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To lead off this Special Issue on Traditional Windows, we'd like to tip our editorial hats to the man who has done more than anyone to raise the quality of historic window work in the U.S.

The Prophet Of Historic Windows

The National Park Service's Chuck Fisher has caused dramatic changes in the kind of windows that are being placed in America's old buildings. Here's how he made it happen.

❖ by Clem Labine

The 1970s were the low point for historic windows. The energy crisis had accelerated window replacement in older buildings. And the typical replacement was a poor-quality bronze-anodized aluminum window with totally square moldings. When wood replacements were used, they bore little resemblance to the original units. And the steel window industry was geared to new construction, totally ignoring the historic preservation market.

It was during those dark ages that Charles Fisher of the National Park Service's Preservation Assistance Div. devised an ambitious plan to improve the quality of window work in historic buildings. His position in the National Park Service's Washington office involved with the Federal historic preservation tax incentive program enabled him to develop a program that would ultimately involve manufacturers, architects, contractors, building owners, and historic preservation review staffs across the country.

Aluminum Window Dilemma

Most of the insensitive aluminum window work of the late 1970s had been justified in terms of costs and manufacturer inability to supply better products for the preservation market. Chuck Fisher set out to establish high-level contacts with leaders in the window industry — contacts that continue to this day. By pointing out the considerable market potential, especially in light of the then new Federal tax incentives for rehabilitation of historic properties, Chuck got the more forward-thinking companies intrigued by the preservation market.

The information Chuck turned up from these high-level contacts was quite revealing. For example, the cost of custom work, such as arched-top heads and custom paint colors, was much lower than commonly believed. But *better and earlier planning* by the architect was essential to benefit from the semi-custom capabilities of the companies.

In addition to custom colors and special tops, critical issues in the early 1980s included muntin grids and custom-contour panning. Rejecting the flat muntin grid commonly in use, Chuck Fisher developed guidelines for the National Park Service that labeled as "inappropriate" fake muntins for smaller buildings and elaborate windows. (The guidelines considered the possible use of fake muntins in high-rise buildings and large institutional complexes — *provided* a more appropriate applied muntin system was adopted by manufacturers.) The new generation of applied muntins consisted of a trapezoidal-shaped muntin applied to the exterior and integral to the frame, with a depth eventually reaching 5/8" as the optimum for good shadow lines.

Panning Over Wood

Another area of concern was the common practice of using flat panning over the existing window frame — totally obliterating the historic molding lines. Once Chuck discovered through his contacts that the cost of custom contour panning to match the historic appearance was relatively low, the National Park Service became a leader in requiring such a feature in Tax Act projects.

Chuck Fisher's work also extended to national manufacturers of wood windows. He discovered early on that most companies had unrealized custom manufacturing potential. Meetings with plant officials and top management helped influence some positive design changes.

Recognizing that insulating glass dictated wide muntin profiles with multiple lites, he encouraged development of true divided lite sash with an attached single-lite storm panel on the room side that rode with the operable sash. Such a design was used in the 1920s — and a few small shops had been offering it in New England. With prodding, one of the leading manufacturers began offering true divided-lite sash with applied interior storm panel.

Getting The Word Out

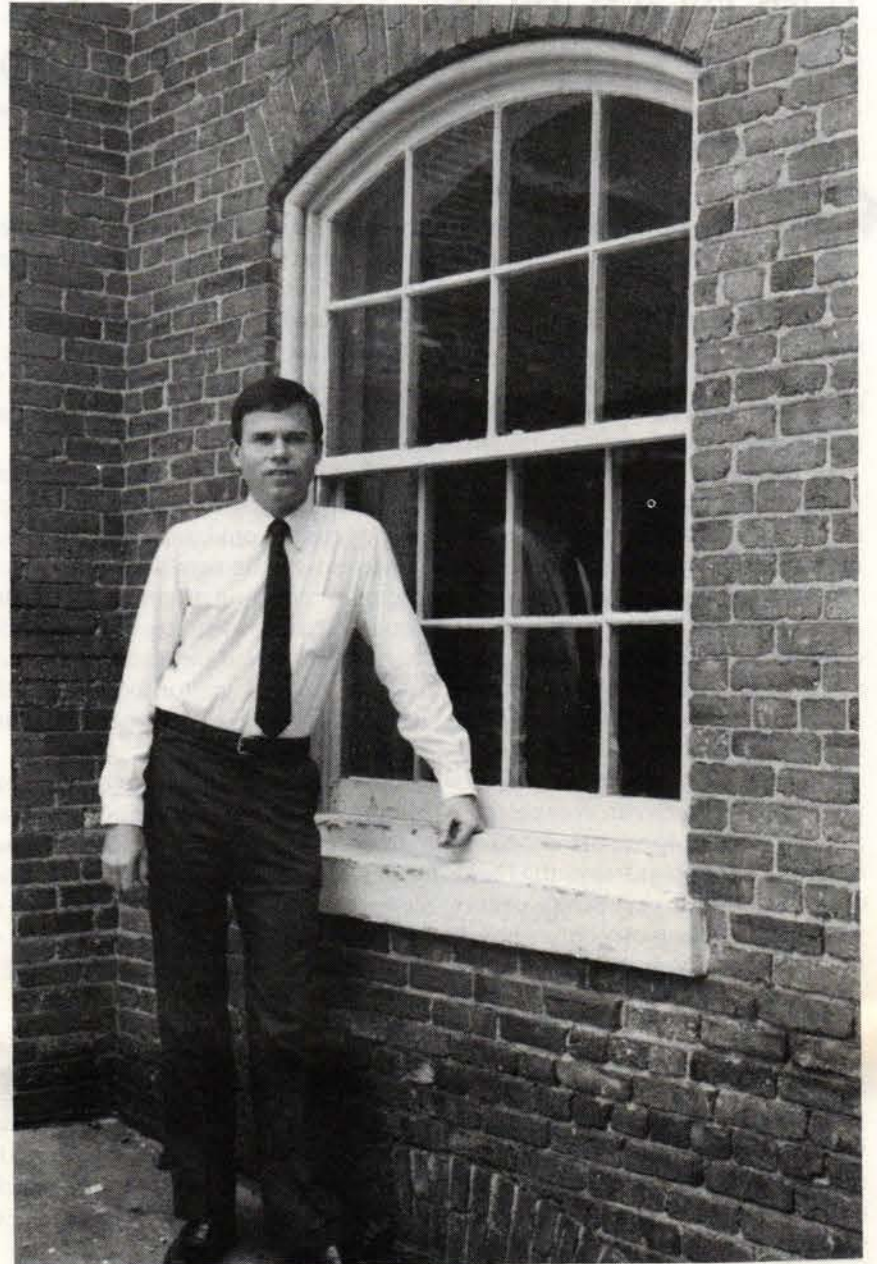
Much of the true custom work for the historic preservation field comes from smaller window companies. Recognizing that the capabilities of most of these companies are not widely known, Chuck launched a National Park Service project in 1985 to develop a national directory of companies offering window work suitable for historic buildings. With cooperation from the Center for Architectural Conservation at Georgia Tech, companies were surveyed to determine their capabilities, and an annotated list of nearly 100 companies was included in a 30-page *Window Directory for Historic Buildings* completed in 1986.

The year 1986 was a major turning point in Chuck's effort to promote quality window work. Up to that time, Chuck had preached the gospel of sensitive window work in workshops and articles. To accelerate the pace of getting information out, he laid plans for the 3-day Window Conference and Exposi-

THE WINDOW GOSPEL

"Deteriorated historic windows should be repaired rather than replaced wherever possible. In the event replacement is necessary, the new windows should match the historic ones in design, color, size, configuration, reflective qualities, shadow lines, detail, and material. Only when it is not feasible to match the historic fabric should substitute window material be considered . . . and only when it is shown through such means as field mock-ups that it possible to match closely both the detail and the overall appearance of the historic windows."

— From *The Window Handbook*, Edited by Charles E. Fisher



tion in Boston in December of 1986. With the co-sponsorship of 10 major organizations, this national conference attracted over 600 architects and other professionals.

Taking The Show On The Road

Currently, Chuck Fisher is working on an update of *The Window Directory* that will include an expanded section on storm windows and a new section on window repair companies — two areas that he feels are critically important.

Along with the Mid-Atlantic Regional Office of the National Park Service, the Historic Preservation Education Foundation, and a volunteer committee of professionals working on window preservation, Chuck is involved with a superb traveling exhibit of historic windows. "Windows Through Time" opened in New York this summer, and next goes on display in October at Independence National Historical Park in Philadelphia.

Fisher also continues to advise architects, preservation officials, and the window industry on complex window problems involving historic properties. Encouraging the use of half screens on the room side, window repair, fire shutters, and better detailing of replacement windows remain high on his priority list.

Chuck is quite modest about his role in the Historic Window Revolution. He points out that the work has been greatly aided by people in the window industry, representatives of historic preservation agencies and commissions, and many individuals working on projects across the country. All true. But if it hadn't been for Chuck Fisher's energy and persistence for the past 12 years, all we'd see today would be endless rows of dreary aluminum windows with flat fake muntins!❖

traditional building profile

The Window Wizards

In the course of their work on historic buildings throughout the Northeast, architects at Robert E. Meadows' firm have solved just about every type of window problem there is.

by Clem Labine

They don't *specialize* in windows, of course. Robert E. Meadows, P.C. Architect is a broad-based firm that handles historic preservation projects of every description . . . from restoring the carousel in Brooklyn's Prospect Park to designing a neo-classical terrarium for the Bronx Botanic Garden. And in between, there have been dozens of projects that include Gracie Mansion, South Street Seaport, Old Westbury Gardens, Sailors Snug Harbor, The National Arts Club, the Richmondtown Restoration, and the American Museum of Natural History.

Even though they handle a wide range of design and preservation assignments, the firm's architects find that windows occupy a big part of their professional life. "We do a lot of work requiring approval from Landmark Commissions or the National Park Service," says Bob Meadows, the firm's principal architect. "And these administrative bodies are paying increasing attention to windows."

As a result, the firm has developed extensive in-house expertise for handling just about every type of window problem. One indication of the central role that windows play in the company's activities: A visitor to the firm's offices in Manhattan's South Street Seaport district finds the conference room stacked high with sample windows dropped off by hopeful vendors.

Being an expert in historic windows, of course, involves a lot more than just choosing between competing suppliers of replacement windows. It's often more desirable to repair existing windows than to replace them. "When the decision is to repair," says the firm's Dean Koga, "the problem then becomes one of training and supervising workers. We're doing a window repair job now where we've had to teach carpenters how to do epoxy consolidation. The first few weeks were a bit rocky, but the project is going smoothly now," Dean says with some relief.

And even when replacement windows are called for, there are pitfalls. Larry Jones, another of the firm's architects, says: "Some of these manufacturers are stretching their technology too thin when it comes to making big double-hung windows." He tells of being called in recently to inspect a two-year-old window installation. "There were big 5-ft.-tall double-hung windows operated with spring balances. The nylon strings started breaking after two years, and each time a string broke the spring fired into the room like a rocket. I took a picture of one of the errant springs sticking into the sheetrock ceiling!"

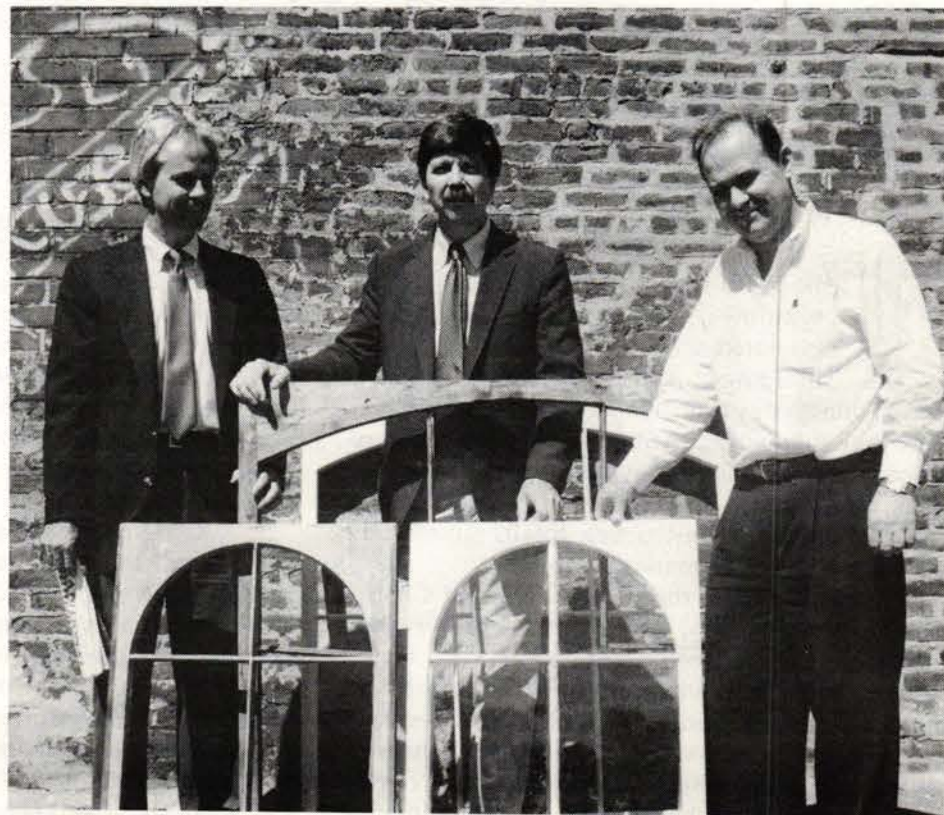
The Voice Of Experience

"We make every effort to retain old windows," says Bob Meadows. "Not only does that ensure that historic character is kept, but it's often more economical and less messy to repair the old windows. And you usually end up with a better product because the wood and hardware in old windows is often superior to what you get today," declares Meadows.

"The joinery makes the window," Bob states emphatically. "And the joinery in old windows is often stronger than in new windows that are designed for mass production. One of our basic specs for a replacement wood window is: 'Joinery shall exactly match the unit to be replicated.'"

Meadows' firm has developed several contractors with whom they work on window repair projects. Techniques used range from simple scrape/putty/paint to epoxy consolidation and dutchman repairs requiring skillful splicing in of new wood.

"Often, we need to add thin strips of wood to the sides of old sash to



Larry Jones (left) and Robert Meadows (middle) are in the process of inspecting some wood sash that is being restored by George Lucey (right) of Lake Construction Corp. The 19th-century sash, from Sailors' Snug Harbor on Staten Island, was in surprisingly good shape despite decades of neglect.

re-establish a tight fit in the frame . . . unless we are adding weatherstripping," says Dean. "But when you're cutting slots for weather strips, you have to be careful not to cut the tenons. I've seen sash, weakened in this fashion, break apart when someone gave a good tug to open it."

The Meadows firm uses aluminum windows as replacements in certain applications — but feels that the advantages of aluminum windows have been overstated. "The anodized colors will last for a reasonably long period," says Bob Meadows. "But it's another story if you have to use a painted finish to get historic color-matching. I've seen paint peel off aluminum windows after 5 years."

Vinyl claddings on wood windows pose similar problems. "I've seen distinct color changes in vinyl that's weathered for three or four years," says Larry.

"Just about any wood shape can be duplicated in aluminum," adds Dean, "but a high-quality custom aluminum window is often more expensive than a high-quality custom wood window."

