budget. Some studios offer an on-site inspection program where a professional stained glass consultant travels to your site to inspect and document your stained glass windows. Trained consultants can help you design the scope of work for your stained glass project.
- At the time of the inspection, photos and measurements are taken documenting the current condition of the stained glass collection.
- Proper documentation is important for a number of reasons:
 1. Insurance & Replacement Costs
 2. Documenting the windows' current condition
 3. To Assist in the repair of damaged windows in the case of catastrophic loss or vandalism.
- *Unfortunately, windows reach critical stages of deterioration when a church has avoided or does not understand the problems that allowed for such damage, until the situation has reached catastrophic levels of disrepair. The following will outline the necessary steps you can take to document your windows.*

Photo Documentation & Why

- In the case of catastrophes such as tornados, hurricanes, fires, or vandalism, stained glass panels or entire windows can be destroyed. Having documentation of your windows would be essential in their restoration.
- Putting together photo documentation of your stained glass is easy. Take an overall photo of each window and then a close up of each section to show the detail. It is also important to measure the window opening, rounding off to the nearest half foot.
- It is a good idea to store this information in multiple locations as well as in a safe deposit box.



Photography Tips

- With note cards on hand observe window #1.
- Write the number 1 on note card. Place card in right hand corner of window and shoot photo.
- Review photo to make sure it is clear.
- Be sure index card and number is visible.
- Take exterior photos using the note cards.
- For inaccessible windows, hold appropriate card number in front of you so you can see the card number and window in picture.



Observing Your Windows

While photographing your windows take note of the following:



Interior Observations

- How many pieces of broken out glass are there?
- Do you see any bowed, sagged or bulged areas?
- Do you see any light leaks and if so, how many?
- Do you see evidence of water leakage?
- Are there any loose or missing brace bars?
- Are there any brace bars missing?

Exterior Observations

- Is the window covered?
- Is the frame wood, steel, aluminum or stone?
- Is the protective covering vented?
- Is the window in need of painting?
- Do you see any rotten wood? Is the protective covering clear?
- Is the protective covering broken?
- Is there any evidence of the protective covering leaking?

Measure

- Round off all measurements to the half foot.
- Ex.: Wood that is 32" should be rounded up to three feet.
- Write *width* measurement followed by *height* (W x H)
- Large windows- measure half the distance and then double it.

Describe

- Identify each window visually.
- Use the name of the scene (i.e. Communion or Nativity etc.)
OR
- Use the name found in a memorial plate (i.e. In Honor of John Smith)
- Another option- Use the area of the church to identify a window (i.e. "large balcony window" or "large altar window")
- Be sure to number each window. Very important!

