



Editorial Statement



There are several issues to be dealt with when implementing a stained glass window project, whether it be for new stained glass windows, restoration of existing stained glass windows, or protective covering of stained glass windows. There is little or no information available to assist people in choosing a studio, specifying the scope of work, budgeting a stained glass window project, etc. Therefore, I have decided to publish a newsletter in order to disseminate information that will be both interesting and educational with regards to restoration, design and protection of stained glass windows.

For the last sixteen years, I have been meeting with people on an almost daily basis to discuss their stained glass needs. I have discovered that the average client is uninformed with regards to stained glass design, fabrication, and restoration, or has been indoctrinated with sales rhetoric rather than facts. As a result of this, a few years ago I wrote a booklet entitled "Stained Glass Restoration--The Necessary Facts: (A compilation of Answers to the Most Frequently Asked Questions)". The response to this publication was so positive that I felt I should find another vehicle to provide this information to as many people as possible.

Too often, I have seen the consequences of improper restoration methods, poor design work, and inappropriate protective overglazing methods. In almost all cases, this was a result of the client not having sufficient knowledge to make a prudent decision. Often this is a result of the client not taking the time to:

- gain a basic working knowledge of stained glass
- determine what should be the scope of work and exact specification
- thoroughly investigate studios (check references and visit each company to verify their capabilities)
- "shop", and avoid decisions based on lowest "bottom-line" price

Unfortunately, the inability of most clients to spend the time needed to do the aforementioned things often results in poor quality work and wasted funds. The clients in most cases are making long-reaching and often historic decisions as well as spending thousands of dollars. There is a need to make them aware that the decisions they make will effect architectural artwork that will endure for centuries. The same time, effort, and study that would go into decisions regarding choice of architectural style and materials for the building should also go into the decisions concerning the stained glass.

This newsletter will address these issues as well as others in detail. Some areas that will be addressed in future newsletters will be:

- ❖ Qualifying a Studio
- ❖ Employee Experience
- ❖ References
- ❖ Insurance
- ❖ Facility & Equipment
- ❖ Security
- ❖ Studio Safety
- ❖ Transportation
- ❖ Guarantees
- ❖ New Design Process
- ❖ Restoration Process
- ❖ Surveys/Findings/Documentation
- ❖ Specifications
- ❖ Protective Overglaze Process
- ❖ Material Specifications
- ❖ Inspection and Maintenance Techniques

I hope this newsletter provides you with a source of factual information and knowledge which will be useful when planning a stained glass project.

Frederick B. Shea
President Stained Glass Resources, Inc.



Employees of Stained Glass Resources, Inc. Back row (L to R): Carl Paulson, Eric Paulson, Tom Flanagan, Peter Wood, Ken Paulson. Middle row (L to R): Martin Phillips, Scott McDaniel, Fred Shea, Mike Ryder, Ray DiLuzio. Front row (L to R): Jan Ledoux, Susan Phillips, Carol Anderson.

Restoration Department



Deterioration in a stained glass window can show up in a number of symptoms. Most of these symptoms are not recognized by the untrained eye, and therefore the windows are usually allowed to deteriorate until more severe

and obvious symptoms occur, such as glass breakage and displacement. The more subtle indications of deterioration such as structural failure in the forms of bulges or broken wire ties usually go unnoticed. This results in window deterioration to the point of extreme structural failure before the client realizes there is a problem. The most undesirable side effect of this is the breakage of glass, caused by the stress induced by structural failure (bulging). It is important to recognize these symptoms so that appropriate intervention can occur before damage becomes excessive. The most practical way to approach this problem is to regularly inspect the windows for these symptoms.