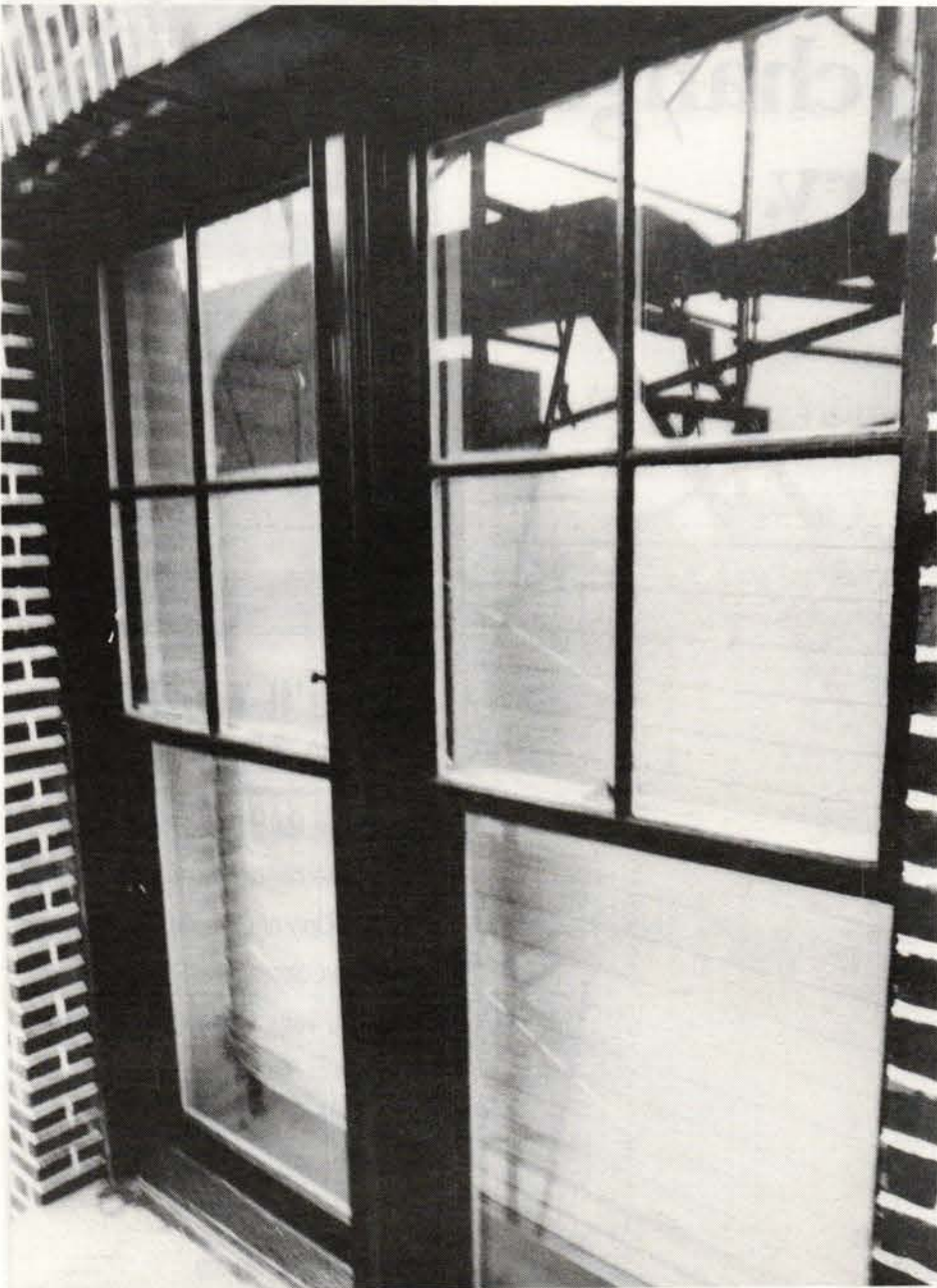
The Meadows firm's "repair rather than replace" philosophy extends to steel windows. They are just starting a job on a building with steel windows that are in bad shape. Preliminary investigation has indicated that they can repair the old windows for about half the cost of new replacements. The Meadows architects are in the process of having the contractor restore a sample steel window that will establish quality and cost benchmarks before plunging into a full-scale repair program. ♦



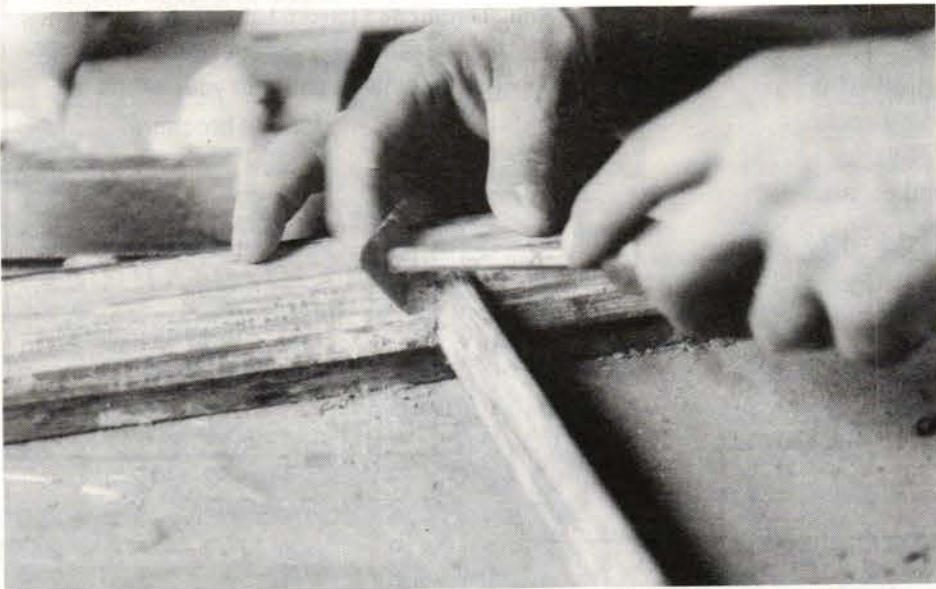
BEFORE: This 1840s building in Montgomery, N.Y., had been vacant for 10 years. The rehabilitation designed by Robert Meadows involved placing 5 shops and 3 apartments into the old building.



AFTER: New wood windows, storefronts, and millwork were custom-produced to Meadows' drawings by Millwork Specialties of Brooklyn, N.Y., preserving the traditional character of the building.



These repaired 4-over-1 units are part of a 180-window restoration project supervised by Robert E. Meadows, P.C. Architect. in a large apartment building. Sash was removed from the occupied apartments in the morning of Day 1 and an acrylic panel fastened in place. Sash was taken away, rehabilitated, and reinstalled the next day.




Sash was taken to the shop for quick repairs. Glass was removed, and all loose paint and putty carefully stripped with scrapers. After repairs, the sash was re-glazed with the original 1/4-in glass. Next day, when the sash was put back into the window frames, integral brass weatherstripping was also installed.



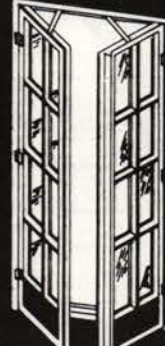
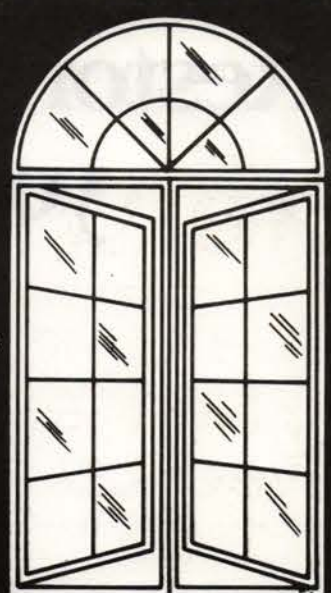

Loose joints were taken apart, glued with epoxy, and repinned. Rotted or damaged wood was restored with epoxy consolidant and filler. When an individual rail was beyond repair, a new "dutchman" was spliced in. If more than 35% of a sash was beyond repair, a whole new sash was manufactured.

— Photos on this page: Kathleen Rowe, Robert E. Meadows, P.C. Architect



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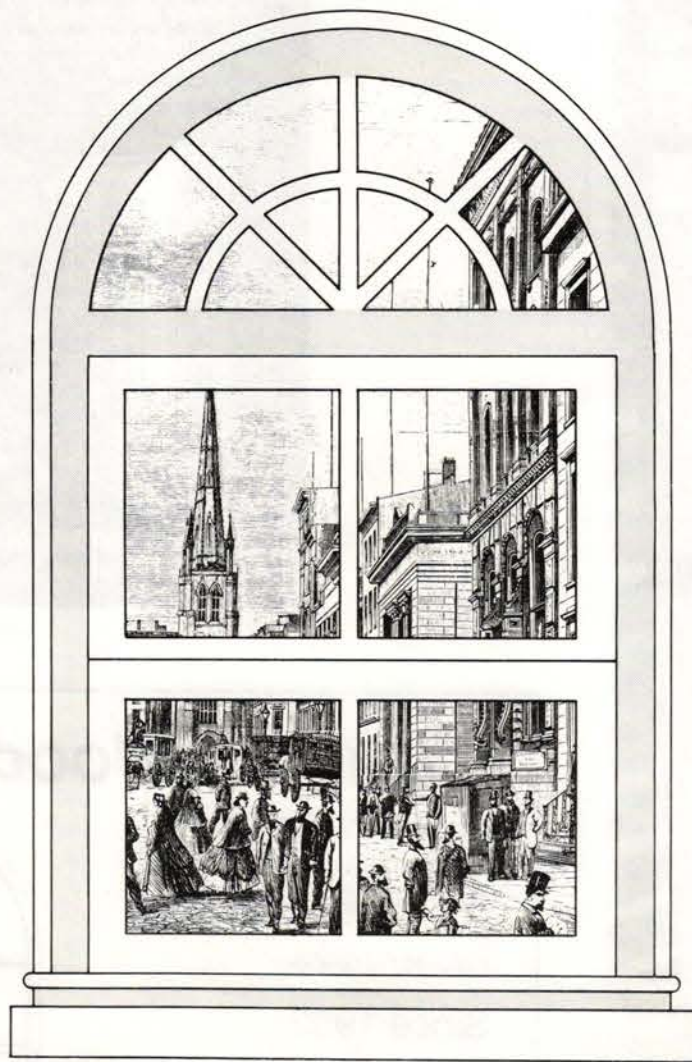
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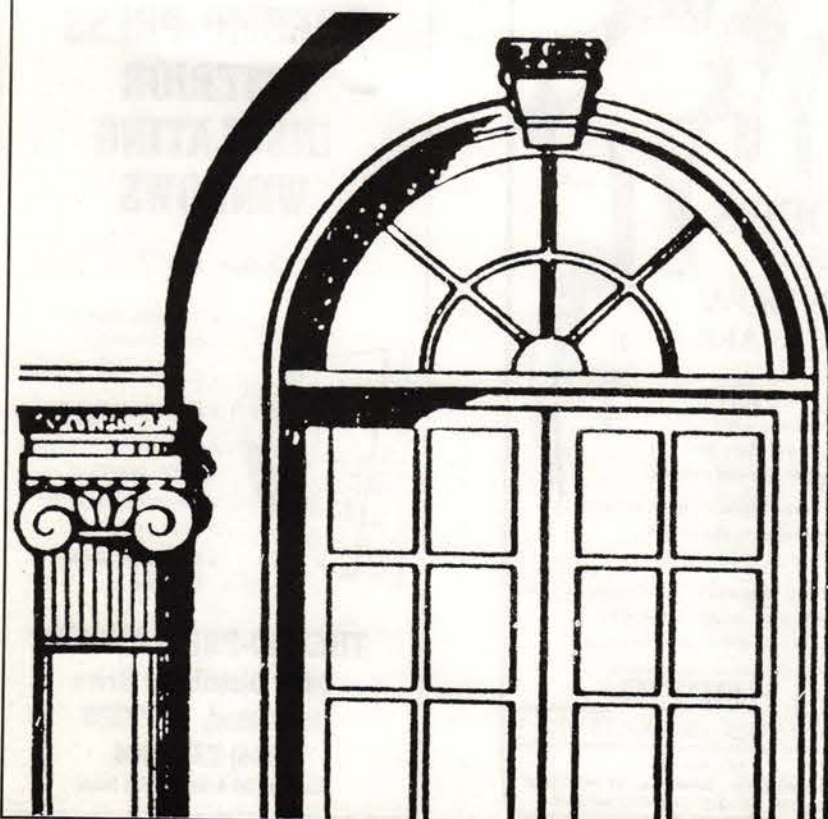
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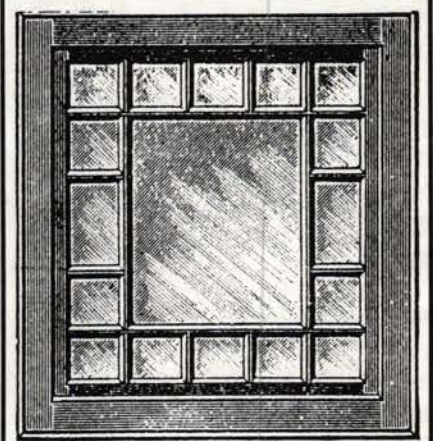
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wood and clad windows

Revival Of The Wood Window

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A few years ago, the wood window seemed to be going the way of the brontosaurus. Countless ads touting aluminum and vinyl windows declared how superior these new materials were to wood. Nonetheless, the wood window is making a remarkable comeback. After experimenting with alternative window types, designers have realized that the old standby wood window has several fundamental advantages:

- ✓ Traditional Look and Feel
- ✓ Good Thermal Properties
- ✓ Ease Of Fabrication Into Custom Shapes
- ✓ Simplicity Of Repairs

For example, Richard Pelletier, president of Historic Windows in Alstead, N.H., runs a company that can make both aluminum and wood windows. Pelletier says he's seen a gradual shift among architects from aluminum to wood as the material of choice. Pelletier is happy with the trend: "A wood window works better, looks better, is easier to repair, and lasts longer than aluminum windows," he says.

The frequent rap on wood windows is maintenance: A wood window should be kept painted. But when looked at over the entire life of the window, wood windows frequently have better maintenance characteristics than alternative materials. Says Pelletier: "I've never seen a 30-year old aluminum window that wasn't in bad shape . . . and almost impossible to repair. But I've seen lots of wood windows older than 30 years that still function well — and are simple to repair when they need work."

Repair simplicity is especially apparent on double-hung balance systems. Wood windows over 100 years old with weights and pulleys are routinely repaired; you can still get replacement cast-iron weights and pulleys (see p. 26). And some resourceful folks are also fashioning replacement weights out of mild steel bar stock.

The simplicity of the weight-and-pulley setup contrasts with the manufacturer-specific systems using spring balances and vinyl jamb-liners. Repairs will be difficult in a decade or two if the manufacturer is no longer producing those specific items.

Replacements in Historic Buildings

When existing wood windows are absolutely beyond repair, and replacements

are called for, there are several problems to be addressed.

On old buildings — especially Tax Act projects — the issue of historic compatibility becomes paramount. Replacement windows have been one of the primary areas of dispute between the National Park Service and developers and architects.

On old buildings, replacement windows must accurately replicate the appearance of existing historic windows. All too frequently, the profiles of muntins, sash, frames, and moldings in replacement windows differ from those in the originals. For example, the muntins in a new double-glazed window may be much wider and flatter than the original muntins. Even though the new window may duplicate the number of existing panes, the character of the historic window is lost due to the change in profile and relief.

Another problem with many replacement windows is the use of panning — metal molding installed over the original surrounding wood molding, or which replaces the existing molding altogether. When panning does not match the existing molding, a further loss of historic character occurs.

Because of vital importance of windows to facade appearance, for Tax Act jobs the Park Service usually requires detailed shop drawings that show all details of the original window and proposed replacements (see illustration).

Stock Vs. Custom

For retrofits, wood windows must nearly always be made to order because of the problems of trimming and detailing a stock window to an old opening.

However, often the entire window unit doesn't need replacing, just the sash. Some companies, such as Marvin Windows, provide sash-only replacements. You just remove the loose existing sash and slip in a new jamb liner and sash.

Wood windows clad in vinyl or aluminum are usually prohibitively expensive to custom-manufacture because of the heavy tooling costs for dies and extrusions. So the question becomes whether a stock clad window will possess the right "look and feel" for a retrofit job — as well as fitting the existing opening.

A related issue is the integrity of the cladding. If the cladding becomes damaged during installation or afterwards, any water that penetrates into the wood core becomes trapped, and the window can quickly rot. Major manufacturers, such as Pella, have carefully worked out the details of their cladding systems. But beware of clad unit from a back-alley shop.

Removable muntins aren't satisfactory for most rehabilitation jobs, but may meet client needs on new construction. For this reason, we've included the availability of this feature in the supplier listings in the accompanying SourceList.

For More On Replacement Wood Windows

A thorough review of the aesthetic, historical, and technical factors in specifying replacement wood windows will be found in the *The Window Handbook* and *The Window Workbook*. See review and ordering information on p. 15. — CL♦

Who's Included On The SourceList

There are hundreds of millwork shops that will make wood windows. The 51 suppliers we've included on the SourceList are the ones who, in the opinion of the editors, provide the best combination of quality and historic sensitivity, along with an interest in serving the special needs of architects and contractors on historic projects.

U.S. WOODWORKING: The More Challenging The Better



The advantage of using U.S. Woodworking, according to manager Warren Weilbacher, is that "we can make

windows in any shape or any size in any material — the other guys use only pine or mahogany." Almost all of the company's recent projects have involved restoration, including massive double-hung windows for New York's City Hall and 27 x 16 ft. clerestory windows for Ellis Island. Windows and doors are their specialty; they also make molding and millwork.

For more information on U.S. Woodworking, see the pullout SourceList in this section. — EMK

MARVIN WINDOWS: Semi-Custom Units

In the 1940s, the Marvin Lumber and Cedar Company gave birth to a window division. These days, Marvin Lumber is a small, local, 85-year-old lumberyard, while its offspring, Marvin Windows, is the country's third largest wood window manufacturer.

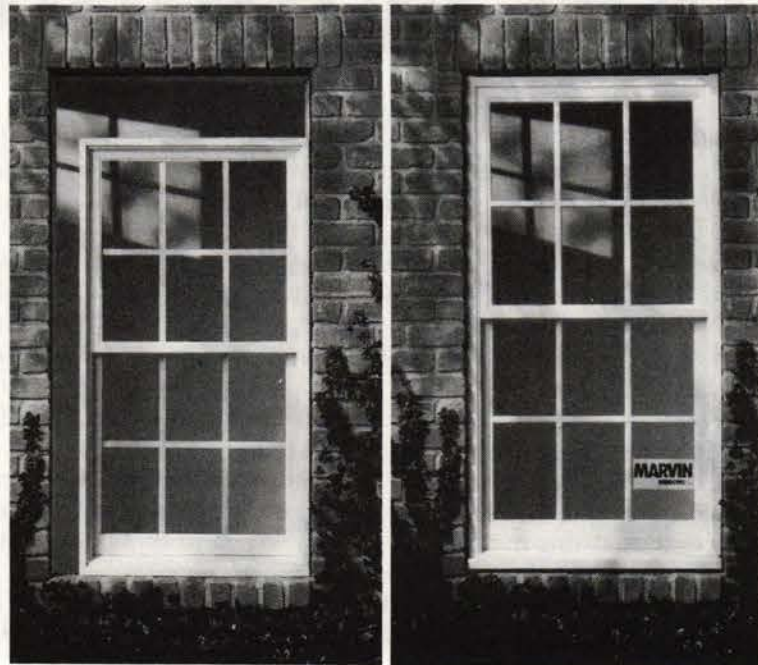
The company specializes in "made-to-order" units. "We go to the parts pile and make what you want and put your name on it," says Frank Marvin, president of the company and grandson of its founder. Stock designs include casements, double-hung tilts, hoppers, awnings, bows, bays, and various non-operable shapes such as circles, ovals, and polygons.

Aluminum-clad and unclad replacement sash are also available. True divided lites are an option on all units. Marvin was the first national manufacturer to standardize production of curved glass windows; curved glass single-hungs are currently available in 9 standard sizes.