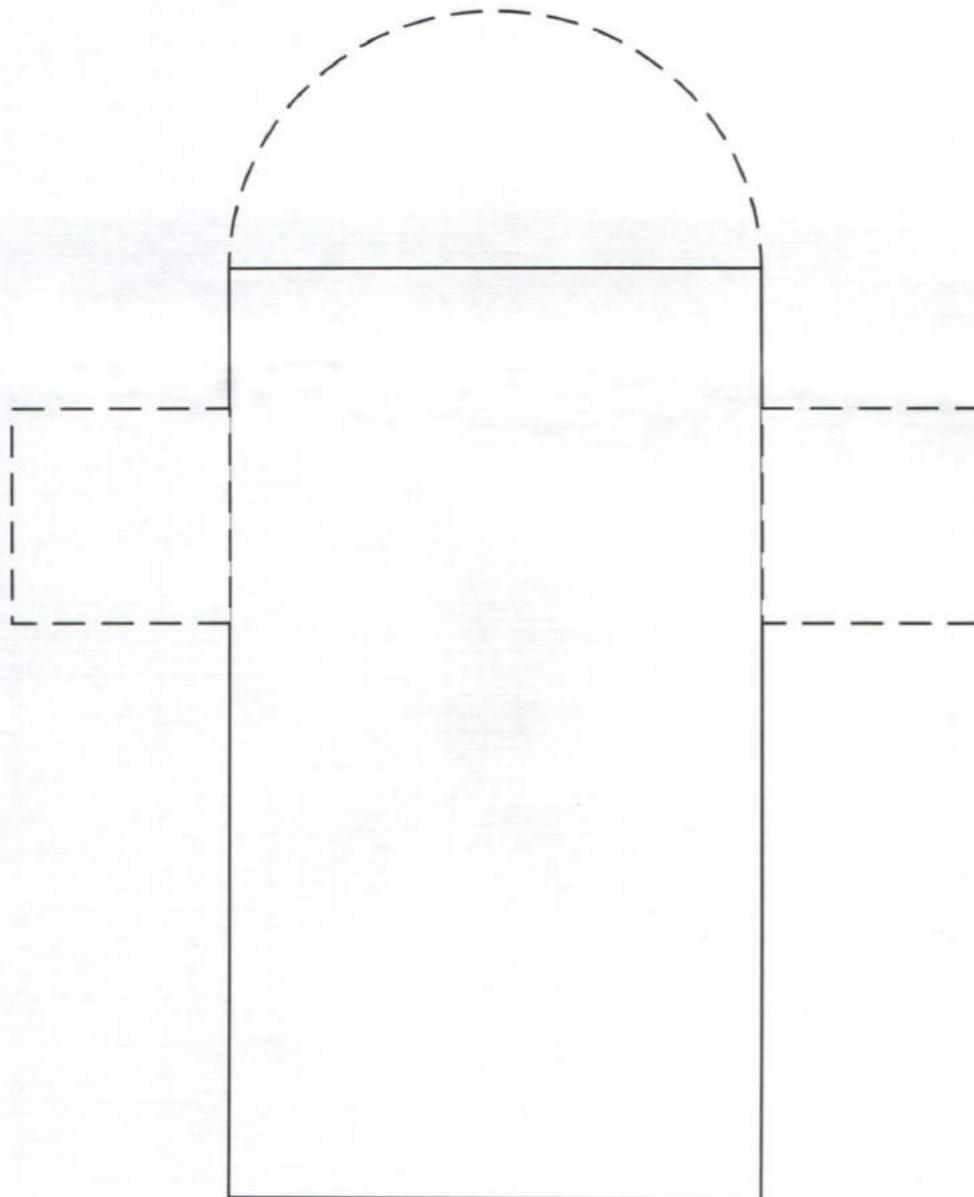
BUILDING DIAGRAM

Church Name: _____

City _____

State _____

Zip: _____

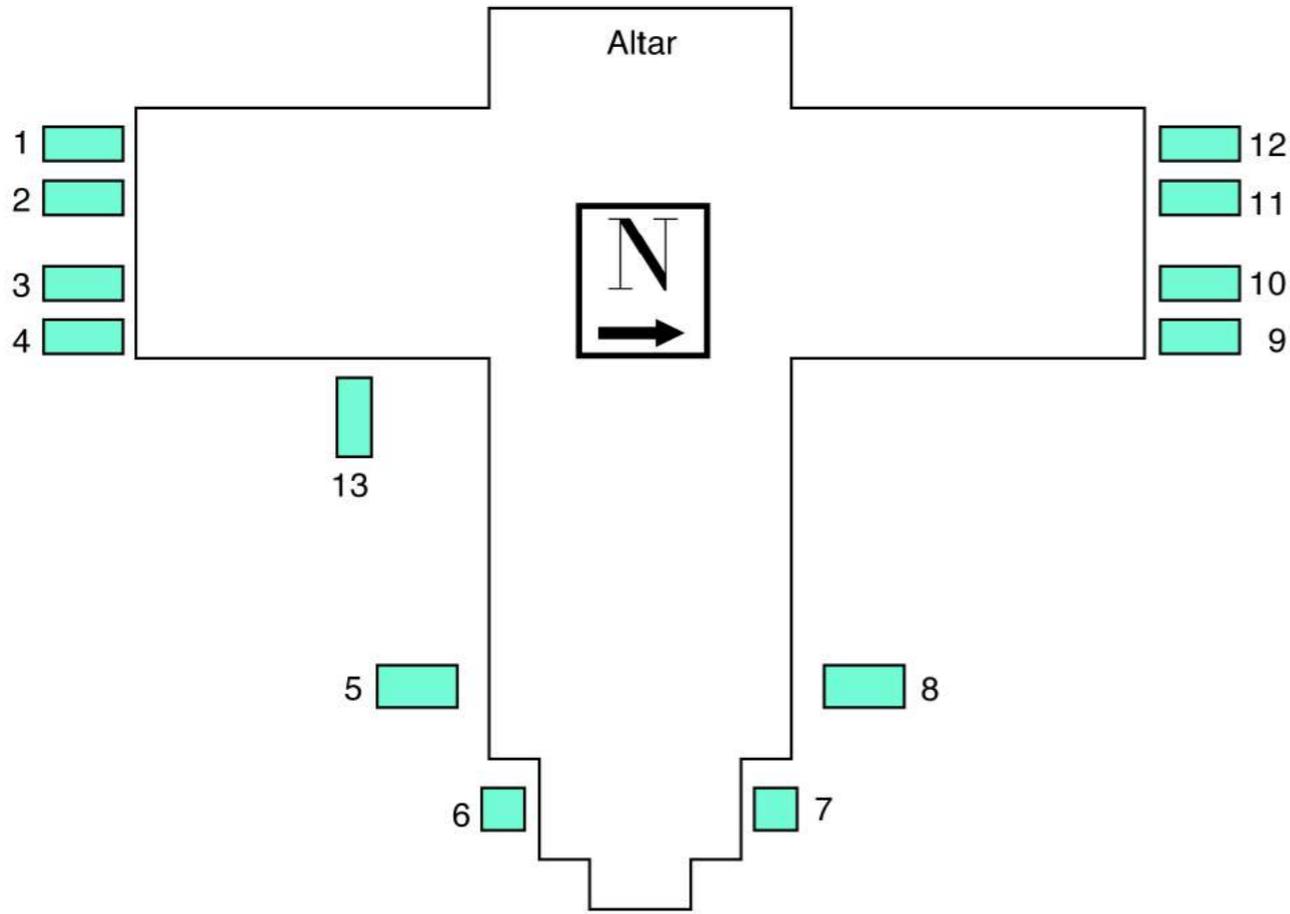


Building Diagram

Additionally, the information gathered can be used to file out a Building Diagram.