The most important factor in properly inspecting the windows is to get as close as possible to them. It will not be possible to accurately assess the window condition from the pews or the pulpit. You must position yourself within a foot or two of the vertical plane of the window. In most windows this will result in you looking up towards the top of the window from the sill area. Since this inspection is to be a "yardstick" and prelude to contacting an expert, I do not recommend that you risk using a ladder or other equipment to access the upper areas of the window. If the window is inaccessible, you may try using binoculars, but often they will be ineffective due to lack of light, angle of view, or distortion of depth perception, caused by contrasting colors in the design. When this occurs, it is best to contact an expert and inquire as to the fee for a formal inspection and report. The following is a list of symptoms indicative of deterioration that you may use for an initial quick inspection to help determine if you should contact a professional.

1. Check for bowing and buckling: when looking up the vertical plane of the window towards the peak, are there areas

that are not flat? Do you detect concave or convex bulging? Many times we have been asked if bulging is a natural occurrence in the window and not cause for concern. The answer is that although it is natural for it to occur, it is a symptom of structural failure and advanced deterioration, which will cause glass breakage, resulting in a more costly restoration.

2. Check for broken wire ties: look at each of the horizontal support bars to see if the wire ties attached to them are still attached to the stained glass window, or if they have broken away and are no longer func-



Buckling is so severe in this window, that the dedication plate is falling out.

tioning as part of the structural support system.

3. View the condition of the lead channel between the pieces of glass: this channel is responsible for holding the glass pieces together and is the structural backbone or "skeleton" of the window. Look for broken, cracked, peeled back, or deformed lead channel.

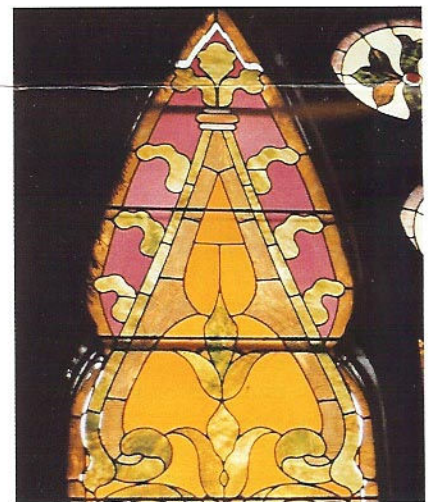
4. View the condition of the glass: look for any broken, cracked, displaced, or missing pieces, especially in areas that are bulging, since the stress created by the bulge usually causes stress cracks to occur.

5. View the window for areas of daylight that may occur between the lead channel and glass: this results from the deterioration of the structural support system. It is often noticeable in areas of large bulges and sometimes even in areas where the window is still flat. It results from the movement of

the window which then causes the weakened lead channel to pull away from the glass. Also, daylight can often be seen at the top of the window as a result of the entire window sagging downward towards the sill.

6. Check the operating condition of the ventilators: the ventilator is the steel or aluminum framed section of the window that can be tilted open for ventilation. Improper functioning of the ventilator in many cases can be attributed to foreign matter such as paint build-up, dirt, rust, etc. In some cases, however, vent function can be inhibited by structural failure of the sections of stained glass above it. This causes the weight of the stained glass sections above to bear down upon the top horizontal rail of the outer vent frame, causing it to pinch the inner vent frame, rendering it inoperable. This situation often confirms the structural inadequacy in the stained glass above the vent. Also, it often causes those trying to operate the vent to subject the stained glass in the vent frame to inappropriate and often violent treatment during opening or closing.

The above six check points are obvious signs of advanced deterioration that can be easily checked by an untrained individual. However, there are several other checks that require close scrutiny by a trained stained glass craftsman. If you are not sure if your windows need restoration, I recommend that you contact a professional to inspect them.



Lead deterioration is extremely advanced in this window. Notice the separation between the lead and the glass in the outer border at the top of the window.

Studio Project



We have recently completed a restoration project for St. George's Episcopal Church in Lee, Massachusetts. It involved the removal, restoration by re-leading, and reinstallation of two ornate plated opal windows

similar in style to those that were produced by Tiffany Studios at the turn of the century. A plated window is one that is fabricated utilizing several layers of glass. It creates an effect similar to what you would get if you sandwiched several windows together. The windows were originally manufactured by the Montague-Castle London Company of New York.