For more on Marvin Windows, see the SourceList in this section. — EMK



WHEN IT COMES TO REPLACEMENT WINDOWS, CLOSE DOESN'T COUNT.



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You need a window that doesn't fit like you need a hole in the wall. But if you have a non-standard opening, that's exactly what you get with most replacement windows. Instead of messing with fit kits and extenders, why not specify the brand of window that's made to order, so it fits exactly right, right from the start. Every Marvin window is carefully constructed by hand to your specifications, regardless of shape, size or style. Standard or custom. For more information about Marvin replacement windows, return the coupon below or call toll-free **1-800-346-5128** (In MN, 1-800-552-1167, In Canada, 1-800-263-6161).

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KEDDEE: Custom Restorations

After 30 years as a chemical engineer, David Finnegan left the white-collar world ten years ago to become The Keddee Company, a one-man millwork manufacturer.

He prefers restoration projects, especially challenging ones: milling unusual muntins, customizing major manufacturers' products, or carving just about anything. "I do things right," he says emphatically. "Architects should spend six months with someone like me, to learn the fine points of millwork."

His work appears on some of Rhode Island's finest historic structures, ranging from the 20th-century commercial Irons & Russell Building in downtown Providence to the 18th-century Smith-Appleby House in Smithfield. His company's name, by the way, derives from the names of his family: son Kevin, wife Eugenia, David himself, son David, and daughters Eileen and Erin.

For more information on The Keddee Company, see the pullout SourceList in this section. — EMK

The Joinery Makes The Window . . .

Specification Checklist For Premium-Quality Historic Wood Windows

Here's a checklist to consider when specifying replacement double-hung wood windows in old buildings — along with some typical language that can be modified to suit your particular job. (Of particular importance are the items listed under "Submissions.") In addition, all standard performance specifications should be included.

WOOD: ☐ Grade 1, ponderosa, sugar or northern white pine, mahogany, teak, or other fine-grained lumber that has been kiln-dried to 6 to 12% moisture content at time of fabrication.

SIZES, THICKNESSES, & PROFILES: ☐ Work shall be fabricated to designs, dimensions, and details shown on the approved shop drawings, and shall replicate configurations and profiles on existing windows except where specifically indicated otherwise. (Note: Inexpensive stock sash can run as thin as 1-3/8 in. High-quality sash is usually as thick as 2 in.)

JOINERY: ☐ All joinery shall match that of existing sash in all respects. — Or — Sash stiles & rails shall have haunch mortise & tenon joints, glued & pinned with teak, aluminum, or stainless steel pins.
☐ Muntins shall have coped mortise & tenon joints.
☐ Mitered or coped joints shall be used for molded members.
☐ All wood jambs and sills shall be connected with dadoed joints.

OPERATING SYSTEM: ☐ Units require two balanced, vertically sliding sash, with two pair of concealed sash weights, pulleys, a pair of lift handles in lower rail, and a lock on meeting rails of lower and upper sash.
☐ Original sash weights shall be reused wherever possible. When new weights are required, they shall match the originals in weight. Replacement weights can be cast iron, or square mild steel bar stock, as specified.

WEATHERSTRIPPING: ☐ Brass, interlocking weather strips designed for permanent resilient sealing under bumper or wiper action. Provide weatherstripping at perimeter of each sash. Weatherstripping shall be completely concealed when sash is closed.

HARDWARE: (Specify whether existing hardware is to be restored and reused, or if new hardware is required.)
☐ Provide solid brass company standard hardware (US3 finish). (Specify supplier, if desired.)

FINISH: ☐ All wood shall be immersed in water repellent for at least 15 sec. after milling or assembly. Allow repellent to dry thoroughly, according to manufacturer's recommendations. Water repellent shall be paintable, non-toxic, and certified compatible with specified final finish.
☐ Provide fabricator's standard white shop prime coat on exposed surfaces only of wood components. Primer shall be alkyl primer undercoat complying with Federal Specification TT-P-25 and identified as manufacturer's best grade product. Supply Benjamin Moore or Pittsburgh Paints.

GLASS: (Specify glazing units, such as: Hand-blown "restoration" cylinder glass, 3/32 in. thick. — Or — Supply double-glazed units that meet Sigma Quality Test CBA and carry at least a 10-year warranty to be free of condensed moisture.)
☐ Glazing will be back-bedded in glazing compound and fastened with glazing points every 6 in. Install glazing compound and tool to provide a

substantial wash away from glass.

GLAZING COMPOUND: Use oil-based glazing compound, non-staining and non-bleeding, complying with Federal Specification TT-C-410 for face glazing compound. Use DAP #33 Glazing Compound or equivalent. If insulated glass is being used: Use silicone sealant that vendor certifies is compatible with the unit seal on insulated glass units.

GLAZING POINTS: ☐ Glazing points shall be galvanized steel, installed every 6 in.

FASTENERS: ☐ Comply with NWMA requirements for fabrication, and with manufacturer's recommendations and standard industry practices for type and size of installation fasteners.

☐ Fasteners, unless originally exposed, shall be concealed. Where surface fastening is required and approved by the Architect, it shall be by means of countersunk screws or bolts, with screw or bolt head concealed with wood plugs. Finishing nails, where required, shall be well set and puttied.

☐ **Window Fabrication Adhesives:** Use non-staining casein or cold resin glue.

☐ **Window Fabrication and Installation Fasteners:** Use zinc-coated or non-ferrous nails and screws.

☐ **Interior Wood Stops:** Secure with exposed brass tapered wood screws with tapered washers made for such installations.

☐ **Hardware and Accessory Installation:** Use brass screws

WINDOW CASING & MOLDINGS: (Specify whether existing moldings are to be removed and reused, or if identical new moldings are to be milled and installed. Field test might be required to determine if existing moldings and casings be reused without damage in removal and reinstallation.)

FIELD MEASUREMENTS: ☐ Contractor is responsible for field measuring all dimensions for the required window work.

SUBMITTALS:

☐ **Site Visit:** Vendor shall submit letter certifying he has visited the site and is thoroughly familiar with all field conditions.

☐ **Installers:** Submit letter certifying contractor will use adequate numbers of skilled workers who are thoroughly trained and experienced in replacing windows in historic buildings. Contractor shall certify that workers are familiar and experienced with the materials, methods, tools and equipment needed to install historic windows.

☐ **Sample Window:** Vendor shall submit sample window showing prior successful production of units similar to those required. Such samples will show fabrication techniques, workmanship, hardware, and accessories similar to those required.

☐ **Weatherstripping:** Submit 12" long samples of all weatherstripping required.

☐ **Moldings:** Submit 12" pieces of each molding type required for each window and casing with specified finish.

☐ **Shop Drawings:** Submit shop drawings showing both horizontal and vertical sections of both the original window (when appropriate) and the replacement window. The sections will be carefully detailed so that all parts of the window are shown and all materials are specified. Drawings shall include dimensioned wall elevations, and full-size section details of every typical composite member and joinery, including all glazing and weatherstripping details. — CL ♦

WOOD AND CLAD WINDOWS SourceList

CSI# 08610

❖ BY EVE M. KAHN

| COMPANY | SPECIALTY | Literature | Wood Type | Cladding & Standard Colors | Removable Muntins Available | Weather-stripping | Storms | Screens | Wood Finish | Special Architectural Shapes | Amount of Custom Work | Price Range |
|--|--|---|------------------------------|-------------------------------|-----------------------------|-------------------|--------|---------|-------------------------|------------------------------|-----------------------|-----------------------|
| Andersen Corporation 5th Ave., N., Dept. TB Bayport, MN 55003 (612) 439-5150 | The largest manufacturer of wood and clad windows. Mostly stock, with "Flexitame" custom option. Some single glazing; mainly High-Performance and High-Performance Sun double glazing. | Free Circle No. 249 | Ponderosa pine | Vinyl: white, brown | ✕ | Vinyl | | ✕ | Preservative | ✕ | 20% | Moderate |
| Architectural Components 26 N. Leverett Rd., Dept. TB Montague, MA 01351 (413) 367-9441 | Five-person shop specializing in reproductions of 18th- & 19th-century windows, patterned after Connecticut River Valley architecture; pegged-through mortise-and-tenon construction. Some stock designs. Single glazing standard, usually in antique-style bubbled glass. | Free flyer; send \$3 for catalog. Circle No. 142 | Eastern white pine | | | Bronze | ✕ | ✕ | Preservative | ✕ | 80% | Moderate |
| Camden Window & Millwork 1551 John Tipton Blvd., Dept. TB Pennsauken, NJ 08110 (800) 345-2338 | Specialty millwork shop: wood windows, doors, moulding, wainscot; any wood to architect's specifications. Replication for historic and landmarks projects. Exclusive residential work on interiors as well as exteriors. | Free Circle No. 223 | As specified | | | As specified | | | Primer and preservative | ✕ | 100% | Expensive |
| Carado Corporation 201 Evans Dr., Box 920, Dept. TB Rantoul, IL 61866 (217) 893-4444 | Large (700 employees), old (founded 1866) wood and clad window manufacturer. Stock line includes bay, casement, awning styles. Double glazing standard; triple & low-E also available. | Free | Western pine | Aluminum: bronze, white | ✕ | Vinyl | ✕ | ✕ | Primer | ✕ | 10% | Moderate |
| Clawson Manufacturing 1225 Rogers, Dept. TB Missoula, MT 59807 (406) 549-7884 | Fifty-person, family-owned maker of wood and clad windows; almost exclusively for new construction. Divided lite and removable muntins; double, triple, & low-E glazing available. | Free | Ponderosa pine | Aluminum: white, bronze, sand | ✕ | Vinyl | | ✕ | Preservative | ✕ | 4% | Moderate |
| Coastcraft 1002 East F St., Dept. TB Tacoma, WA 98401 (206) 272-1154 | Mid-size custom window shop that can handle large orders. High-end residential and commercial renovation and new construction. All glazing types available. | Free | As specified | | ✕ | Gal-ion | ✕ | ✕ | Preservative | ✕ | 90% | Expensive |
| Colonial Woodworks Box 19965, Dept. TB Raleigh, NC 27619 (919) 783-5592 | Wood-window shop offering double-hung, Palladian, round, & half-round units with double glazing only. Designs based on historic styles. Large selection of compatible woodwork, doors, etc. | Send \$5 for catalog. | Clear white pine | | | Vinyl | ✕ | ✕ | Preservative | ✕ | 10% | Moderate |
| Corapi Company 2307 Oakdale Ave., Dept. TB Glenside, PA 19038 (215) 887-0556 | Eleven person shop specializing in larger buildings. Exact replicas of existing wood windows. Dowel-jointed corners. Recycled glass and interior storms available. Will also work on aging aluminum and steel windows. | Free Circle No. 224 | As specified | | | Zinc or brass | ✕ | | As specified | ✕ | 100% | Expensive |
| Custom Millwork Box 562, Dept. TB Berryville, VA 22611 (703) 955-4988 | Small custom millwork shop with restoration experience. Pegged, mortise-and-tenon, or dowel construction, depending on window shape. Single-, double-, triple-hung units. Antique glazing available. | Free | As specified | | | Bronze | ✕ | ✕ | As specified | ✕ | 100% | Moderate to expensive |
| Drums Sash & Door Box 207, Dept. TB Drums, PA 18222 (717) 788-1145 | Small millwork shop offering stock and custom wood windows. Stock line includes double-hung units with up to 24 panes, traditional six-pane barn and three-pane cellar windows. Single or double glazing available. | Free Circle No. 247 | Clear white pine | | ✕ | Vinyl | | ✕ | Primer | ✕ | 50% | Moderate |
| Dubague Sash & Door 950 Jackson, Box 577, Dept. TB Dubuque, IA 52001 (319) 557-8851 | Small wood window and door shop, primarily for restoration. Victorian houses and storefronts a specialty. All glazing types, including reproduction and low-E, available. | Free | As specified | | ✕ | Vinyl | ✕ | ✕ | Preservative | ✕ | 100% | Expensive |
| Duratherm Rt. 32, Dept. TB N. Vassalboro, ME 04962 (207) 872-5558 | Mid-size high-end wood window manufacturer, mainly for large commercial construction or restoration projects including colleges, corporate headquarters, civic structures. Triple glazing standard; many other options. | Free | Teak, mahogany, American ash | | ✕ | Neoprene | | ✕ | Primer | ✕ | 100% | Expensive |

TRADITIONAL BUILDING'S Wood And Clad Windows SourceList ■ II ■

CSI# 08610

| COMPANY | SPECIALTY | Literature | Wood Type | Cladding & Standard Colors | Removable Grilles Available | Weather-stripping | Storms | Screens | Wood Finish | Special Architectural Shapes | Amount of Custom Work | Price Range |
|---|--|------------------------|---------------------------|--------------------------------------|-----------------------------|-------------------|--------|---------|--------------------------|------------------------------|-----------------------|-----------------------|
| Englander Millwork Corporation 2369 Lorillard Pl., Dept. TB Bronx, NY 10458 (212) 364-4240 | Small shop specializing in duplicating historic millwork, especially circle and round-top windows using true divided-lite construction. Insulated glass on request. | None | As specified | | | As specified | ✕ | ✕ | None | ✕ | 75% | Moderate |
| Gibbons Sash & Door Box 76, Rt. 1, Dept. TB Hurley, WI 54534 (715) 561-3904 | Small shop specializing in wood windows to specification. Mainly new construction. All joints doweled to permit odd angles. Various glazing types offered. | Free Circle No. 225 | As specified | | ✕ | Polypropylene | ✕ | ✕ | As specified | ✕ | 80% | Expensive |
| Harbrook Architectural Wood 146 Vley Rd., Dpt. TB Scotia, NY 12302 (518) 370-0032 | Consultation, design, & installation of wood windows for restorations, rehabs, & new construction in the Northeast. Provides wide range of special architectural shapes, window types, & store-fronts. Experienced with landmark review boards. | Free Circle No. 240 | As specified | As specified | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Expensive |
| Herrick & White 3 Flat Street, Dept. TB Cumberland, RI 02864 (401) 658-0440 | Woodwork shop that can make windows in unusual sizes and shapes, mainly for commercial new construction and restoration projects on East Coast. All glazing types available, with true divided lites preferable. | None | As specified | | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Expensive |
| Historic Window Box 138, Jct. 123 & 123A, Dept. TB Alstead, NH 03602 (603) 835-2918 | Mid-size wood-window restoration specialists. Will reproduce existing units. Can also salvage old sash: from commercial to museum quality work, depending upon price. Antique, reproduction, or modern glazing in single, double, or triple strength. | Free | As specified | | | As specified | ✕ | ✕ | As specified | ✕ | 100% | Moderate to expensive |
| Ideal Company Box 2540, Dept. TB Waco, TX 76702 (817) 752-2494 | 85-year-old mid-size millwork manufacturer with line of stock wood and clad windows: casement, awning, tilt double-hung, round top, true divided light. Various glazing types available including triple and low-E. | Free | Pine | Aluminum: white, bronze | ✕ | Vinyl | ✕ | ✕ | Preservative and primer | ✕ | 10% | Moderate |
| J.B. Sash & Door 280 2nd St., Dept. TB Chelsea, MA 02150 (617) 884-8940 | Mid-size company specializing in wood and clad tilt replacement sash for double-hung windows. Double glazing with removable muntins standard; low-E available. | Free | Sugar and ponderosa pine | Vinyl: white | ✕ | Vinyl | | ✕ | None | ✕ | 5% | Moderate |
| The Keddee Company 794 Hartford Pike, Dept. TB Scituate, RI 02857 (401) 934-2000 | One-man restoration specialist. Will carve or mill wood as needed; can customize major manufacturers' products and salvage old sash. All glazing types available. | Free | As specified | | | None | ✕ | ✕ | As specified | ✕ | 100% | Moderate |
| Lincoln Wood Products 701 N. State St., Dept. TB Merrill, WI 54452 (715) 536-2461 | Large stock wood & clad window manufacturer. Double-hung, casement, glider units, & replacement sash. Some true divided lite, also removable & sealed-in muntins. Double glazing standard; single strength, low-E, & argon-filled available. | Free | Western pine | Aluminum: white, bronze, beige, grey | ✕ | Vinyl | ✕ | ✕ | Primer | ✕ | 5% | Moderate |
| Lindsay Sash 1995 Commerce Dr., Dept. TB N. Mankato, MN 56001 (507) 625-4278 | Small company specializing in wood and clad replacement double-hung sash. All units swing out for cleaning. Double glazing standard; single strength also available. | Free | Ponderosa pine | Aluminum: white, brown | | Vinyl | ✕ | ✕ | Preservative | ✕ | 20% | Moderate |
| Lititz Planing Mill 302 E. Front St., Dept. TB Lititz, PA 17543 (717) 626-2186 | 77-year-old planing mill with thousands of cutters for creating antique muntin profiles. All glazing, including recycled, and all wood types available. | Free | As specified | | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Expensive |
| Marvin Windows Dept. TB Warroad, MN 56763 (800) 346-5128 | Third largest manufacturer of custom and stock wood & clad windows and tilt replacement sash. Odd stock designs include non-operable pentagonal and Gothic-head windows, half rounds with spider-web muntin patterns, round-top double-hung. Single or double glazing with low-E or other high-performance panes. Also curved windows. | Free Circle No. 226 | Ponderosa pine | Aluminum: white, brown, bronze, grey | ✕ | Vinyl | ✕ | ✕ | Primer | ✕ | 50% | Moderate to expensive |
| Maurer & Shepherd Joyners 122 Naubur Ave., Dept. TB Glastonbury, CT 06033 (203) 633-2383 | Small woodwork shop that reproduces 17th- and 18th-century windows for old and old-style homes. Recycled glass a specialty. Can recreate any muntin or trim profile. | Free Circle No. 36 | Oak or eastern white pine | | | None | ✕ | ✕ | Linseed oil & turpentine | ✕ | 100% | Expensive |