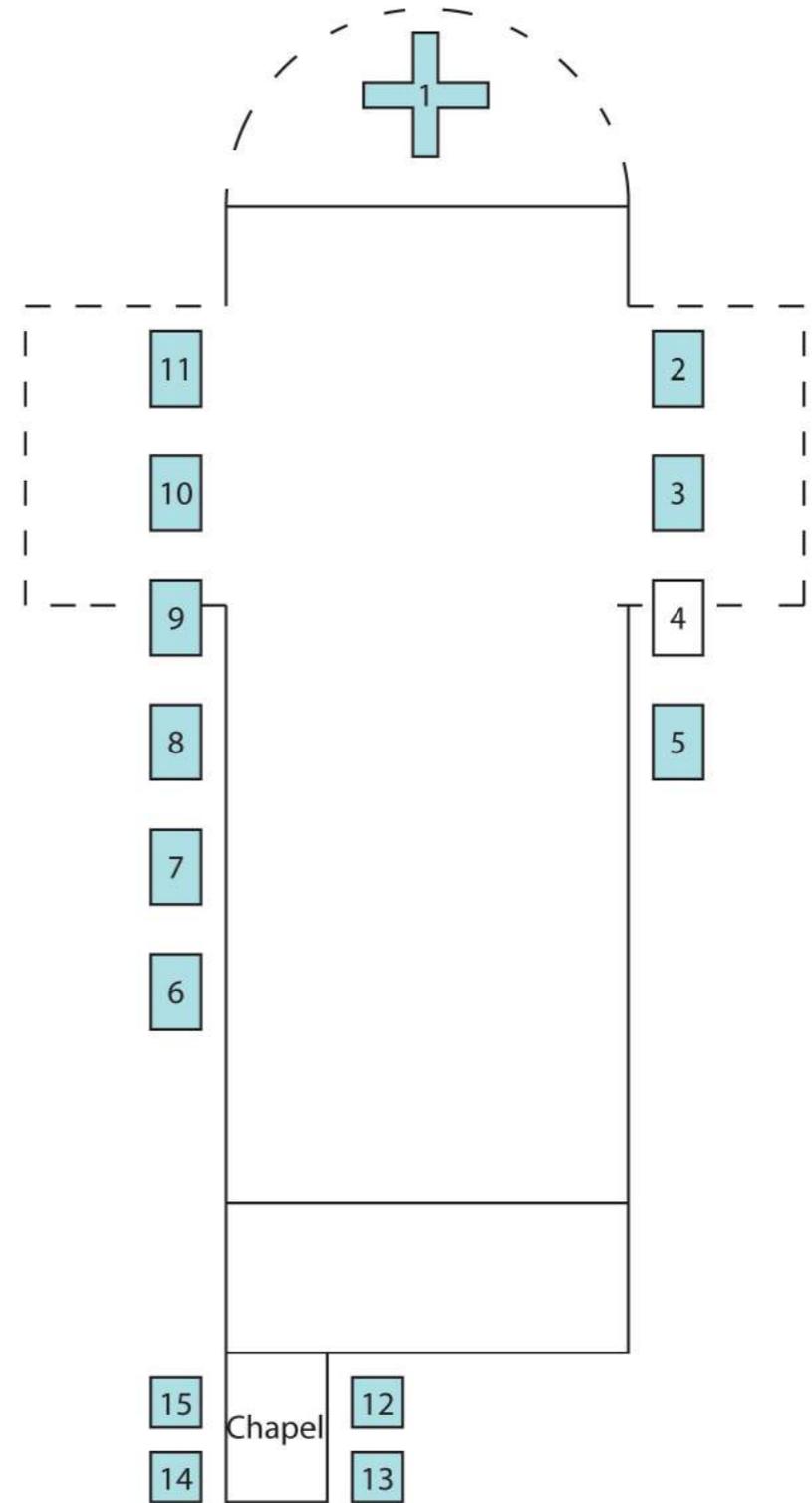
Instructions: Please make multiple copies of this blank drawing.

1. Indicate the shape of your building from the drawing above.
2. Show the location of each window with an "X".
3. Assign a number to each window.
4. For multiple levels of windows, use a separate drawing indicating their location.



Not to Scale

Sample Building Diagrams



Art Glass: Do-It-Yourself Survey

- To assist with your documentation, we have designed the a guide for you to view and observe each of your stained glass windows. This Do-It-Yourself Guide can be found on our website: <http://church-stained-glass-windows.com>
- We have provided you with a form that you can submit to Associated Crafts/Willet Hauser for review. When completed, this survey can also serve as documentation of each window, which can be very helpful with insurance claims or reproduction in the case of loss.

Filling Out the Do it Yourself Survey:

STAINED GLASS ASSESSMENT FORM

Window No. Window Description. Width. X Height.

Interior Observations
 Bulging yes no Broken Glass yes no Loose Braces yes no Light Leaks yes no

Exterior Observations
 Protective Covering yes no Evidence of leakage yes no Window Setting wood aluminum steel stone
 Painting yes no Frame Damage yes no

Comments

Window No. Window Description. Width. X Height.

Interior Observations
 Bulging yes no Broken Glass yes no Loose Braces yes no Light Leaks yes no

Exterior Observations
 Protective Covering yes no Evidence of leakage yes no Window Setting wood aluminum steel stone
 Painting yes no Frame Damage yes no

Comments

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Bulging yes no No Broken Glass yes no No. Loose Braces yes no No. Light Leaks yes no No.

Exterior Observations

Protective Covering yes no Evidence of leakage yes no Window Setting wood aluminum steel stone
Painting yes no Frame Damage yes no

Comments

Replacement Costs

- Using the information collected during documentation, the studio will provide you with a full report and replacement cost appraisal. This detailed information assures you that, in the case of a disaster that damages or destroys the windows, you have the needed documentation for your insurance company. You also have the technical and artistic information needed to restore or replicate the windows.
- Additionally, we offer every church the use of our online appraisal tool where the church or insurance agent can enter and submit basic information, such as window size and description, along with a photo of each stained glass window. With this information our studio will prepare for you a custom complementary replacement appraisal of your stained glass windows and send it back to you. This information is designed to verify your insurance coverage and will also act as a documentation of the windows in case of catastrophic loss.

Insurance

- Many churches rely on insurance agents alone to guide them on their stained glass window coverage. Often insurance agents aren't experts in the value or history of stained glass windows so this approach can be unfortunate. Working with stained glass experts can be beneficial to both the church and the insurance company.
- After a catastrophic event, some stained glass studios assisting in repairs have found that a sufficient amount of coverage, and in certain cases - no coverage at all, was in place. Nothing is more disheartening than to see a church suffer a loss and later find out that their insurance coverage is inadequate.
- It is best to do the necessary documentation and get a comprehensive appraisal by a qualified stained glass studio- before its needed!