The first window restored was a memorial window dedicated in memory of Frederick Knowlton Baird by his wife Mary S. Baird on August 11, 1909. It is a copy of the Holman Hunt painting "I Stand at the Door and Knock". It represents the figure of Christ clad in a white tunic with a cloak of deep red over the shoulders, one hand holding a lantern, the other knocking at the door. The radiance shed from the lantern is brilliant—a result of the superb combining of acid etching, silver staining, and trace-line painting.

The second window restored was a memorial window dedicated in memory of Katherine Henry Washburn by her daughter Mary S. Baird on March 30, 1910. The subject is the Ascension and represents Christ rising up into the clouds while adoring disciples and women gaze up at him from below. This window is particularly large for a plated window. It is over thirteen feet tall and is six feet wide.

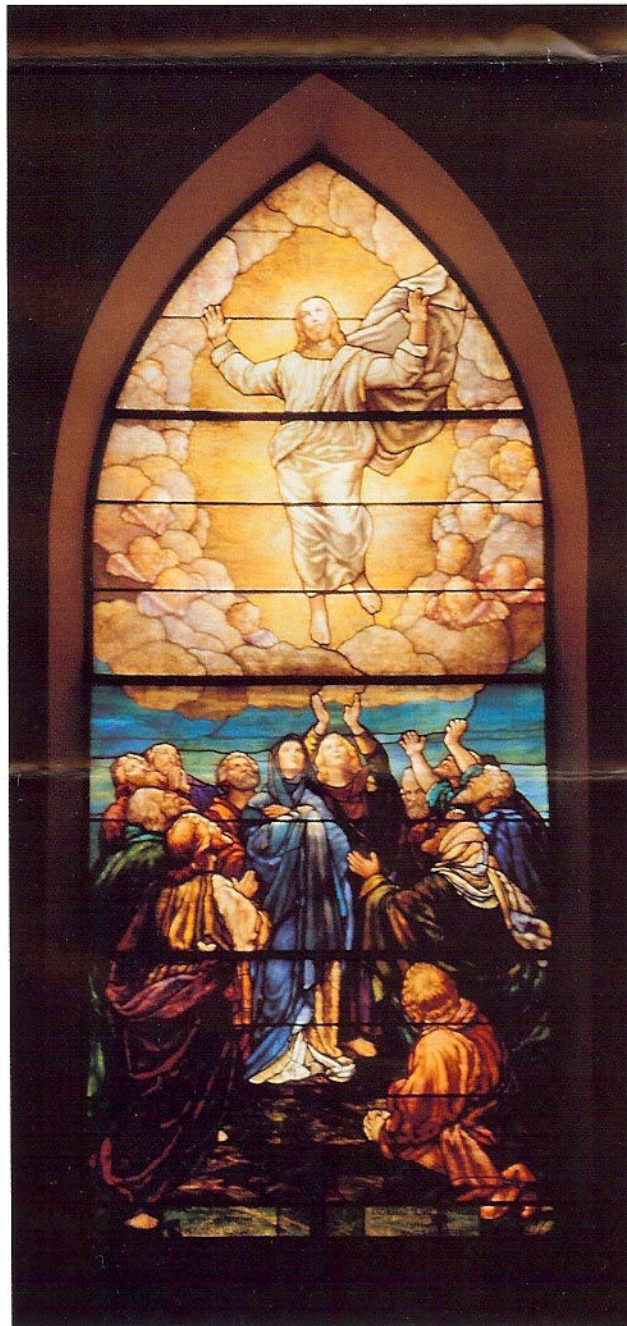
Due to the fact that the windows were historic, ornate and heavily plated, it was necessary to utilize specific restoration techniques required for this type of window. Prior to removal, an in-depth site survey as well as detailed photographs were taken. The windows were then stabilized, carefully removed, and then packed for transport back to the studio. Disassembly techniques involved careful documentation of all original manufacturing techniques to insure proper reassembly. Many of the lead profiles had to