TRADITIONAL BUILDING'S Wood And Clad Windows SourceList ■ III ■

CSI# 08610

| COMPANY | SPECIALTY | Literature | Wood Type | Cladding & Standard Colors | Removable Grilles Available | Weather-stripping | Storms | Screens | Wood Finish | Special Architectural Shapes | Amount of Custom Work | Price Range |
|---|--|------------------------|--|--|-----------------------------|-------------------|--------|---------|--------------|------------------------------|-----------------------|-----------------------|
| Messing Planing Mill 5020 Arsenal Street, Dept. TB St. Louis, MO 63139 (314) 664-3544 | Small 77-year-old shop that makes windows, doors, and other woodwork, mainly for residential restoration projects. All glazing types available in single or double strength. | None | Sugar pine | | ✕ | None | ✕ | ✕ | None | ✕ | 100% | Moderate |
| Midwest Wood Products 1051 S. Rolff St., Dept. TB Davenport, IA 52802 (319) 323-4757 | Small wood-window manufacturer. They have stock components for double-hung, storm, and screen windows that can be assembled in custom sizes. Double glazing standard; antique reproduction, single, and triple glazing available. | Free Circle No. 146 | Northern white, sugar, or ponderosa pine | | | As specified | ✕ | ✕ | Preservative | ✕ | 100% | Moderate |
| Millwork Specialties 189 Prospect Ave., Dept. TB Brooklyn, NY 11215 (718) 768-7112 | Ten-person millwork shop that makes wood windows mainly for restoration projects. Stock line includes casements and double-hungs. Various glazing types available. True divided lites only; also storms and screens with wooden frames. | None | As specified | | | Vinyl | ✕ | ✕ | As specified | ✕ | 80% | Expensive |
| MW Manufacturers Box 559, Dept. TB Rocky Mount, VA 24151 (703) 483-0211 | Major manufacturer of stock wood and clad windows. Double-hung, casement, awning, bay, round-top, and non-operable odd shapes. Any new glazing type available. | Free | Ponderosa pine | Vinyl: white, brown | ✕ | Vinyl or TPE | | ✕ | Preservative | | 8% | Moderate |
| New Morning Windows 10425-A Hampshire Ave. S., Dept. TB Bloomington, MN 55438 (612) 944-5120 | Mid-size manufacturer of non-operable wood and clad windows of unusual shapes and sizes. Units and cladding colors designed to complement products of major manufacturers. Any new glazing type available. | Free Circle No. 227 | Ponderosa pine | Aluminum: 12 colors | ✕ | None | ✕ | ✕ | Preservative | ✕ | 100% | Expensive |
| Norco Windows 811 Factory St., Dept. TB Hawkins, WI 54530 (715) 585-6311 | Major manufacturer of wood and clad windows, mainly for new construction. Stock units, with or without true divided lites, include awning, tilt double-hung, round top, casement. Any new glazing except triple offered; double standard. | Free | Ponderosa pine | Vinyl: white, brown, almond; Aluminum: white, brown, beige | ✕ | Polypropylene | ✕ | ✕ | Primer | ✕ | 15% | Moderate |
| North Pacific Joinery 76 W. 4th St., Dept. TB Eureka, CA 95501 (707) 443-5788 | Small millwork shop specializing in redwood windows and doors; established 1922. Mainly residential new construction. Any new glazing type available. | Free | Redwood | | | Vinyl | | ✕ | Preservative | ✕ | 100% | Expensive |
| Northwest Window Works 3227 164th St. SW, Dept. TB Lynnwood, WA 98037 (206) 743-4442 | Mid-sized wood window manufacturer. Mainly West Coast residential and specialty commercial projects. Arches and divided lites with insulated glass and 1-1/4" muntins a specialty. Low-E, heat mirror, and insulated leaded glass available. | Send \$2 for catalog. | As specified | | ✕ | Q-Ion, foam | | ✕ | Preservative | ✕ | 100% | Expensive |
| Pella 102 Main Street, Dept. TB Pella, IA 50219 (515) 628-1000 | Second largest manufacturer of wood and clad windows. Stock units include casement, awning, double-hung. Double glazing standard; sealed-in blinds available. | Free | Western pine | Aluminum: any color | ✕ | Vinyl | | ✕ | Preservative | ✕ | 20% | Moderate to expensive |
| Petersen Planing Mill Company 3320 Rutger St., Dept. TB St. Louis, MO 63104 (314) 772-2700 | Mid-size millwork shop that makes windows. Large and small sizes, elliptical shapes a specialty. Some restoration experience. Any glazing type offered. | None | As specified | | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Moderate |
| Point-Five Windows 1314 Duff Drive, Dept. TB Ft. Collins, CO 80524 (303) 482-6971 | Mid-size wood-window restoration specialists. Muntin profiles copied from muntins on historic buildings around the country. Replacement sash only also available. Single or double glazing with modern float glass or hand-blown cylinder glass. | Free Circle No. 228 | As specified | | | As specified | ✕ | ✕ | As specified | ✕ | 100% | Expensive |
| Pozzi Wood Windows Box 5249, Dept. TB Bend, OR 97708 (503) 382-4411 | Major manufacturer of wood windows; subsidiary of Bend Millwork Systems. Over 4,000 window products plus custom shapes and sizes. Various glazing types available. | Free | Ponderosa pine | Aluminum: white, bronze, champagne | ✕ | Vinyl | ✕ | ✕ | Primer | ✕ | 40% | Moderate to expensive |
| Ricketson Woodworking 34 Potter St., Box 23, Dept. TB Hartford, CT 06101 (203) 522-3257 | Family-owned mid-size millwork shop, founded 1902. Mainly high-end new construction, large commercial and residential projects; some restoration. All glazing types available. | Free Circle No. 230 | As specified | | | As specified | ✕ | ✕ | As specified | ✕ | 100% | Expensive |

TRADITIONAL BUILDING'S Wood And Clad Windows SourceList ■ IV ■

CSI# 08610

| COMPANY | SPECIALTY | Literature | Wood Type | Cladding & Standard Colors | Removable Grilles Available | Weather-stripping | Storms | Screens | Wood Finish | Special Architectural Shapes | Amount of Custom Work | Price Range |
|--|---|------------------------|------------------------------|------------------------------|-----------------------------|--------------------|--------|---------|--------------|------------------------------|-----------------------|-----------------------|
| Ruffin & Payne E. Laburnum & Vawter Ave. Box 27286, Dept. TB Richmond, VA 23261 (804) 329-2691 | A family-owned lumberyard that makes wood windows based on local Colonial architecture. Can also customize the products of other manufacturers. Tilt and non-tilt. Single glazing standard on Colonial windows. | None | Western pine | | | Vinyl | | | None | ✕ | 100% | Moderate |
| Selrite Millwork Corporation 581 Rahway Ave., Dept. TB Union, NJ 07083 (201) 964-1555 | Mid-size millwork manufacturer; large round tops a specialty. Mainly residential new construction. Any new glazing available. | Free | As specified | | ✕ | Vinyl | ✕ | ✕ | None | ✕ | 100% | Moderate |
| Staples Millwork 32 Taunton Ave., Rt. 140, Dept. TB Norton, MA 02766 (508) 285-4477 | Mid-size custom millwork shop specializing in the replication and restoration of wood windows. Reproduction glass and hardware available. | Free Circle No. 208 | As specified | | | As specified | ✕ | ✕ | None | ✕ | 100% | Moderate |
| Tischler und Sohn 51 Weaver St., Dept. TB Greenwich, CT 06830 (800) 282-9911 | Top-of-the-line German-based window manufacturer. Primarily new construction, large homes or commercial projects. Any new glazing available. Optional cladding has air space, to allow wood to breathe. | Free | Mahogany | Aluminum: any color | | Neoprene | | ✕ | As specified | ✕ | 100% | Expensive |
| United States Woodworking 35 Engineers Rd., Dept. TB Hauppauge, NY 11788 (516) 234-4910 | 30-person millwork shop, specializing in windows and doors. Mainly restoration of commercial buildings and larger homes. Any glazing except antique glass. | Free Circle No. 120 | As specified | | | Vinyl or zinc | ✕ | ✕ | Primer | ✕ | 100% | Expensive |
| Walbrook Mill & Lumber Company 2636 W. North Ave., Dept. TB Baltimore, MD 21216 (301) 462-2200 | Lumberyard, hardware store, & cabinet shop that makes wood windows, mainly for restoration. Family-owned, 70-year-old business, mainly for Baltimore & D.C. area. Double glazing standard; low-E available but not antique or reproduction glass. | Free | White pine | | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Moderate |
| Webb Manufacturing Box 707, Dept. TB Conneaut, OH 44030 (216) 593-1151 | Large manufacturer of stock non-operable wood windows: round, oval, half round, quarter round, octagon. Single or double glazing. | Free | Ponderosa pine | | ✕ | None | ✕ | ✕ | Primer | ✕ | 10% | Moderate |
| Wes-Pine Wood Windows King St., Box 1157, Dept. TB W. Hanover, MA 02339 (617) 878-2102 | Mid-size wood window manufacturer specializing in true divided lite Colonial-style units with low-E glass. Primarily residential. Various glazing options available, as well as sash-only replacements. | Free Circle No. 222 | Ponderosa pine | | ✕ | Vinyl | ✕ | ✕ | Primer | ✕ | 25% | Moderate |
| Window Millwork Shop 218 Shrewsbury St., Dept. TB Worcester, MA 01604 (508) 791-8352 | Small shop that provides windows for both new construction and restoration work. Has worked on large commercial projects in Boston area. Recycled and reproduction glazing available. | None | As specified | | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 100% | Moderate |
| Windsor Window Company 900 S. 19th. St., Dept. TB W. Des Moines, IA 50265 (515) 223-6660 | Large stock wood & clad window manufacturer. Line includes casement, awning, and double-hung, mainly for residential new construction. Double glazing standard; other options available. | Free | Ponderosa pine | Aluminum: white, bronze | ✕ | Q-Ion | ✕ | ✕ | Primer | ✕ | 3% | Moderate |
| Wood Window Workshop 26 Gansevoort St., Dept. TB Albany, NY 12202 (518) 463-6767 | Small company specializing in restoring old sash; can also remill components or entire unit. Subsidiary of building supply company, so some stock products available. Mainly New York state since work done on site. | Free | As specified | Aluminum: white, bronze, tan | ✕ | As specified | ✕ | ✕ | As specified | ✕ | 80% | Moderate |
| Woodstone Company Patch Road, Box 223, Dept. TB Westminster, VT 05158 (802) 722-4784 | Small wood-window manufacturer for high-end new construction and large restoration projects; period reproductions, including double glazing with thin muntins, a specialty. Pegged mortise-and-tenon construction. All new glazing types. | Send \$3 for brochure. | Most hardwoods and softwoods | | ✕ | As specified | ✕ | ✕ | Preservative | ✕ | 100% | Moderate to expensive |
| J. Zeluck 5300 Kings Highway, Dept. TB Brooklyn, NY 11234 (718) 251-8060 | Mid-size wood window and door manufacturers for high-end new construction and large restoration projects; top-of-the-line product. All types of new glazing offered. | Free | Mahogany | | | Bronze or neoprene | | ✕ | None | ✕ | 100% | Expensive |

MIDWEST WOOD: Small Or Large Orders



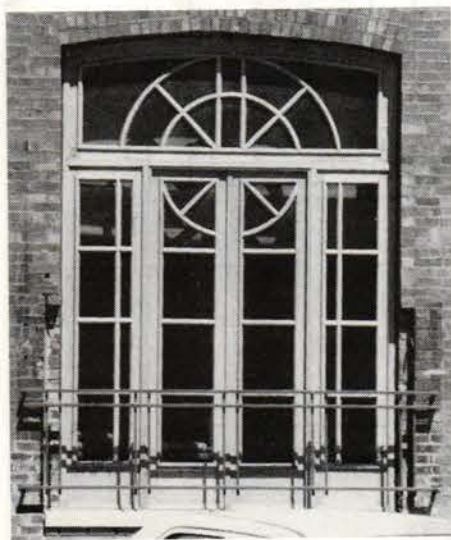
Midwest Wood Products is a user-friendly establishment. Their brochure includes not only side and front views of their double-hung windows, storms, and screens but also a glossary of window terminology and an illustrated diagram of window parts. Midwest will work on small orders of a few windows or replacement sash, and they'll also tackle large replication projects like storefronts (a handsome turn-of-the-century example is depicted in the brochure).

A basic price list comes with the brochure. Costs range from \$30.32 for an unglazed double-hung unit with room for two 16 x 16 in. panes to \$144.95 for a glazed window with two 44 x 48 in. panes. Add \$3.50 per sq. ft. of glass for insulated glazing and \$2.25 per lite for true divided lites.

For more on Midwest Wood Products, see the SourceList. — EMK

GIBBONS: Dowelled-Joint Specialists

Gibbons Sash & Door uses only dowelled joints on its windows. "The mortise and tenon is designed for 90 degree angles," says owner John Gibbons. "But we get asked to do all kinds of odd angles, that other people won't do. A dowel is much more flexible than a mortise and tenon; it can go into any joint."



Recent projects range from a post-and-beam window wall for a storefront to an elliptical-head window that wraps around the corner of a house. Their work is divided equally between new construction and restoration; Gibbons says that both are challenging. "Either we have to duplicate everything exactly as it was on an old building, or we work with architects who specify every detail—the muntins, the sills. We'll make all the custom profiles they want."

For more about Gibbons Sash, see the SourceList in this section. — EMK

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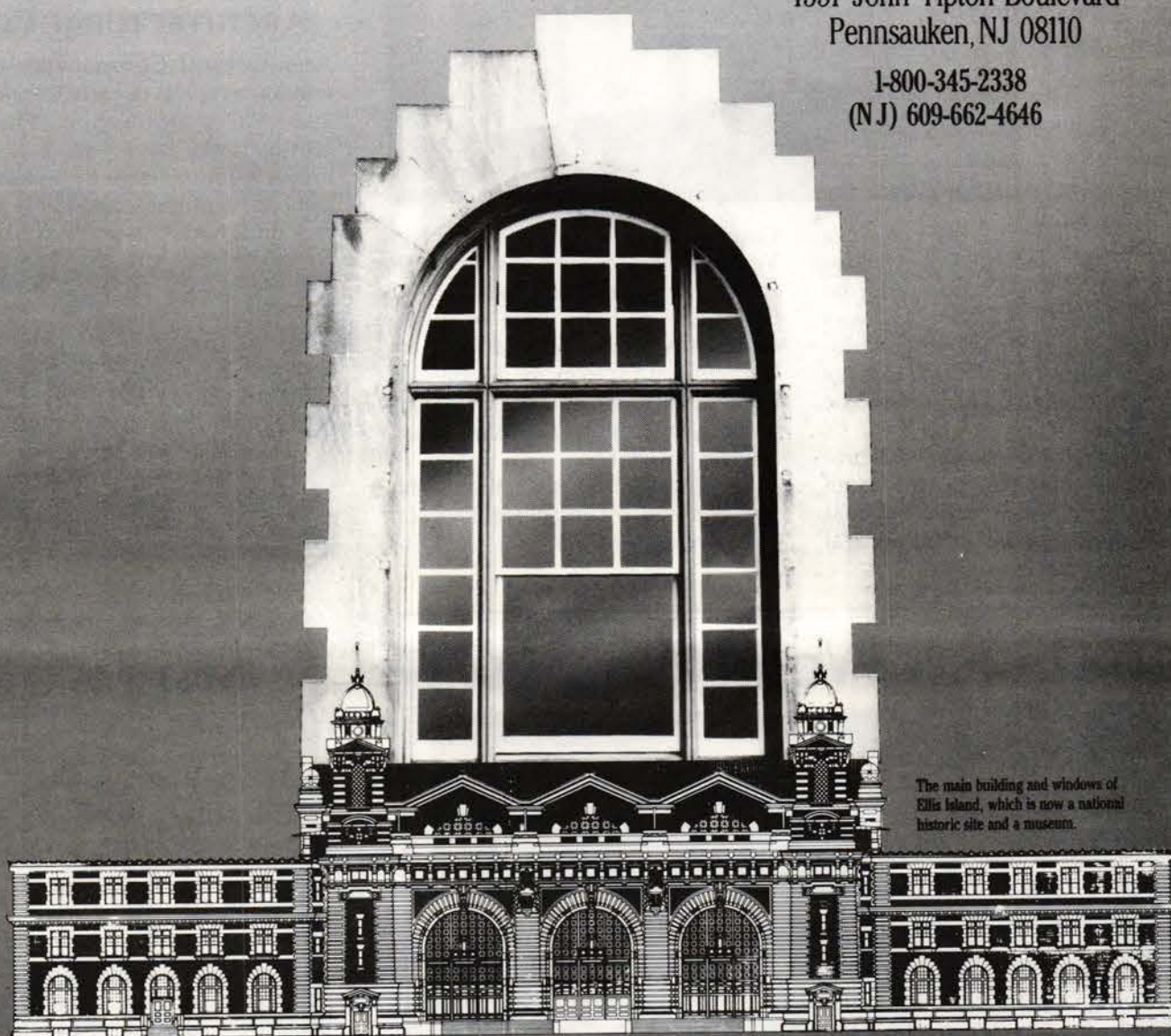
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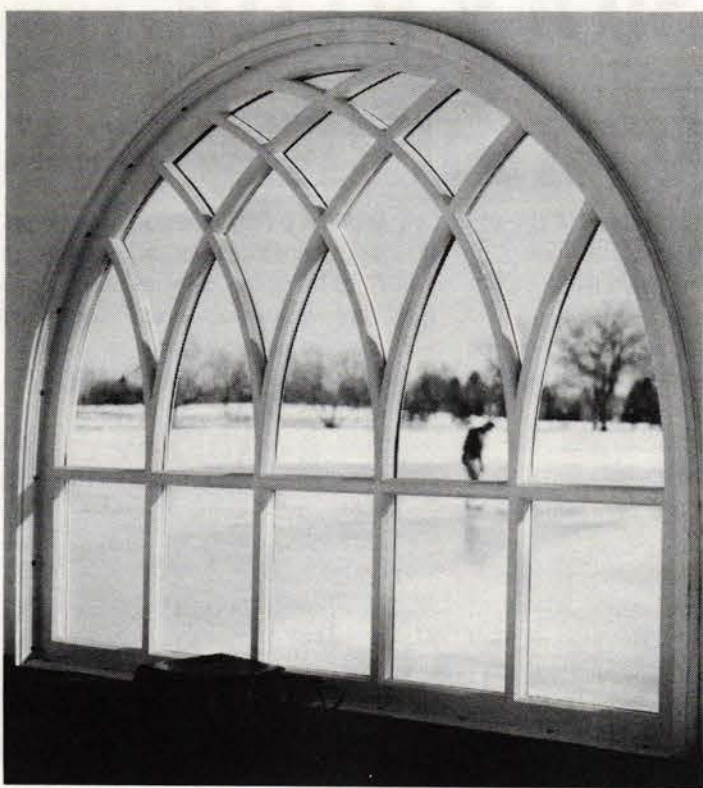
POINT-FIVE WINDOWS: Leak-Proof Sash

Point-Five Windows derives its name from the maximum cubic feet of air per minute per foot of seal that its windows will leak. "And they usually test even better than that," says its owner, Dave Lundahl.