Catastrophic Loss: Case Study

TRINITY EPISCOPAL CHURCH, GALVESTON, TEXAS

When Hurricane Ike struck in 2008, Willet Hauser was in the process of restoring an eclectic collection of stained glass at Trinity Episcopal Church in Galveston, TX. The strength of the hurricane was so intense that it blew out and nearly destroyed an entire panel from the church's beloved Tiffany window known as "Christ and the Children." Thanks to detailed documentation, our studio was able to restore the badly damaged Tiffany window back to its original splendor.



Faceted Glass: Potential Problems and Solutions

- Faceted Glass is very durable and load bearing. Not only is it a beautiful form of art but it rarely requires repair.
- The main repair issues associated with faceted glass revolve around improper installation - thus creating failure and leakage.
- The other potential problem is cracking of the epoxy matrix that binds the glass together. Failure can occur from a poor quality matrix or the improper mixing of the matrix. Unfortunately the only way to completely correct this issue is by disassembling the panel and completely repouring epoxy. Stop gap securing of cracks may be possible in cases of minimal cracking. However, this is not recommended and is only a temporary solution until the proper repair can be made.



Leaded Glass

- Leaded Glass Issues
 - Deterioration of lead comes
 - Bulging
 - Loose braces
 - Broken or cracked glass



Releading vs. Repair



The actual work to stained glass is broken down into two categories: Repair and Restoration (re-leading). Often a combination of the two may be required. Deciding which scope of repair work to do on the stained glass windows can be a confusing decision for any committee.

REPAIR: refers to onsite repair work such as broken glass replacement, bulge reduction and securing of loose braces.

RESTORATION: refers to the process of re-leading. Each window is moved and taken apart piece by piece and then reassembled using new lead and bracing. This process is usually done after the windows have been transported to the studio but if the circumstances are right, can be done in on-site as well.

Avoid Unnecessary Repairs

Repairs should be made by professionals only after carefully evaluating the condition of the windows. The level of repair, protection, or cleaning depends on the condition and the quality of the glass as well as the available budget. Hasty, over aggressive, or poorly executed repairs can cause more damage than prolonged deterioration.

Areas of concern:

- Bulged glass
- Cracked or broken glass
- Weakened lead matrix allows glass to move and break

It is important to take the time to find a reputable stained glass studio and raise the necessary funds.

Misunderstandings & Misconceptions

- We are currently in an era where much of the nation's stained glass windows have reached the 100 year old mark, which is generally thought of as a time in which stained glass needs to be re-leaded. This is somewhat true; however, age is effected by how they are preserved and maintained over the years as well as the original quality.
- The danger of not re-leading when needed is that the window will fail and damage the historic glass. If a window can be stabilized and remain straight, there is little reason to re-lead.
- In today's business world it is very difficult to have craftsmen skilled in onsite work and willing to travel. It is much easier to manage projects where most of the work is done in the studio. With these issues in mind, often complete re-leading is over prescribed.

Common falsities used to promote re-lead:

1. If not completed, your windows will fall out.
 - Of course this can be true in some cases but very few. Do you see separation, excessive bowing, etc.? Is there a lot of oxidation and lead fatigue? Have the inspector show you these areas.
2. If you re-lead them your windows will be good for 100 years!
 - This has never been true. Properly protected stained glass needs maintenance between 30 and 40 years after they were installed- the same for re-leading. Yes, they most likely will not need to be re-leaded but they will need maintenance.

It is important to understand the condition and the pros and cons of each possible scope of work. This way you can determine what is best for your situation and not the studio's situation.

Signs that re-leading is necessary:

- Check for oxidation, fatigue, torn lead, and excessive bulging.

Leaded Glass Issues: Broken or Cracked Glass

To keep the originality intact of an historic window, we recommend replacing only the broken but not cracked glass. View replacement as a last resort. Cracked pieces that are not missing areas art to be either supported by Dutchman, sealed with epoxy, or edge glued (in re-leading). These repairs will support and secure the original piece.

Perfect matching of replacement pieces can be difficult and not always possible. However, a knowledgeable studio can acquire a large spectrum of glass from manufacturers or old inventories. Be sure to insist your craftsmen provide you with a close match. Do not settle for something noticeably different. We can use little techniques to provide swatches that blend to give you a quality restoration. Test the craftsmen and ask them what they can do if an exact match is not possible.



Bulging

Another common problem is the bowing or sagging of an area of stained glass. Due to years of exposure, gravity, heat build-up, settling and improper bracing, bulging occurs in most stained glass.

To correct this problem, the affected panel needs to be removed from the frame and carefully placed flat on the table. Once the panel is flat, broken joints need to be soldered. The original bracing may need to be re-attached or new bracing added to support the weakened area. If new bracing is installed, it is important that it be the same type as the original bracing and attached in the same method. The same is true for the re-attachment of existing braces. They should use the same method. For restoration purposes, it is important that everything remain as original as possible.

Loose Braces

Braces are mostly flat, rectangular or round. We solder the braces directly to the panel or wire them to the panel using copper ties. It is important that the re-securing is achieved using the original method used on the stained glass window.



Soldering new braces.

Frame Repair

One of the most requested services is the repair and maintenance of stained glass frames. This is a very important service! Frequently studios are referring to wood but this also relates to steel. Often, companies provide this service peripherally. Without a quality repair, there cannot be a quality paint job. Without a quality paint job, you cannot have a quality window repair project. Keep in mind that it is a very visible portion of the overall stained glass project. Make sure your studio is skilled in this aspect of the project.