be custom manufactured to exact original specifications. The glass had to be carefully cleaned due to the presence of delicate stains and cold enamels. The windows had experienced extensive structural deterioration, and in many areas the plating had slid out of place. In some areas the intrusion of water had caused plates to crack due to freezing in winter. There was quite a bit of broken glass which had to be conserved rather than replaced due to the historic nature of the project. This was accomplished by either edge foiling or edge gluing the broken pieces back together. Finally, the windows were rebuilt with all new lead channel and restored to their original structural and cosmetic condition. The windows were then carefully packed for transport back to the Church.

Our examination of the window openings and existing overglaze after the windows

were removed had indicated that new protective overglaze should be installed on both windows. This was due to the fact that the old overglaze was insufficient, broken, and leaking. The examination had also uncovered extensive sill deterioration in the Ascension window frame. We performed this work in coordination with the reinstallation of the stained glass windows.

A high level of communication was established and maintained with the Pastor and Warden throughout the project. A tour of the studio was conducted for interested parishioners, during which they were able to see the project in various phases and as a result more clearly understand the restoration process. We have found that tours such as this greatly enhance the level of understanding and enthusiasm of the parishioners, and result in an excellent client/studio relationship. The project was a great success.



**Ascension Window—
St. George's Church,
Lee, Massachusetts**

Feedback



As we have stated previously, the purpose of this Newsletter is to bring good factual information to the reader in an educational format. Therefore, we have decided to dedicate part of this Newsletter to answering

questions from the readers. We hope that this will lead to a great deal of interaction with the readers, thus confirming in their minds that they have a constant and easily accessible "source" for any information that they may require regarding stained glass. Our commitment goes beyond this question and answer section of the Newsletter. Any questions submitted by mail will be answered immediately and will not have to wait until the publication of the next Newsletter. Also, phoned in questions will be answered when received, and then recounted in the next Newsletter. We sincerely hope this will have an immediate and positive effect with regards to the dissemination of factual information and will increase awareness and understanding with regards to stained glass, its design, applications, and restoration.

For the first issue, we have decided to address two of the most frequently asked questions:

Question: What Is Releading?

Answer: Releading is a restoration process in which all of the original lead came is removed from the stained glass window and is replaced with all new lead came. Once this has been done, the main structural support system of the window has been replaced with all new material. This involves removing the stained glass window from its location and transporting it to the workshop. This process cannot be performed with the window in place.

The following is a brief overview of the releading process, since it will be addressed in greater detail in a future issue.

The first step after the window has been removed and brought to the shop is to: 1) view it in the light in order to make notes regarding: previous repairs which had resulted in improper glass replacement, badly faded painted glass, etc.; 2) photograph the

window; 3) make a rubbing of the window which will be used later when the window is reassembled; 4) document overall window measurements, support bar placement, lead sizes and configurations, etc. The window is then disassembled, and all the old lead is deposited in a storage container for pick-up by a recycling company.

Once the window has been disassembled, any broken pieces of glass are reviewed, and determinations are made as to their replacement or conservation. Replacement, repair, conservation, etc., are then performed, and the window is then ready for releading.

Using all new lead came, the window is reassembled onto the rubbing, fitting each piece of glass snugly into the lead

the window, is the cementing process. This process also waterproofs the window, preventing rainwater from passing through the lead came. A cementing compound is brushed under the edge of all the lead came to fill in any space between the lead and the glass. The front side of the window is cemented first, and then the back side.

After the cement has been allowed to cure for a few days, the window is ready to undergo final inspection and cleaning. The window is once again viewed in the light so that it can be properly inspected and thoroughly cleaned.