The company's products include replacement sash and complete windows, both designed specifically for old buildings. The cast-bronze hardware is based on turn-of-the-century designs.

The windows are typically glazed with hand-blown cylinder glass, which all but disappeared from the scene when rolled glass was developed in the 1880s. Weatherstripping is intended to be, as Lundahl puts it, "conspicuously absent," unless the sash is open.

Eight standard profiles are available, all of which are copied from muntins on important buildings that Point-Five has worked on: the Federal



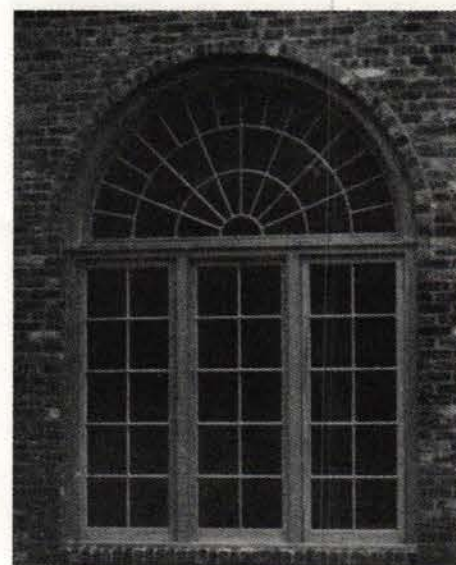
Court House in Providence, the New York Life Building in Kansas City, the Asher Levy Bathhouse in New York City. The muntins come in custom widths in increments of 1/16 in., beginning at 13/16 in. for double glazing and 9/16 in. for single glazing. Custom profiles can be provided for a \$950 set-up charge.

For more information on Point-Five Windows, see the pullout SourceList in this section. — EMK

WOODSTONE: Custom Windows Via CAD/CAM

The Woodstone Company can take a customer's sketch and turn it into window specs via a CAD/CAM system. "We can figure out virtually an infinite number of dimensional possibilities," says co-owner Jay Eshelman. Among the company's specialties are one-inch-wide muntins on true divided-lite insulated-glass units and a high-tech weight-and-pulley counterbalance system. The windows are guaranteed for ten years. About 20 people work for the company, and they are comfortable with any wood species from teak to pine.

For more information on The Woodstone Company, see the pullout SourceList. — EMK



ARCHITECTURAL COMPONENTS: 18th-Century Sash

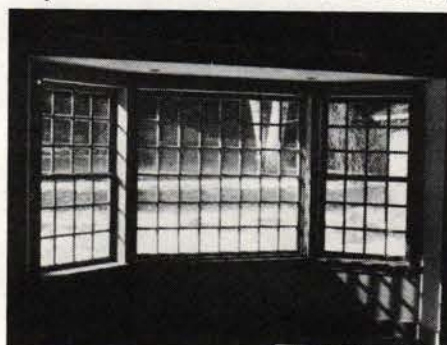
Architectural Components makes windows typical of early Connecticut River Valley architecture. The 18th-century units have 1-in.-thick muntins, a holdover from those found on Jacobean buildings, and the 19th-century units have 5/8-in.-thick muntins,

which reflect the delicacy of Georgian and Federal architecture.

The upper sash is fixed and the lower is operable. Single glazing is standard, usually with antique or reproduction panes. Prices range from \$46 for an unglazed 15/16-in.-thick 18th-century unit with four 6 x 8 in. panes to \$466 for a 1-1/8-in.-thick 19th-century unit with 12-over-12, 9 x 12 in. panes and a 2-1/4-in.-wide sill.

The company also takes on custom orders. "I imagine there's something out there I wouldn't want to do, but I haven't come across it yet," owner Chuck Bellinger says.

For more on Architectural Components, see the SourceList. — EMK



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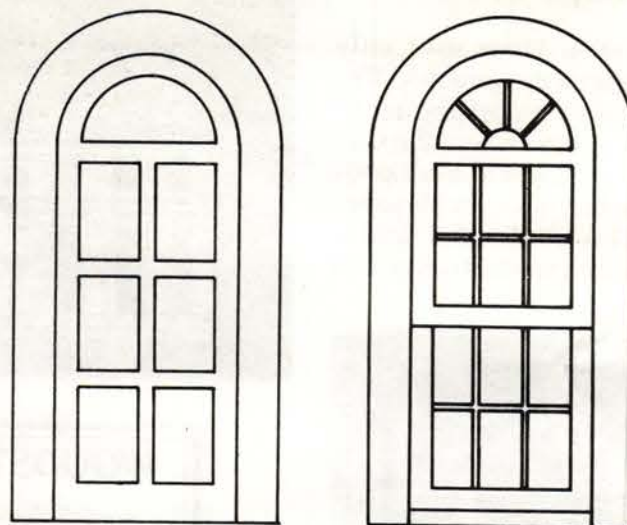
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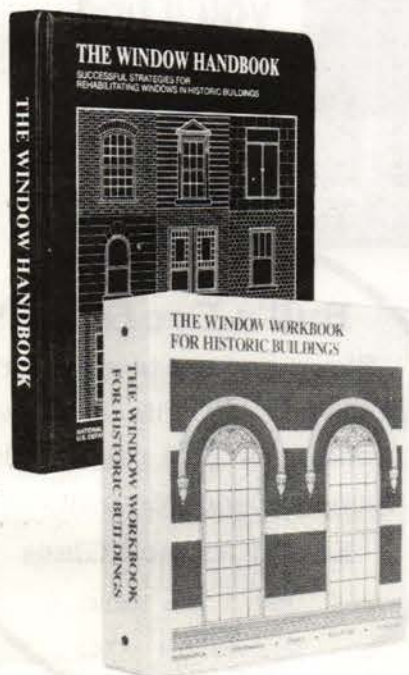
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The first manual, "The Window Handbook," contains 125 pages of brief, well-illustrated



case studies called Preservation Tech Notes. The Tech Notes describe both innovative and traditional procedures for repairing and/or replacing historic windows. The Tech Notes give lots of specific detail...including costs and product information...so you can adapt the same procedure to other projects. The Tech Notes are divided into six categories: (1) General Guidance; (2) Planning & Evaluation; (3) Repair & Weatherization; (4) Double-Glazing Historic Windows; (5) Replacement Sash & Frames; (6) Screens, Awnings, & Accessories.

The second Manual, "The Window Workbook," contains 368 pages on the preservation and rehabilitation of windows in older buildings. The contents are based on papers given at the national Window Conference sponsored by the National Park Service. It's a great guide for architects, developers, contractors, and building managers. Among the topics addressed are: energy conservation, historic technology, maintenance, custom fabrication, repair techniques, and government regulations. There's also a 30-page directory of companies that do all special types of window work.

Purchased separately, "The Window Handbook" costs \$30, and "The Window Workbook" costs \$48.25. Together, the set of two costs only \$70, postpaid. Order from: **Historic Preservation Education Foundation, P.O. Box 27080, Central Station, Washington, D.C. 20038.** — CL ♦

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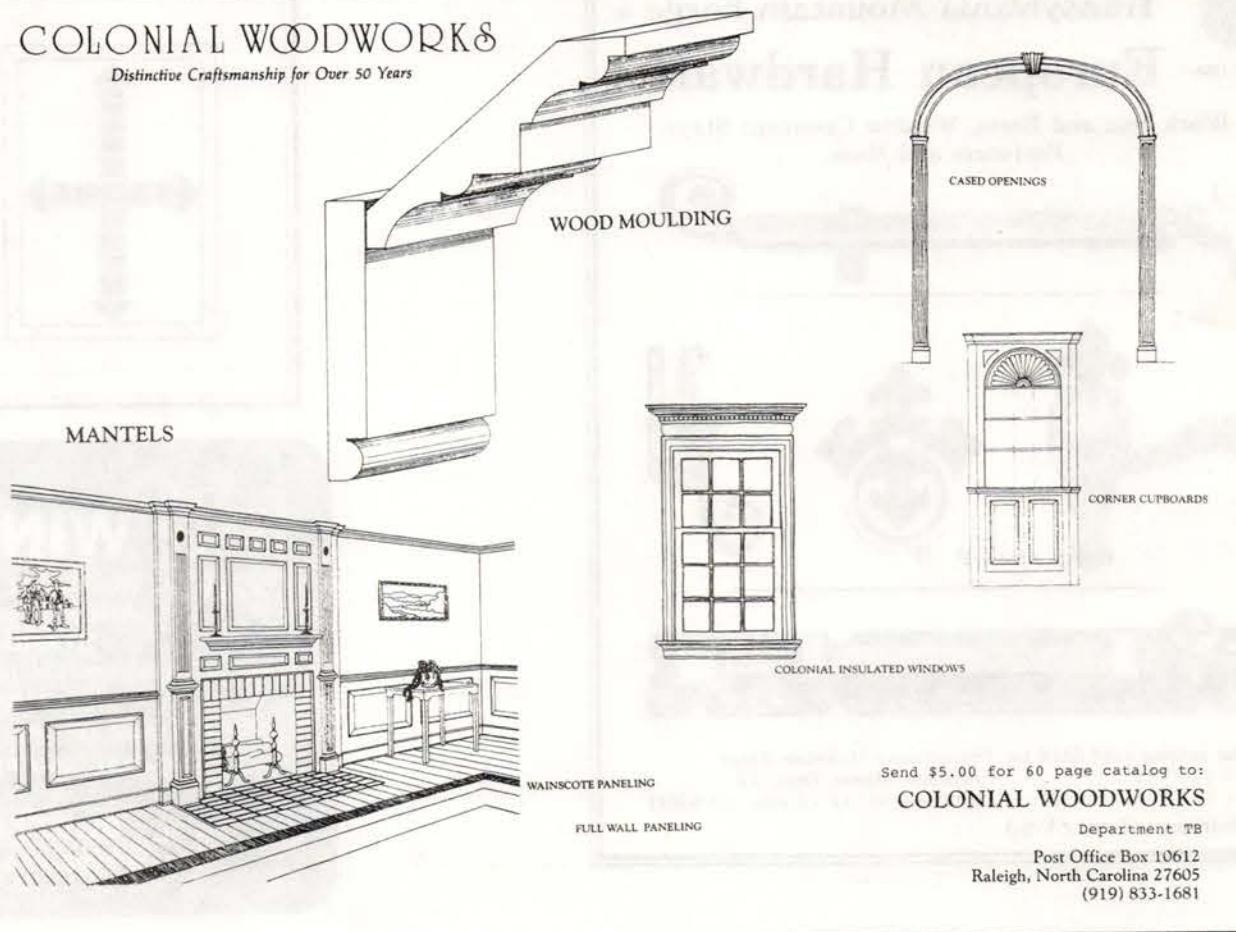
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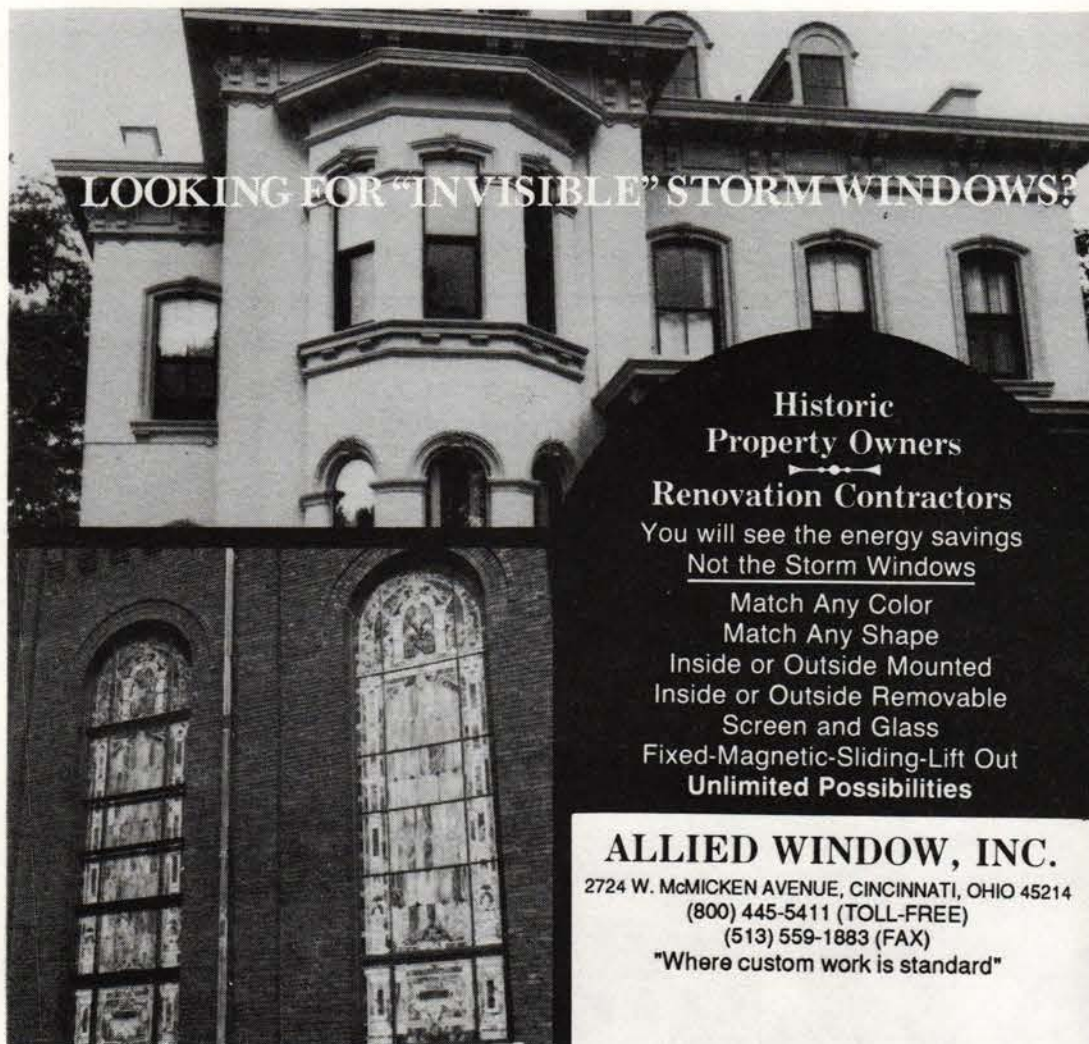
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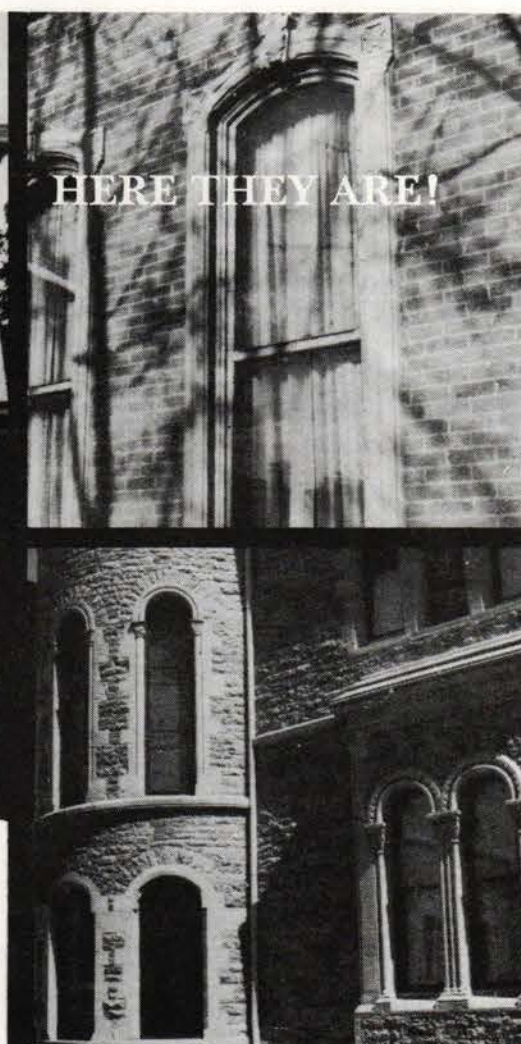
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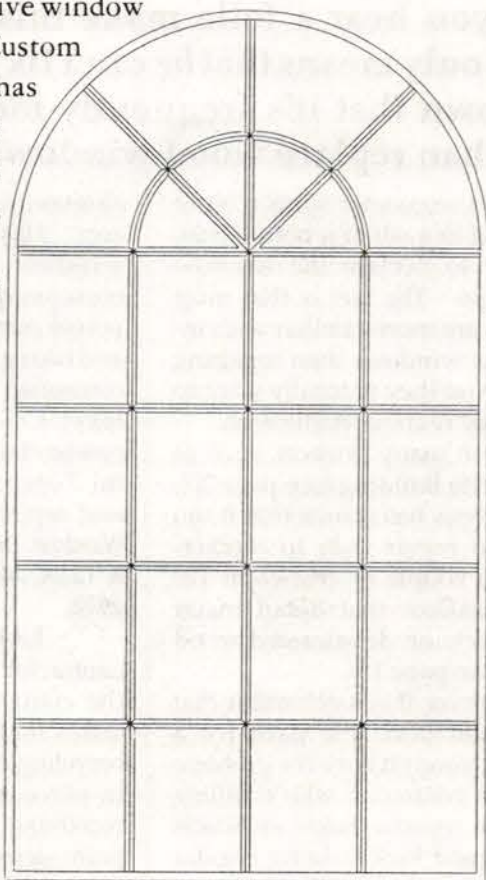
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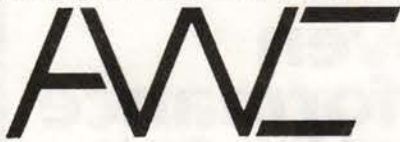


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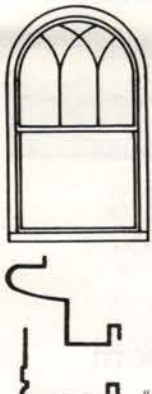

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But on many projects, such as the Marquette Building (see page 20), careful analysis has shown that it can cost less to repair than to replace. There are a couple of articles in *The Window Handbook* that detail major repair projects on deteriorated wood windows (see page 15).