After Repair



Before Repair

Framing Types

- **Masonry:** Typically last a long time with few problems, however the removal of leaded glass set in hardened putty or mortar can be difficult to nearly impossible.
- **Wood:** Used in restoration to match historic framing. Also used in high-end new installations when the church wants to use wood to create a particular look.
- **Steel:** Used for restoration projects to keep the frame original.
- **Aluminum:** Made of high-quality aluminum. Frames are secured with clipped or welded joints. Each frame provides an excellent glazing situation with snap-on beds to secure each glazing material and dead air space to allow proper insulation. Frames come in three standard colors: white, bronze and putty. Standard finish is baked-on enamel, which will not peel or fade. Once installed, they will be virtually maintenance free.
- **Awsco:** American Woodwork Specialty Co. is a manufacturer of wood-alternative Architectural Millwork Products, Accent Windows, Church Windows (Open), Shutters, Louvers, and Transoms

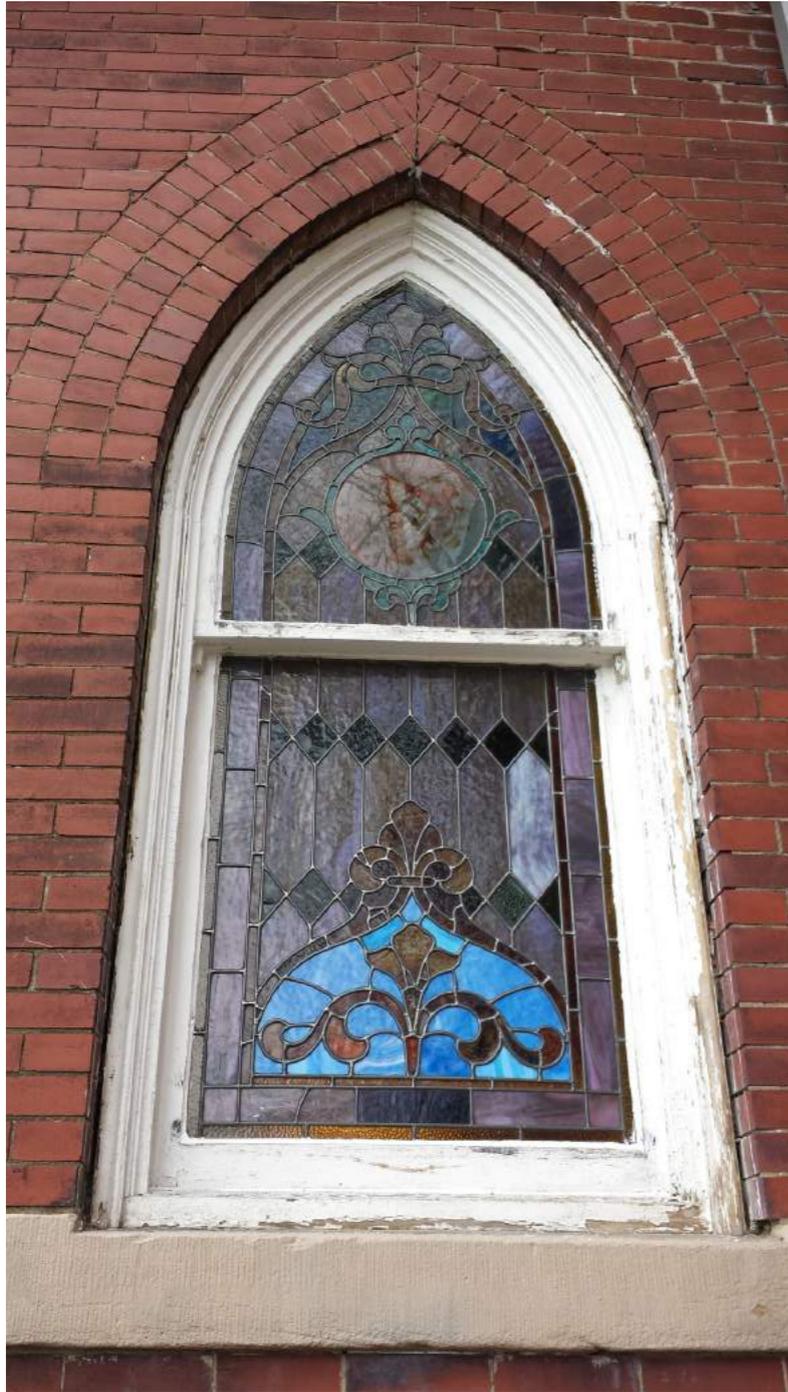
Framing Issues and Correction

Improper or infrequent maintenance can lead to costly framing issues.

Possible framing issues:

- Damage to wood or metal framing due to infrequent maintenance of paints and sealants.
- Metal ventilator frames in poor structural condition may provide inadequate support for the stained glass panels they contain.
- Improper maintenance of wood frames will cause the frame to rot, weakening its ability to support the stained glass.
- Deteriorated masonry windows that have not been repaired or maintained will weaken the frames ability to support the stained glass window.

Wood Repair: Preparation



Part of a quality stained glass project is maintenance of the framing. Many stained glass windows are housed in wood frames and over the years these frames become deteriorated and in need of maintenance and repainting.

Before painting can begin proper preparation must be made. This necessary step makes all the difference in a quality project. We recommend scraping off all loose and flaking caulk and existing paint. We rarely find it necessary nor cost effective to strip frames down to the bare wood. However, if bare wood is required we recommend an ibex machine to strip the paint.

Once all the scraping has been completed, the rotted sections must either be repaired with an epoxy fill or replaced. Only after all the necessary repair preparations are completed can painting begin.

Wood Repair and Painting



Before painting, we recommend applying an epoxy primer to arrest fungus and to consolidate the mill work, thus providing an improved surface for the adhesion of quality paint.

Our recommended primer is Clear Penetrating Epoxy Sealer (CPES) for wood.