The final step is to install the support bar wire ties to the appropriate lead joints. These wire ties are used to reattach the window to its support bars, which are



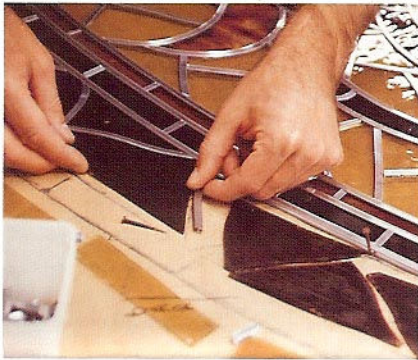
Disassembly Process

channel. When the window has been reassembled, it is checked for sizing, and then prepared for soldering. The solder, usually a 60/40 mixture of tin and lead, is then applied to each joint where the lead abuts. After the first side of the window is soldered, it is thoroughly cleaned to remove any flux residue. The soldering and cleaning process is then repeated on the back side.

The next step, which contributes greatly to the overall structural integrity of

affixed to the frame. The support bars are essential in "holding up" the weight of the window and preventing future sagging and bending from occurring.

At this point, for all intents and purposes, we have created a new window, except for the original glass and pattern. Complete releading gives a stained glass window a new "lease on life". It eliminates the main problem, which is the deteriorated lead.



Assembly Process

Question: *We know our windows are in bad condition, but we can't afford an expensive project. What will happen if we do nothing?*

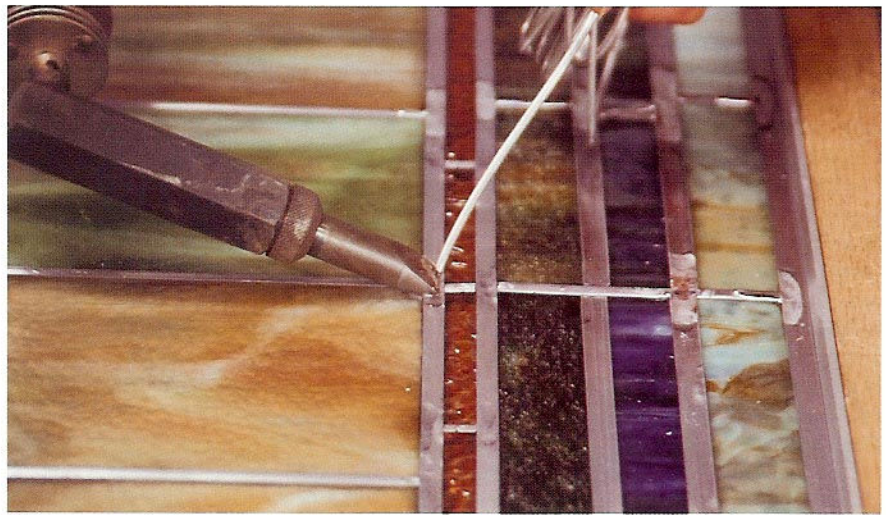
Answer: A window that is bulging and bowing will continue to do so and will start to bow in other parts of the window as well. The existing bulges will increase in size, and in the process, the lead came will start to break and pull away from the glass, revealing areas of daylight. When the window has reached this point, a great deal of glass will crack, and eventually, pieces of glass will begin to fall out of the lead came. At some point during this process the wire ties will break, eliminating the window's vertical support. If this condition is allowed



Cementing Process (Waterproofing)

to progress any further, large sections of the window will begin to fold, collapse, and then fall out. I have been asked on occasion "but isn't it natural for a stained glass window to do this?". Although it is inevitable that the lead came will deteriorate, it is inadvisable to allow the deterioration to continue, and in the process cause breakage of the original glass. I strongly suggest that you do not allow your windows to reach the above conditions, for if they do, it may be time to consider building new windows. Bear in mind that the cost of replacing your windows can range from four to five times the cost of relaying. If your windows are finely painted/stained glass windows, or very finely detailed windows, the replacement cost can be much higher. A decision not to restore your stained glass windows is not a final answer. It is just a postponement of an inevitable expenditure that will increase substantially as each year goes by.