However, if you determine that repair is the desirable path for a specific job, you still have the problem of finding a contractor who's willing to fuss with repairs. Some architects have had good luck training regular carpenters to tackle window restoration. As long as the workers have had experience on preservation projects, the odds are good that they'll adapt successfully to this new task.

There are also some contractors who specialize in window repair. Below we've listed a few of the companies we've run across who have a good track record in wood window restoration.

CORAPI CO. — Medium-size window contractor that will repair or replicate aging wood — or even aluminum and steel — windows. Strong preservation orientation. Specializes in larger projects, such as commercial, government, and institutional buildings. **Corapi Company, 2307 Oakdale Ave., Dept. TB, Glenside, PA 19038 (215) 887-0556. Circle No. 224**

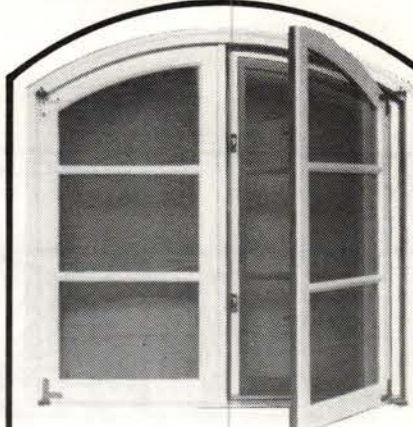
HISTORIC WINDOW — Medium-size contractor that both repairs windows and manufactures new units, in either wood or

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LAKE CONSTRUCTION — A contractor specializing in restoration, the company has developed procedures for the economical repair and recycling of wood windows. Will do in-place epoxy repairs, as well as removing windows to his shop for paint stripping, replacement of rotted parts, and reglazing. Handles larger jobs. Among their many projects is window restoration for Sailors' Snug Harbor, Staten Island, NY. **Lake Construction & Development Corp., 150 King St., Dept. TB, Brooklyn, NY 11231 (718) 852-7771.**

REPLACEMENT SYSTEMS INTL. — Midwestern contractor will restore or replace wood windows. Services include epoxy consolidation, replacement of deteriorated wooden parts, weatherstripping, possibly retrofitting with insulated glass, and refinishing with high-performance paints. Specializes in the larger commercial and institutional buildings. Can also custom make wood windows that replicate the historic originals when necessary. Offers exclusive pivot sash hardware for easy-cleaning energy-conserving sash. **Replacement Systems International, Ltd., P.O. Box 2304, Dept. TB, Kalamazoo, MI 49003 (616) 345-8214. —CL♦**

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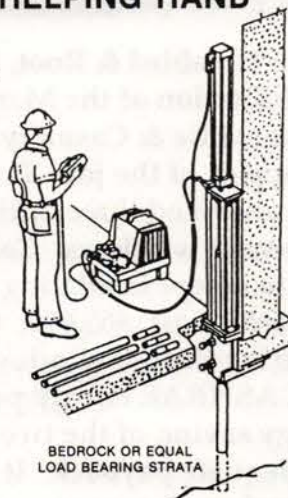
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wood window repair

A Computer "Expert"

It takes an expert to decide whether it's more economical to repair or replace wood windows. Soon, you can have your own personal window expert on your desktop.

❖ by Constance W. Ramirez and John H. Myers

Work now being done by the U.S. Dept. of the Army through the Center for Architectural Conservation at Georgia Tech may make life simpler for anyone who needs to evaluate the condition of windows and make sound "repair or replace" decisions. The project is called "Window Expert System" and, in essence, it stores the knowledge of experts in a computer program that then directs non-experts through the evaluation process. The non-expert arrives at a technically and philosophically sound decision just as an "expert" would.

Figure 1

| Window Expert System |
|--|
| Clem, please select any or all of the following characteristics for the window: (Press F1 for HELP) |
| <ul style="list-style-type: none"> • Arched top or special shapes • Drawn glass • Bulls eye-glass |
| Press 'ENTER' when finished. |

The Window Expert System starts with a computer program "shell" developed by specialists in expert systems. The shell is then loaded with technical information on window types, sizes, materials, the Secretary of Interior's Standards, information from Preservation Briefs and Tech Notes — and names, addresses, and capabilities of window manufacturers. It is then programmed to go through the same steps as a human expert to evaluate a window and come up with a correct decision on significance and condition, recommend action, and list suppliers of products and services appropriate for the recommended action.

Figure 2

| Window Expert System |
|---|
| Clem, are there any broken or missing parts on this window frame or sash? (If yes, please indicate where on the screens which follow.) |
| <ul style="list-style-type: none"> • YES • NO |
| Select answer and press 'ENTER'. |

Window Expert System runs on IBM-compatible personal computers and portables — so it can be used on-site for window-by-window analysis. While the program can be used by any property owner, it is designed mainly as a planning tool for users with hundreds of windows in many buildings.

The program, like a human expert, may be "trained" by adding or changing the information by which decisions are being made. If the system is too "lenient," the rules can be tightened. If new products or services become available, they can be added to the program.

The 3 Parts Of Being Expert

The program guides the user step-by-step through a series of questions in three major sections:

(1) The first stage collects basic data on the building. (Intelligent window decisions can only be made in context of the building's importance.)

(2) The second step evaluates the relative significance of each window type in the building. Usually, some windows are more important architecturally than others in the same building. The program asks a series of questions like the one in Fig. 1, and ultimately assigns a significance level to each window type.

(3) The third step is a window-by-window assessment of physical condition, within each identified type. A series of questions like the one in Fig. 2 helps the user describe conditions.

The program then uses the information on significance and condition to make repair/replace recommendations for each window. The system can use information stored in commonly used database programs like dBase, and it can store the results in a database as well. For example, the Window Expert System will read from a database of window manufacturers' capabilities and inform the user where appropriate products are available.

Solutions For Other Problems

This new approach to analyzing historic preservation issues holds great promise for many other preservation problems where there are large inventories of historic buildings. For the Army, which maintains about 10,000 pre-1940 build-

ings and over 100,000 archeological sites, expert systems offer the opportunity to ensure uniform inspection and analysis criteria necessary for budget and manpower decisions. For this reason, the Army has been leading the field in applying computer programs to historic resource management.

The Window Expert System is the first such program targeted to building maintenance, and is a forerunner of powerful and inexpensive aids for solving technical problems. The Window program will allow property owners and managers to work more effectively with architects and engineers to achieve solutions that protect the significant features of historic buildings. It joins other Army programs such as the Cultural Resources Information System and Geographical Resources Analysis Support System that aid the development of historic preservation plans.

The Window Expert System is still in the developmental phase, but ultimately the Army and the Center see the program as one to be shared with other users ranging from federal agencies to historic house museums. ❖

To get additional information about the Window Expert System, contact: Richard Hayes, Facilities System Div., U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, 2092 Newmark Drive, Champaign, IL 61821. Or: John H. Myers, Center for Architectural Conservation, College of Architecture, Georgia Tech, Atlanta, GA 30332 (404) 894-3390.

John H. Myers is Director of the Center for Architectural Conservation and author of Preservation Brief No. 9: "The Repair of Historic Wooden Windows." Constance Werner Ramirez, Ph.D., is Historic Preservation Officer for the Dept. of the Army and develops policies for management of archeological sites and historic buildings on military land.

Window Repair: \$65,000. New Windows: \$1,600,000.



When Holabird & Root, Chicago, undertook the \$17-million rehabilitation of the Marquette Building for the owner, Bankers Life & Casualty Co., it was clear the windows were a major part of the job. Project Architect Walker C. Johnson, AIA, analyzed three options: (1) High-quality aluminum replacement windows. **Cost: \$1,600,000.** (2) Modifying existing sash to accept insulating glass. **Cost: \$860,000.** (3) Repair existing sash. **Cost: \$65,000.** Careful analysis showed that just repairing the old windows would still allow the building to meet ASHRAE energy performance standards — and that the energy saving of the two more costly options would not yield an adequate payback. It was a case of good preservation practice and good economics going hand in hand. ❖

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■ SPECIAL WINDOWS ISSUE

SEPTEMBER/OCTOBER 1989 ■ 21



storm windows

STORMS: THE TREND'S INSIDE

Storm windows are now available that upgrade thermal efficiency — *without detracting from historic looks.*

When you've got to improve the energy performance of windows in historic buildings, some sort of double glazing is usually called for. Options include: (1) installing a traditional exterior storm window; (2) installing an interior storm window; (3) routing out the historic sash to insert a double-glazed thermal unit; or, (4) replacing the deteriorated sash with a new double-glazed one that preserves the historic character.

Storm windows — interior or exterior — are often the most economical double-glazing strategy. Whether the storm goes inside or out is usually decided by a combination of aesthetic, technical, and perhaps legal factors — if the property is in a historic district or is subject to Tax Act review.

Outside storm windows are often the best strategy when dealing with simple 1 over 1 windows. Well-designed exterior storms have a minimum impact on appearance — and have been approved by the National Park Service for use on Tax Act projects.

Outside storms have serious drawbacks, however, with multi-lite sash because the exterior storm panel masks the muntin profiles of the prime window. For windows with distinctive glazing bar patterns, interior storms are often the way to go. There have been dramatic developments in the past few years in the types of interior storm windows available. For example, the new magnetically attached interior storms are especially useful on steel casement windows; they grab right to the steel frame.

Many of the high-quality exterior and interior storm windows don't have self-storing panels, which

is why they look better than the ubiquitous triple-tracks. But the property owner may have to figure out where to store the glazing panels during the summer.

For more details on improving the thermal efficiency of historic windows, consult the Window Handbook (see review on p. 15). Below you'll find a list of some of the leading suppliers of storm windows for historic buildings.

ALLIED WINDOW, INC. —

The company makes four lines of aluminum storm windows: one for exterior mounting, and three types for interior mounting. Allied specializes in custom designs and custom colors, priding itself on making "invisible" storm windows. The company has supplied storm windows for many historic and Tax Act projects.

For exterior installation on commercial, industrial, and residential buildings with double-hung windows, Allied has its Historic One Lite (HOL) line. The HOL storms are available with: (1) A single removable panel; (2) One fixed and one removable panel; (3) Two removable panels. Units are custom-engineered to the installation, and can be made with arched, round, and segmental heads. Even circular shapes can be provided; all panels are inside-removable.

For interior installations, Allied has its Magnetic One Lite (MOL), Allied One Lite (AOL), and Slide-A-Way (SAW) lines. The MOL line is designed primarily for double glazing of fixed windows. It attaches magnetically to steel tape or steel angle affixed to the window frame. Because of its aluminum frame, it can utilize glass panels — and undivided glass panels

as large as 64 in. x 92 in. have been successfully installed.

The AOL line has been approved for interior installation on Tax Act projects. There are a couple of ways to attach it to the inside of a window frame. Panels snap out easily from the aluminum frame with mechanical clips. Units are custom-engineered, ranging from single removable panels to multiple panels for massive openings (openings as large as 12 ft. wide and 18 ft. high have been handled). Special shapes follow line of existing windows. Screen panels and special glazing are offered. **Allied Window, Inc., 2724 W. McMicken Ave., Dept. TB, Cincinnati, OH 45214 (800) 445-5411. Circle No. 69**

DEFENDER, INC. —

Company makes interior storms that feature in-jamb or face-mounted vinyl frames — in several colors — with acrylic glazing panels. Five different interior storm systems are offered to fit just about every shape and style of window. The acrylic glazing panel can be installed or removed without special tools. **Defender, Inc., Dept. TB, Box 3582, Bridgeport, CT 06605 (800) 257-2882.**

KASSON & KELLER —

Company provides aluminum secondary windows, both exterior and interior-mounted, for commercial buildings. The Manhattan single-hung commercial secondary window can be manufactured as large as 72 in. wide by 120 in. high. Head-mounted balances allow the bottom insert to be raised or lowered on large units. Tilt-in glass and screen inserts allow easy removal for cleaning and repair. The units are engineered to meet wind and structural loads that occur in high-rise buildings. **Kasson & Keller, School Lane, Dept. TB, Fonda, NY 12068 (518) 853-3421. Circle No. 233**

MAGNETITE CORP. —

Offers interior storm system with ABS alloy edging and a continuous flexible strip magnet. Several framing systems allow installation on any existing window; size limited only by glazing dimensions. Self-storing models are available. All units are custom made, so unusual shapes are possible. Uses acrylic or glass panels in thicknesses up to .25 in. Specialty glass, such as solar reflective and low-E, is available. **Magnetite Corp., 8356 Tom Drive, Dept. TB, Baton Rouge, LA 70815 (800) 624-8483.**

NATIONAL ENERGY CORP. —

Supplies the Spring-Tite interior storm window, which is designed to slip easily inside a window jamb and be held in place by friction pressure supplied by internal spring mechanism. No magnets, Velcro, or other mounting strips required. The frame is extruded PVC; the corner key is injection-molded nylon with aluminum pop rivets. The springs are made from tempered stainless steel. Glazing can be acrylic or double-

strength glass. The frames come in white, tan, or dark brown; neoprene gasketing around the perimeter makes a tight weather seal. **National Energy Corp., 105 Franklin St., Dept. TB, Westerly, RI 02891 (401) 348-1030. Circle No. 132**

PANELAIR —

Sells a simple inside storm window consisting of a sheet of clear glass set in a vinyl gasket within a U-frame aluminum channel. Also available with acrylic glazing, double-strength glass, and UF-3 for ultra-violet protection. A vinyl bulb-type gasket provides an air-tight seal. Frames available in white or brown, which can also be painted to match existing woodwork. Held securely in place by spring-loaded clips for easy access and removal. **Panelair, 203 Spark St., Dept. TB, Brockton, MA 02402 (508) 588-8900. Circle No. 232**

PLASKOLITE —

Company supplies custom-made Winsulator inside storm windows for residential, commercial, and industrial locations. Storm unit is attached magnetically to a steel banding affixed to the window frame. Magnetic strip is connected to the extruded vinyl frame via a flexible bellows that accommodates out-of-square surfaces. Glazing is acrylic; vinyl frame comes in white, brown, or tan. **Plaskolite, Inc., P.O. Box 1497, Dept. TB, Columbus, OH 43216 (614) 294-3281.**

THERMO-PRESS CORP. —

Company provides an inside storm window in which a continuous 1/2-in. hook Velcro strip is stapled to the window trim or to a wood strip attached inside the window jamb. An extruded PVC frame with a strip of loop Velcro is pushed against the mating Velcro strip; weathertight seal is provided by an inner vinyl gasket extruded to the PVC frame. Acrylic glazing sheet is permanently bonded to the PVC frame. The PVC frames are available in many custom colors, including wood stains.

Thermo-Press windows can be divided into two sections, like a double hung window. The bottom panel can self-store into the top panel, allowing easy access to the prime window. Interior screens also available.