CPES is an epoxy sealer used on rotting wood, impregnating the wood rather than coating it, arresting fungi and bacteria growth. CPES creates a stronger yet flexible piece of wood that fungi will not penetrate. This is often a good option for heavily weathered frames and would be used **INSTEAD** of Kilz brand primer.

It is important to choose a paint with the highest quality finish. Our personal preference is Sherwin Williams Duration. After the epoxy primer coat we suggest applying two finish coats of paint.

It is important to apply paint to the frame and not the surrounding substrate or the stained glass. This is the difference between an amateur application and that of a professional.

Steel Painting

Use rust inhibitive primers and paints and be sure to prepare the surface properly, as suggested by the product's manufacturer.

Masonry Repair

In regards to stained glass, most issues stem from the installation of the stained glass into the stone rebate. If the window is puttied or glazed with a non-flexible caulk the stained glass panel will be unable to expand and contract properly. To avoid this, we recommend using a non-flexible sealant such as Silpruf or Dow Corning 795 for installation into a stone frame.

Other repairs to masonry require a qualified stone mason.



Aluminum Frame Use - new construction and thermo barriers

Three types of frames:

Double-glazed: This frame is designed to house both the stained glass as well as the protective covering.

Single glazed: This frame holds only one glazing material.

Thermos barrier: These frames will hold both the stained glass as well as the protective covering. This framing has a built-in plastic barrier, which slows down the transfer of heat or cold to the inside of the frame, virtually eliminating condensation on the interior of the frame.

AWSCO

AWSCO is recommended when the church's millwork must be repaired or replaced due to damage or rot.

AWSCO has been supplying the Millwork Industry for over 65 years with extensive experience in the Industry, complete understanding of construction details, and offers a comprehensive and exclusive product line. In the past AWSCO was recognized as the Wood Accent Window & Louver Supplier. They are considered a "One-Stop" source of the finest Architectural Millwork Products available.

AWSCO's unique technology has the ability to replicate any historic architectural millwork - very important when the original millwork is damaged beyond repair. AWSCO can produce all Architectural Accent Millwork (virtually any shape, size, multiple-lite opening church windows) in Solid Vinyl, Redwood, Cedar, Mahogany (Sapelle) or Oak.

As an alternative option to wood, AWSCO offers AZEK (Cellular PVC Solid Vinyl) as a frame material. AZEK cannot deteriorate, decay or rot, is impervious to insects & water infiltration. Assembly includes minimal sections and layers, special glue and thru-bolting for maximum Structural Integrity. The Material and Assembly Process allows for a Limited Lifetime Structural Integrity Warranty. With the use of AZEK there is no need to ever replace a window frame again. When replicating an original frame, the new frame is a perfect mirror image of the original.

Preservation (Protective Covering)

Just think how wonderful it would be once your stained glass windows were installed or maintained that they simply stayed in pristine condition. That would mean little heat or air conditioning loss through them, no vandalism, or element damage. Unfortunately, that is not going to happen and that is why you need to preserve them by properly installing protective glazing. PROPERLY is the key word. Improper installation can create more damage.

Proper installation includes sufficient dead air space, venting, choice of material, frame and millwork repair, type and setting of divider bars, as well as application of the correct type of sealant.

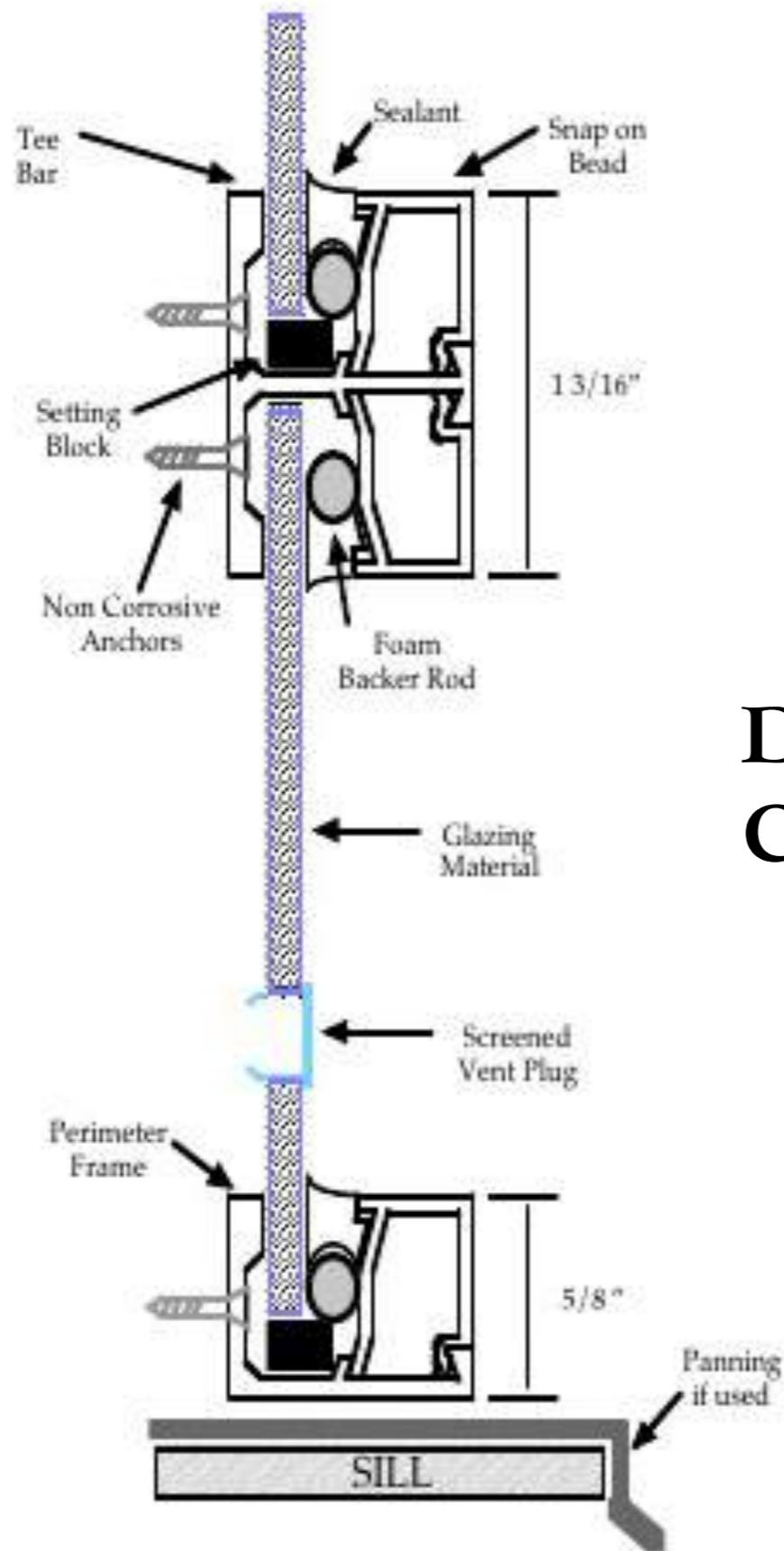
Things to avoid:

Unfortunately, regular glazing company installers do not understand the installation from the perspective of stained glass, which is our ultimate goal. A glass house rarely performs a proper installation as successfully as a stained glass studio. The pricing may be appealing but remember you get what you pay for.

Types of Covering: Pros & Cons

There are several types of protective covering. To assist you in deciding which type of covering is best for your project, please refer to the table below or call a stained glass representative.

Description	Pros	Cons
1/4" Acrylic	Very break resistant and non-yellowing (cast made only).	Plastic, scratchable, shows deflection.
1/4" Lexan XL10	Virtually unbreakable, guaranteed not to yellow for 10 years by Manufacture Lightweight.	Very scratchable, shows less deflection than 3/16" Lexan, more expensive. Will eventually yellow.
1/4" Float Glass	Washable, looks better than plastic (less deflection), durable for a glass product.	Breakable, heavy, more expensive.
1/4" Laminated Glass	Washable, looks better than plastic (less deflection), safety feature When broken. It stays together	Very expensive, Breakable.
1/4" Tempered Glass	Washable, 4 times more break resistant than regular glass, less deflection than plastics, safety feature.	Slightly more expensive, when broken falls into dice, harder to replace. Must have custom piece made



Detail of a Protective Covering Installation

Venting of Protective Covering System

A venting system is necessary to reduce heat build-up, reduce the potential for condensation, and eliminate exposure to the elements which preserves the stained glass windows. If condensation were to occur the venting system will allow the cavity between the stained glass and the protective covering to dry out with out any damage to the building or the stained glass

Some in the industry today advocate not using any venting in their protective covering installations. However, the majority of studios recommend venting.

The only non-vented installation we consider are thermo barrier frames installed with insulated glass units. If you insist on venting your installation it should only be done to the interior.

Venting certainly decreases heat build up and promotes airflow that helps dry and reduce any condensation. With quality vents and innovative installation techniques, the installation is attractive. There are few drawbacks to venting.

3 Choices for Venting

1. Most popular - the glazing material has strategically placed holes to insert vent plugs. (These are very visible but effective and can be strategically placed to maximize airflow.)
2. Venting through the aluminum extrusion itself provides the client with a discreet installation that is customized to fit and maximize the particular needs of each stained glass window. It is by far the most attractive installation
3. Vented framing is another option. Some have introduced a couple of versions into the market. However, vented frames are often large and unattractive. The venting ability is one size fits all and does not allow for customization. The other draw back is that vented extrusion does not bend well and flattens out around the vented screen.

Venting should be 1/4 square of space per every one square foot of covering and they should always install at the bottom and top to create airflow from top to bottom.