At the very least, you should meet with a stained glass professional to get an accurate window-by-window condition report. This condition report will indicate if any of the windows are in "crisis stage", requiring immediate restoration. The remaining windows can



Soldering Process

then be dealt with as a phased project which could span several years, thus allowing the necessary time for fund-raising. You should be aware that during difficult financial times it is easy to fall prey to quick-fix and low-budget repairs. The best philosophy to maintain during these trying times is to do the restoration right the first time, even if the project spans a decade. A properly restored window will last for many decades. A poorly repaired window will require attention again in a matter of a few years.

Stained glass windows are the art treasures of our Churches. They should not be put in line behind other expenses that come along, nor should they be ignored. They appreciate in value each year; therefore, they should not be allowed to depreciate in condition. All too often, the restoration of windows is put off or disregarded in order to replace carpet, paint, heating systems, pews, etc., which are disposable goods and can be replaced at any time. Stained glass windows are not disposable goods and should not be treated as such. Stained glass is architectural art and should be afforded the same respect as the architecture of the building.

Please send any questions you may have pertaining to stained glass to:

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Studio Tours

We regularly conduct tours of our studio facility on an appointment basis, for both clergy and prospective clients. The tour consists of a short lecture, a physical tour of the studio, and a question/answer session with refreshments. We are able to accommodate groups of up to 25 people per tour. If you are interested in scheduling a tour, please contact us for additional information.

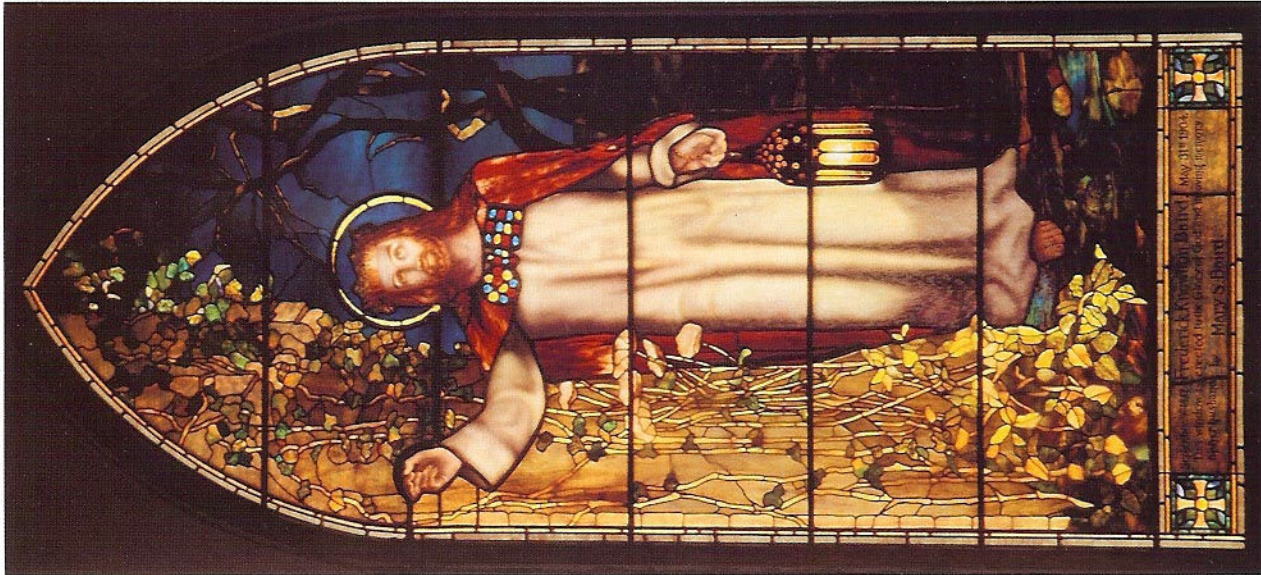
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New Design Department

In future issues of *Resources*, we plan to interview various stained glass designers. We will be questioning them with regards to their design styles, practices, and opinions pertaining to the artist/client relationship during the initial design phase of the project.



“Christ Knocking at the Door” —
 St. George's Church, Lee, Massachusetts

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