Thermo-Press Corp., 5406 Distributor Drive, Dept. TB, Richmond, VA 23225 (804) 231-2964. Circle No. 231

ULTRASTORM CORP. —

Offers an interior storm window that slips inside the window jamb and is held by friction generated by an internal Spring-Tite mechanism. The frame is extruded PVC with acrylic glazing. It'll accommodate windows that are as much as 1-1/4 in. out of square. Compression clips are used to compress the spring-loaded frame, then storm unit is positioned inside window jamb and clips are removed. Frame then springs into place. **UltraStorm Window Corp., P.O. Box 380, Dept. TB, Lincoln, MA 01773 (508) 358-5524. — CL♦**

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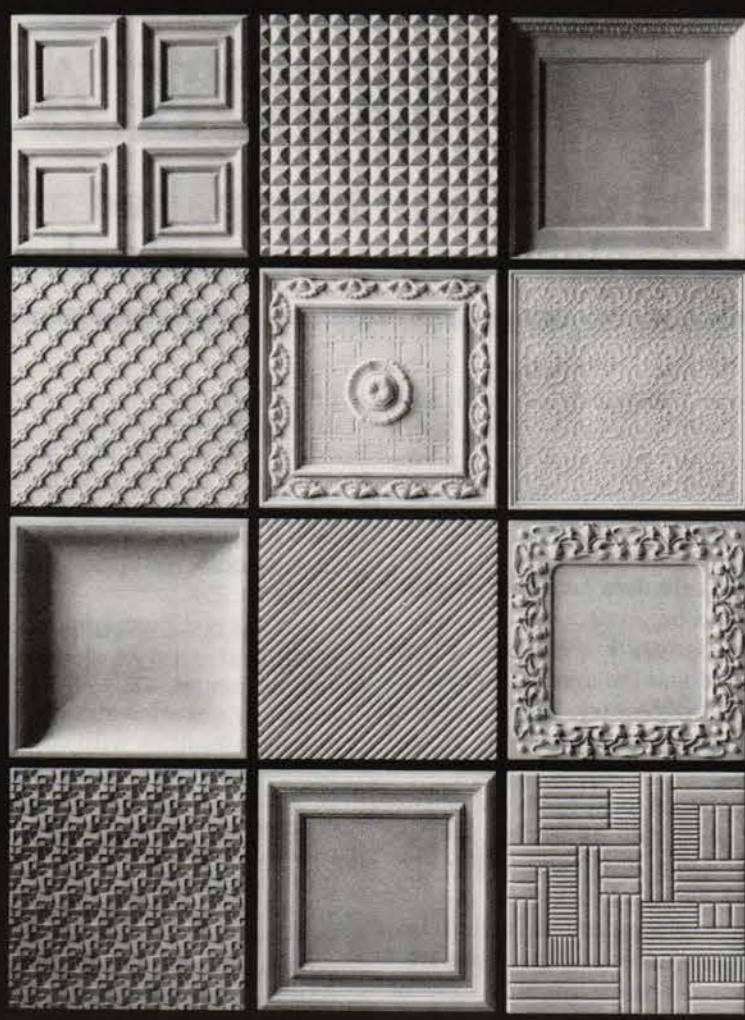
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steel & aluminum windows

A NEW LOOK AT STEEL WINDOWS

Steel windows can be repaired and thermally upgraded. But there are times when replacement is the only choice.

Many thousands of steel windows have been ripped out in the mistaken belief they couldn't be repaired. But experience of the past few years has shown that:

- ✓ Steel windows are an important design element and their original look should be preserved;
- ✓ Many old steel windows can be repaired and thermally upgraded;
- ✓ If necessary, steel windows can be replaced with matching or sensitively designed new windows.

Detailed techniques for repairing and thermally upgrading historic steel windows are contained in *The Window Handbook* (see review p. 15).

If replacement is called for, several companies still produce steel windows. In some cases it may be desirable to make the replacement units from aluminum. *The Window Handbook* gives a detailed review of a commercial rehab in Lowell, Mass., in which the original steel windows were replicated in aluminum by Custom Windows Co. of Denver (see below).

A & S WINDOW ASSOCIATES — Manufactures steel windows in four weights: Residential, Commercial, Standard Intermediate, and Heavy Intermediate. For preservation work, they can match the pre-war 14 in. x 20 in. or 12 in. x 18 in. pivoting ventilator windows. Windows are available with weather-stripping applied into integral grooves in the sections. Windows can be prepared for inside or outside glazing, putty or bead, single or insulated glass. Styles available include casement,

projected, horizontal and vertical pivoted, terrace doors, and security windows. Vertical pivoted windows, when oversized, can be manufactured with tubular ventilator sections. **A & S Window Associates, 88-19 76th Ave., Dept. TB, Glendale, NY 11385 (718) 275-7900. Circle No. 234**

BLISS-CASHIER — Makes traditional metal windows in both steel and aluminum. On restoration jobs, the company's steel windows incorporate old-style muntins with cove detail and narrow sight lines. Old lite sizes are easily fabricated. Their windows have been used on Tax Act projects. Available in two weights: commercial and architectural. Makes both projected and pivoted ventilators, as well as security windows, and casements. Offers custom work and curved heads. **Bliss-Cashier Metal Products, 617 West Manlius St., Dept. TB, East Syracuse, NY 13057 (315) 437-3396. Circle No. 235**

CORAPI CO. — Medium-size window contractor that will repair or replace steel and aluminum windows, although their specialty is wood windows. Mainly handles larger jobs. **Corapi Company, 2307 Oakdale Ave., Dept. TB, Glenside, PA 19038 (215) 887-0556. Circle No. 224**

CUSTOM WINDOWS — Company produces custom aluminum windows and has extensive experience in replicating, in aluminum, old wood and steel windows for preservation and Tax Act projects. (A detailed review of one of their steel window replacement projects is contained in *The Window Handbook*.) Their 8300 Historical Renovation series maintains the ap-

pearance of historical windows, while providing thermal barrier construction and true divided-lite fenestration. Steel windows can be made in casement, projected, and stationary styles. The firm also produces aluminum window systems for commercial, institutional, and industrial buildings — stock and custom. **Custom Window Co., 27700 S. Valjejo, Dept. TB, Englewood, CO 80110 (303) 761-2909. Circle No. 238**

ENVIRON, INC. — Custom design and fabrication of aluminum and vinyl replacement windows for the commercial, institutional, housing, and historical markets. Extensive experience in getting approvals for Tax Act projects. Can also replicate steel windows in aluminum. Has own installation crews to ensure high-quality workmanship when windows are installed. **Environ, Inc., P.O. Box 20808, Dept. TB, Greensboro, NC 27420 (919) 272-3592. Circle No. 241**

HOPE'S ARCHITECTURAL PRODUCTS — Company produces steel windows for new construction or restoration. All windows are custom-fabricated to specific project requirements. Hope's "Jamestown" Series and "Landmark" Series are available in fixed or operable styles. All ventilators come with weather-stripping applied to an integral dovetail groove. "Jamestown" Series windows accept up to 1-in. insulated glass ("Landmark" Series up to 5/8 in.), using snap-in glazing beads. Steel casement doors, 3/4-hr. fire-rated windows, and replacement hardware also offered. All products furnished with factory-applied finishes of urethane, Kynar, or polyester powder. **Hope's Ar-**

chitectural Products, 84 Hopkins Ave., Dept. TB, Jamestown, NY 14701 (716) 665-5124. Circle No. 236

SEEKIRCHER WINDOW REPAIR — A small window contractor specializing in the maintenance and repair of steel windows in the New York metropolitan area. **Seekircher Window Repair, 630 Saw Mill River Rd., Dept. TB, Ardsley, NY 10502 (914) 693-1920.**

TORRANCE STEEL WINDOW — Specializes in steel casement windows and doors in two grades: Standard Intermediate and Residential/Architectural — in both stock and custom sizes. Also produces 3/4-hr. fire-rated windows. The Standard Intermediate line is 1-1/4 in. thick, and includes fixed, projected, and casement designs. For insulating glass, 1/2 in. could be glazed with putty, and the balance provided with a steel bead. The Residential/Architectural line is 1 in. thick, and features residential steel casements. Units can also be used in light commercial construction. Also: Industrial security windows, commercial projected windows, and steel window hardware. **Torrance Steel Window Co., 1819 Abalone Ave., Dept. TB, Torrance, CA 90501 (213) 328-9181. Circle No. 237**

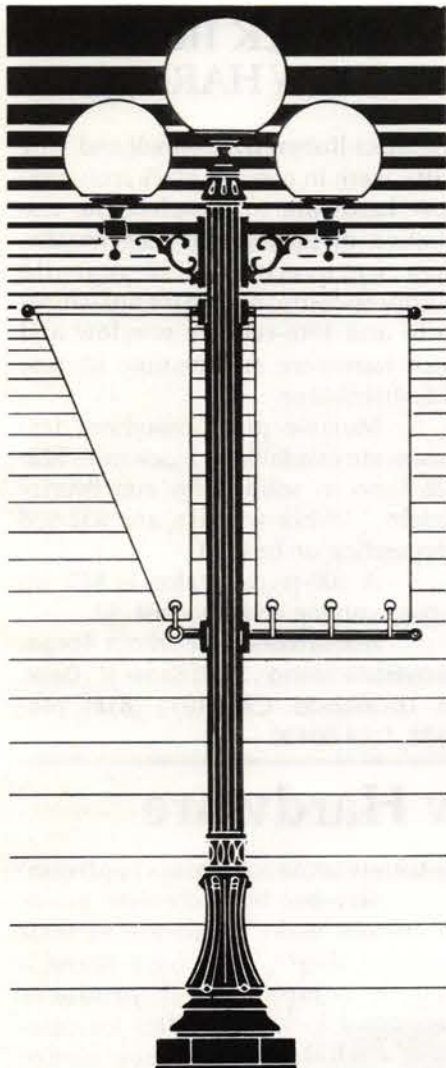
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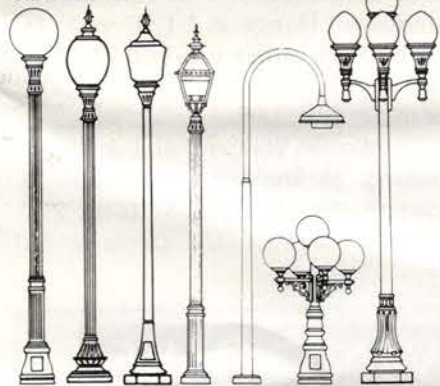


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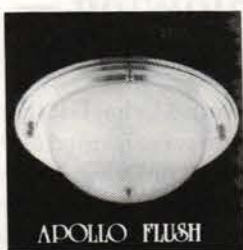
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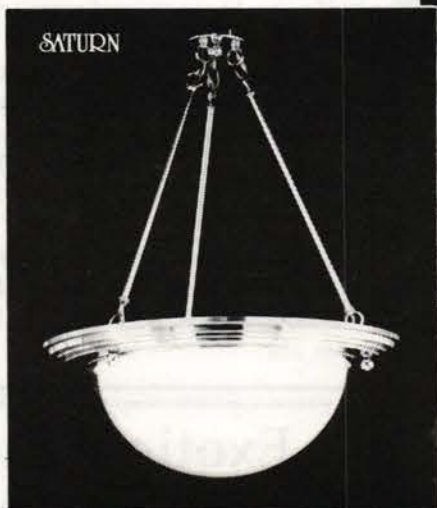
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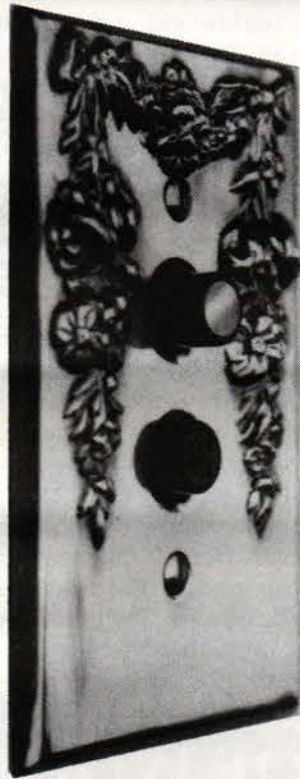
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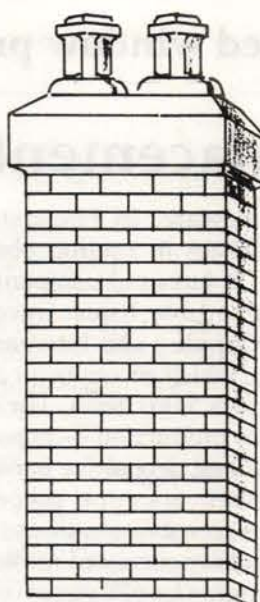
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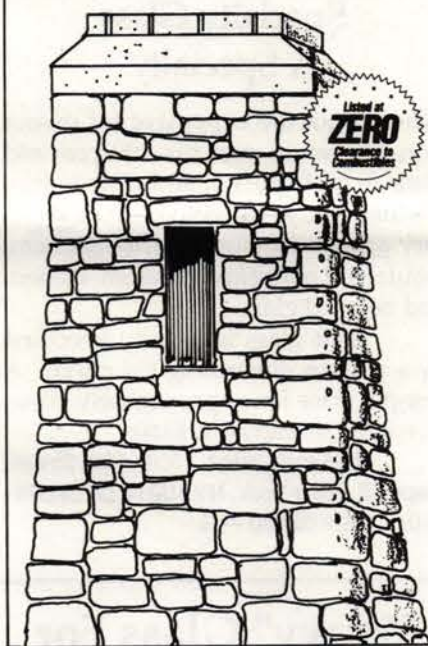
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related window products

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Blaine Hardware, in Hagerstown, Md., specializes in finding obsolete hardware. It buys old companies or defunct product lines (recently Crestline, Cupples, and International Hardware), which accounts for its inventory of over 5,000 items. For items no longer in production — especially ornamental and decorative hardware — Blaine can machine pieces on premises. A recent restoration at Princeton University consisted of Blaine's making patterns for 675 pieces of win-

dow hardware.

The Hagerstown shop is primarily mail order; you send them a sample and written request (including quantity), they send you the part(s), if available, or a recommendation for a substitute. There are also two retail stores in Silver Springs, Md. and Stone Park, Ill. that offer window repair.

Blaine Hardware, 1919 Blaine Drive, Dept. TB, Hagerstown, MD 21740 (301) 797-6500. CSI# 08600 — JL Circle No. 221

NEW ANTIQUE GLASS

If you've heard the term "Antique Glass," you may not know that what is being described is blown glass. At least that's the case with Blenko Glass, suggests owner Richard Blenko. Blenko's Antique Glass is blown sheet glass and is used in stained glass applications, for panes in transoms and sidelights, and for exotic windows.

A fourth generation Blenko and the great grandson of William John Blenko (the first American to produce sheet glass, who also patented a process for creating a ruby sheet glass

that holds the color true), Richard stresses the distinction between blown (antique) and another glass he manufactures, cast (dalles de verre or slab) glass. Slab glass is 1" thick and used in more contemporary designs. Also available are hand-spun rondels used for leaded glass. Antique Glass runs about \$5-\$6 per sq. ft., and dalles de verre is \$5-\$6 per 8" x 12" slab. Both are available as "crystal" (clear).

Blenko Glass, PO Box 67, Dept. TB, Milton, WV 25541 (304) 743-9081. CSI# 08800 — JL Circle No. 219

Specialty Glass A Specialty

When it got too expensive for owner Ron Glazer to run his 100-year-old glass manufacturing and distribution business, he decided to become a factory agent. He now distributes bent, insulated, patterned, custom etched, and beveled glass.

Bent glass is usually specified by a pattern illustrating the curve. A sample price for approximately 10 sq. ft. with a 20" radius is \$200.

RGS Industries, 130 E. 30th Street, Dept. TB, New York, NY 10016 (212) 679-8104. CSI# 08800 — JL

"Wavy" Glass For The Antique Look

For restoration projects that demand authenticity, S.A. Bendheim imports mouthblown Restoration Glass, made using the original cylinder method. The pits and imperfections that define this method give windows an antique look.

The glass comes in two thicknesses: "Full" and "Light." "Full," the more distorting, is 1/8" thick and costs between \$4.99 and \$6.25 per sq. ft. (price depends on size of order.) "Light," 3/32" thick, costs between \$4.10 and \$5.15 per sq. ft.

Recent projects using Bendheim's Restoration Glass include: The Octagon (Washington, D.C.), Trinity Church (Newport, RI), and Strawberry Banke (Portsmouth, NH).

S.A. Bendheim Co., now run by the three sons of its founders (S.A. and Margaret Bendheim), is the oldest importer of stained glass in the United States. It also imports a large variety of specialty glass.

S.A. Bendheim Co., Inc., 67 Willett St., Dept. TB, Passaic, NJ 07055 (800) 221-7379; in NJ (201) 471-1733. CSI# 08800 — JL Circle No. 71

Glass Blowing — A Team Effort

Susan Russell and Michael Kraatz, glass blowers (both were trained at the Rhode Island School of Design), run a glass blowing studio in Canaan, New Hampshire. Among other specialties are authentic bull's-eye glass panels made using the traditional method. The bull's-eye lites are used primarily for transoms, doors, and sidelights.

Although they prefer to quote prices for individual projects, some sample sizes and prices are as follows: 6" x 6" for \$27, 6" x 8" for \$31, 8" x 10" for \$50, 10" x 10" for \$63, and 10" x 12" for \$98.

Kraatz Russell Glass, Grist Mill Hill, RFD 1, Box 320C, Dept. TB, Canaan, NH 03741 (603) 523-4289. CSI# 08810 — JL Circle No. 254

BLACK IRON WINDOW HARDWARE

Architect Robert McDonnell and wife Patty were in need of black iron window hardware to complete the restoration of their home. Eventually, they uncovered a 130-year-old European company that manufactures 18th- and 19th-century window and door hardware and became its sole U.S. distributor.

Mortise plate casement fasteners are available in black iron, \$22-\$26 (also in solid brass and bronze finish). Window stays are \$32-\$38 (depending on length).

A 100-page catalog is \$12; an 8-page catalog and price list, \$2.

Transylvania Mountain Forge, Graystone Manor, 2270 Cross St., Dept. TB, LaCanada, CA 91011 (818) 248-7878. CSI# 08600 — JL

Exotic Window Hardware

Stry-Buc Industries has a catalog filled with hundreds of new and obsolete door and window hardware items that they distribute to manufacturers. Says Cindy Ervin, Sales Manager, "We inventory 10,000 items and have access to an additional 40,000."

Among the stock items are: window balances, mounting hardware, cam handles, weatherstripping, screen and storm window replacement hardware, roller assemblies, vent arms, and more. Most of the pieces are cast bronze (white and red), although they also

distribute some solid brass hardware.

Stry-Buc buys obsolete molds to custom make hardware in their machine shop. They have found a British company that produces decorative locking handles for casement windows, which are now hard to find. Inventory also includes a "tape balance" to be used instead of weights and pulleys; it is inexpensive, yet has been used on some historical renovations.