Sealants

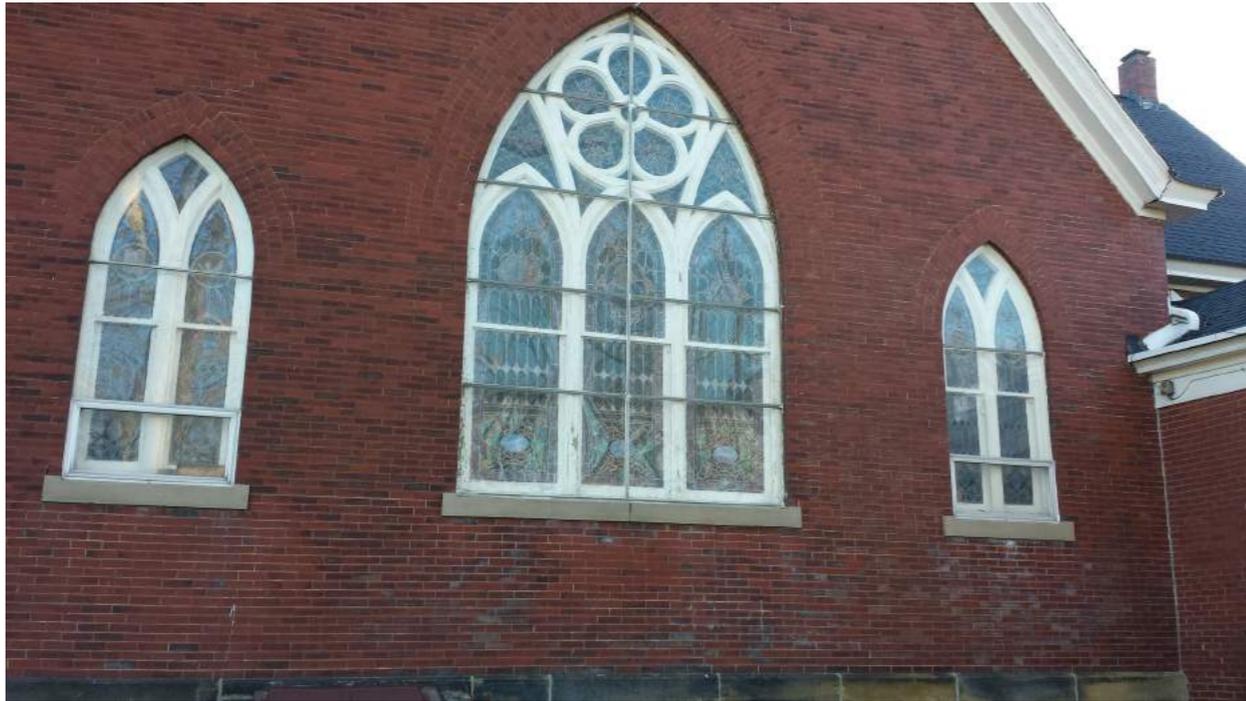


The sealant must be a non-acidic cure or it will not react with the lead correctly and will quickly deteriorate it. Sealants must be able to adhere to a variety of surfaces, including metal, glass, plastic and masonry. For years, companies were sealing plastics with straight silicone, not realizing that within a year, the seal would break allowing water to penetrate the covering systems. This leakage continued for years creating severe damage to the windows and their frames.

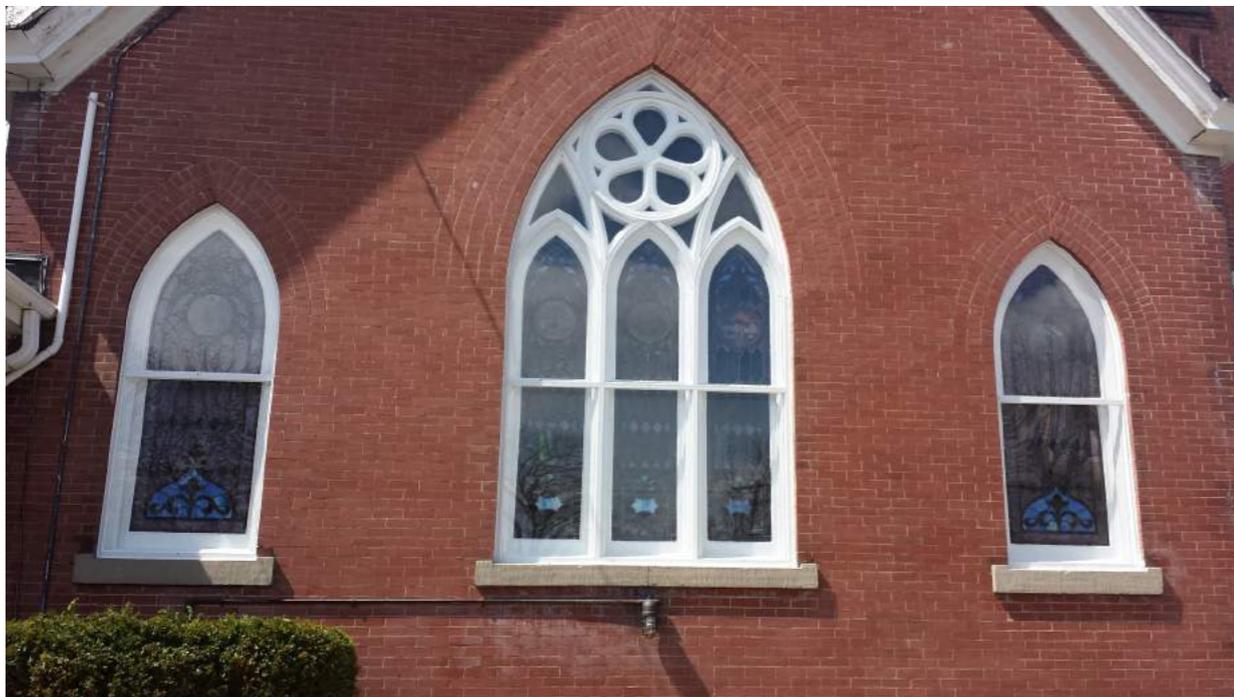
We recommend the use of either SCS2000 Silpruf®, or Dow Corning 795 sealant.

These sealants are the only ones we have found that meet all the necessary requirements and are time tested. The sealants also come in variety of colors.

Bending



Before Bending and new protective covering



After Bending and new protective covering

The main draw back to the installation of protective covering has always been its appeal. Visually many installations have not been attractive.

To correct this lack of appeal some in the industry have adopted the method of bending the divider bars to closely match the existing millwork. This provides the client with an improved look on the exterior of the building. We recommend this process in all applicable installations.

This is a skilled process and will help you determine a skilled studio that is competent in exterior glazing.

Conclusion & Resources

Websites:

www.church-stained-glass-windows.com/ www.willethauser.com

Appraisal Tools:

<http://church-stained-glass-windows.com/stained-glass-window-appraisal>

Willet Library:

Contact Willet Hauser at 800-533-3960

FAQ:

<http://church-stained-glass-windows.com/frequently-asked-questions>

Project Guide:

<http://church-stained-glass-windows.com/free-stained-glass-window-project-guide>

Diocese Inspection Program:

Contact 888-503-1184 ext 1

This concludes The American Institute of Architects Continuing Education Systems Course

At this time the course participants are free to ask questions

Conference of Catholic Facility Managers



Andy Guljas (765) 269-4625

John Phillips 800-533-3960 ext 704
Kathy Jordan 800-533-3960 ext 724

WILLET HAUSER
Architectural Glass