Stry-Buc Industries, 546 Church Lane, Yeadon, PA 19050 (800) 352-0800 in PA (215) 626-3200. CSI# 08600 — JL

SASH PULLEYS RISE AGAIN

One annoyance when rehabilitating old windows is finding pulleys for the sash weights. The problem was so vexing for U.S. Woodworking that they are now manufacturing their own pulleys.

Housing, flange, and pulley wheel are made from Zytel glass-reinforced nylon resin. Pulley wheel rotates on a brass axle. The entire unit is rustproof, avoiding problems that

arise when steel pulleys corrode and start to bind. The pulley is sized for most institutional and commercial windows: Flange is 1-1/4" wide by 5-7/8" deep; pulley is 2-1/2" dia. The Zytel pulleys are \$7 apiece; discounts for quantity orders.

Warren Weilbacher, U.S. Woodworking, 35 Engineers Rd., Dept. TB, Hauppauge, NY 11788 (516) 234-4910. CSI# 08700. — CL Circle No. 220

EPOXY REPAIR OF WOOD WINDOWS

When confronted with rotting sash and sills, epoxy repair is often the most economical solution. The epoxy process consists of a wood consolidant, which saturates and strengthens rotted wood, followed by an epoxy paste that fills in and reshapes damaged wood. (For a detailed case study on window repair with epoxy, see *The Window Handbook*, reviewed on page 15 of this issue.)

The epoxies listed below are two-part systems. Differences are in curing time, mixing ratio, and viscosity. Check specific products carefully; some epoxies can be sanded, drilled, planed, stapled, nailed, stained, and painted (for example, Abatron's WoodEpoxy), others can't. Epoxies weather well because their chemical properties allow the polymer to shrink and expand with the wood. But all epoxies are sensitive to weather conditions during application; there are some weather conditions that greatly hamper curing.

Note that most epoxies have a two-year shelf life, so make sure that the batch you buy is fresh. Following are leading suppliers of wood epoxy systems; free literature is available.

✓ **ABATRON, 33 Center Drive, Dept. TB, Gilberts, IL 60136 (312) 426-2200.** The largest supplier of epoxies to the restoration market. Their epoxy is convenient for site use because the ratio of resin to hardener is 1:1 (you can eyeball the measure.) Prices are: 1 gal. of wood consolidant (LiquidWood), \$52.50; 1 gal. paste (WoodEpoxy), \$48.00. Quantities in pints, quarts, gallons, and 5 gallon pails. *Circle No. 130*

✓ **CONSERVATION SERVICES, 8 Lakeside Trail, Dept. TB, Kinnelon, NJ 07405 (201) 838-6412.** Their epoxies are more flexible than wood so they don't shear. The consolidant has a low viscosity for deep penetration into the wood. 1/2 gal. of consolidant, \$55 and 7/8 gal. (4 liters), \$68. *Circle No. 175*

✓ **DELL CORPORATION, P.O. Box 1462, Dept. TB, Rockville, MD 20850 (301) 279-2612.** A general contracting firm that distributes the Beta Epoxy system. Their low-viscosity (flows like water) consolidant (E1200 - parts A and B) comes in a 1-liter unit and is \$21.65. The filler (FM-250C) comes as a powder and mixes with the consolidant to make 10 oz., \$2.80 a bag. They also sell Rottex (good for cosmetic work), which is two-part paste epoxy mixed in a 1:1 ratio; 2.2 lbs. is \$18.60. *Circle No. 218*

✓ **GOUGEON BROTHERS INC., 100 Patterson Ave., Dept. TB, Bay City, MI 48706 (517) 684-7286.** Manufacturer of West System epoxy; largest supplier of epoxies to marine construction and repair market. The focus of their recipe: strength and water resistance. One qt. of 105 Resin and .44 pt. of 205 Hardener are mixed in a 5:1 ratio, \$16.85 and \$7.45 respectively. 406 Colloidal Silica (dry filler added to the mixed resin and hardener to form an adhesive paste), \$4.50 for 1.9 oz. Low-density 410 Microlight (dry filler mixed with resin and hardener to form an easily sanded filler), \$5.90 for 2.3 oz. They also sell gloves, brushes, application tools, and pre-calibrated dispensers for easy site use, \$7.00/pr. *Circle No. 246 — JL*



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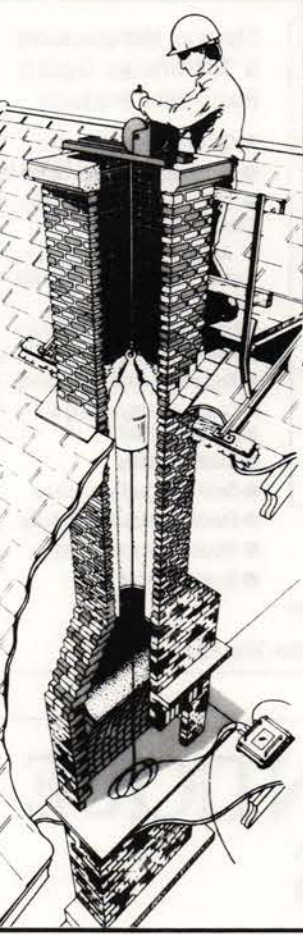
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
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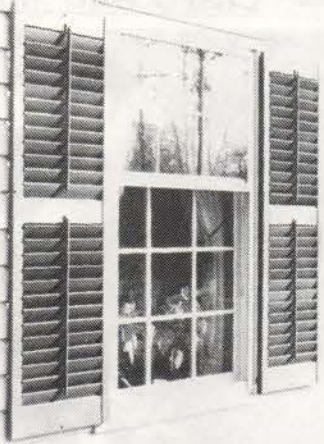

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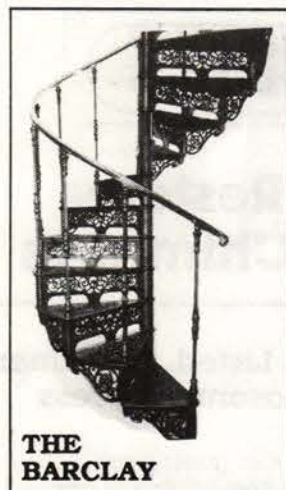
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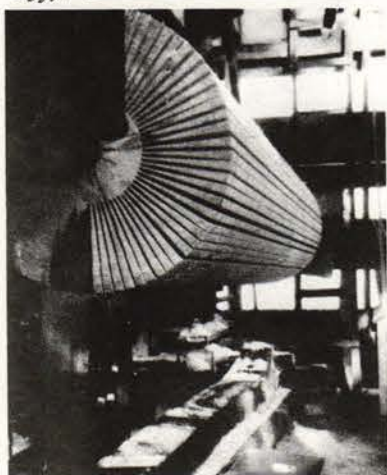
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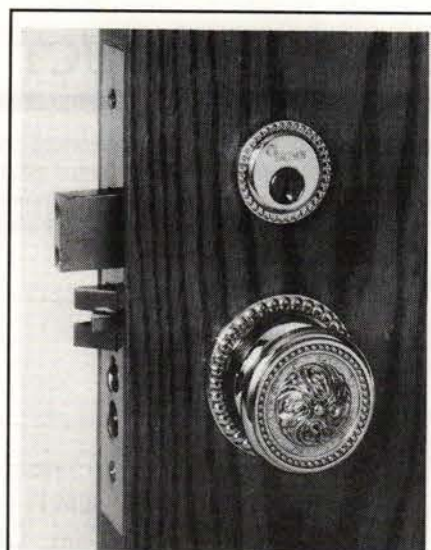
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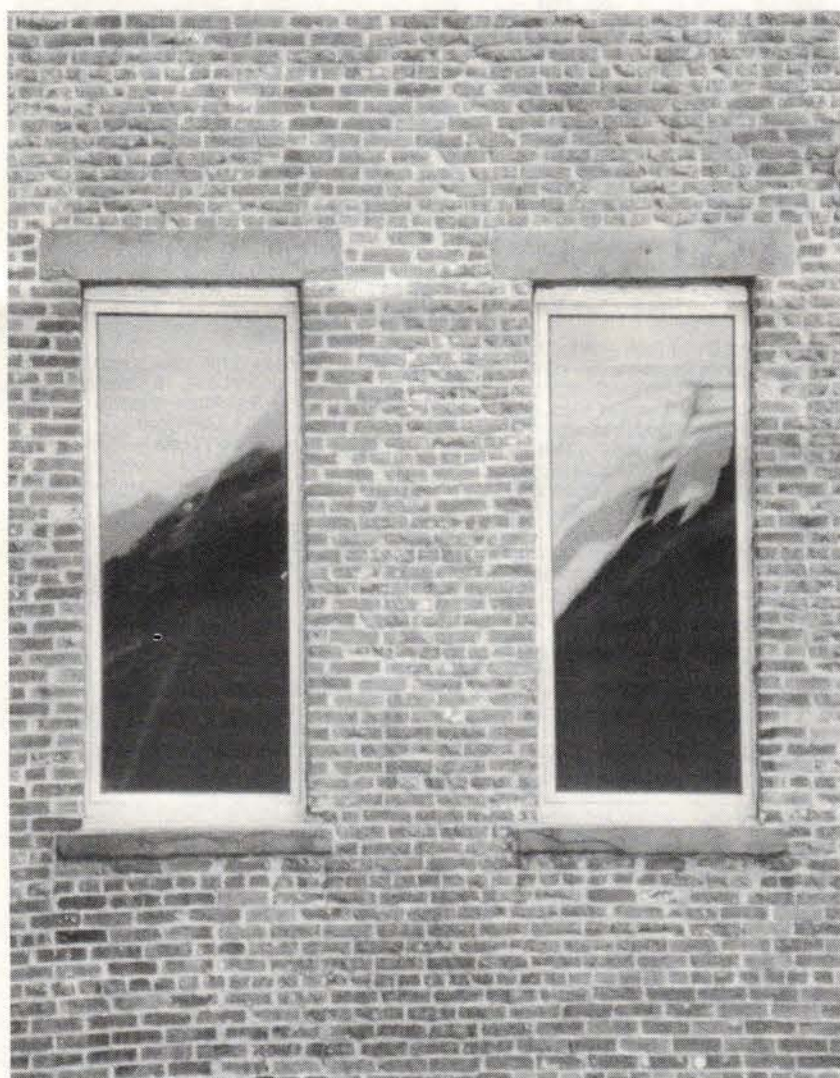
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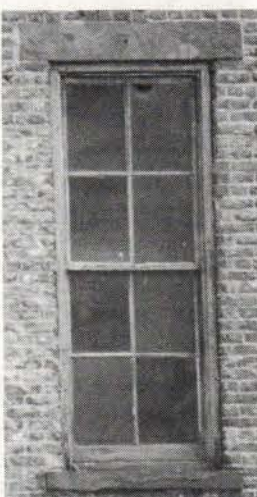


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Since this renovation was not a Tax Act project, the Secretary Of Interior Guidelines did not apply. But one can always hope that, in the absence of The National Park Service looking over one's shoulder, common sense will nevertheless prevail. Not in this case, alas.

— Submitted by Irwin Fields, New York, N.Y.

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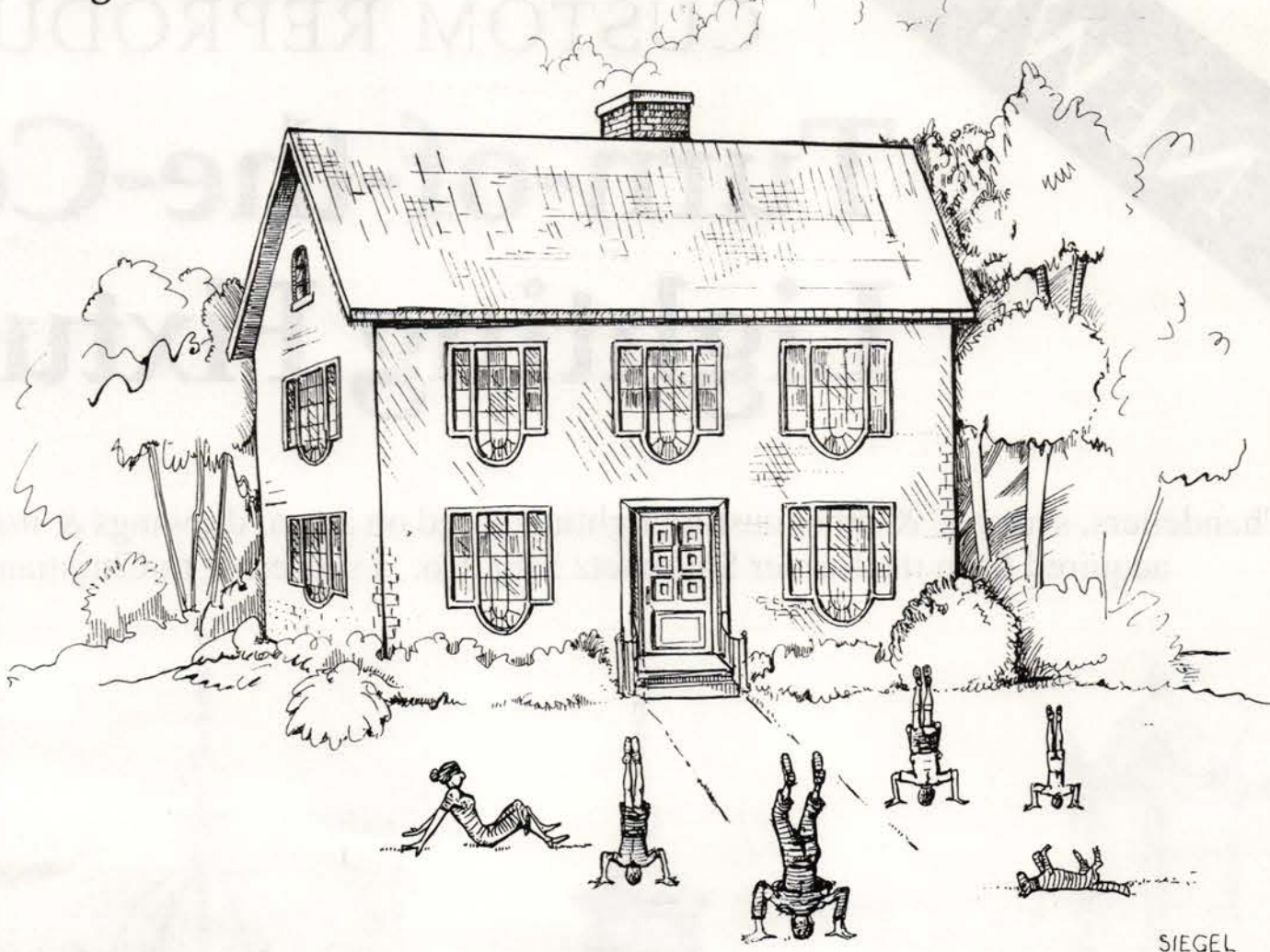
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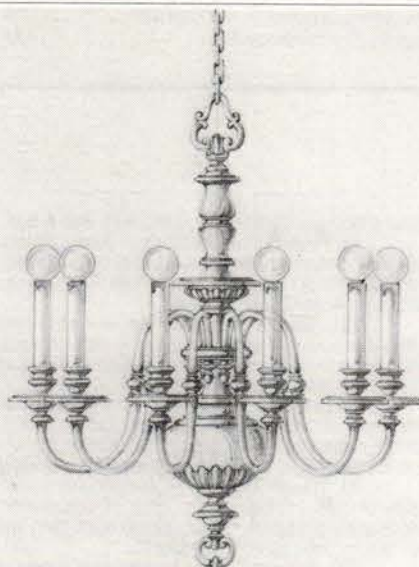
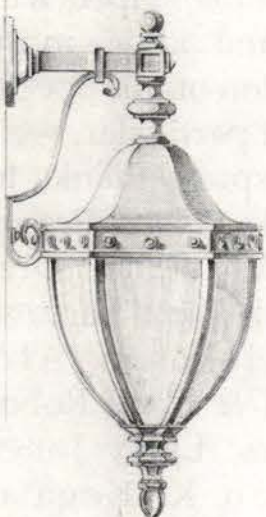
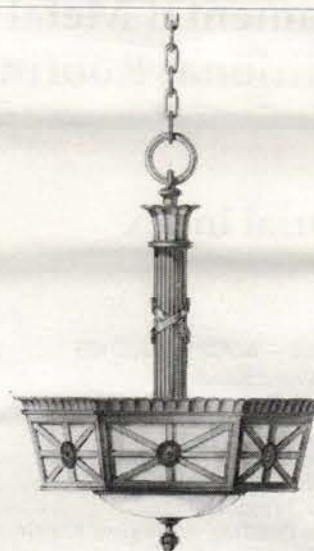
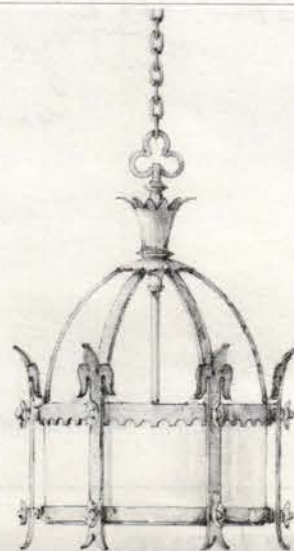
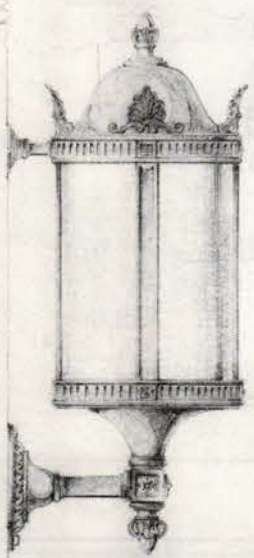
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