LAWRENCE-WENTWORTH HOUSE
Lowell, Massachusetts

The Lawrence-Wentworth House, originally the home of one of Lowell's antebellum mill owners, has had numerous alterations and changes in use since its construction in 1831. Its original Greek Revival street facade was altered sometime after the Civil War to such an extent that it appears more Victorian than Greek Revival.

Beginning at the turn of the century, the single family residence was converted to a boarding house, a succession of commercial uses, and finally to offices for a social service organization. Sometime during this series of changes, the Victorian double-hung wooden sash on the first floor were replaced with mill finish aluminum jalousies as shown in the above photograph of the rear facade. The Victorian wooden sash, consisting of a two-over-two (2/2) light configuration, survived on the second floor.

After experiencing several years of sizable increases in energy costs, coupled with the inherently poor thermal performance of the jalousie sash on the first floor, the owner, Unitas, Inc., a service organization to Lowell's Hispanic community, came to the Lowell Historic Preservation Commission requesting assistance in replacing these visually obtrusive and thermally inadequate windows.

Design Problem
The Victorian 2/2 sash on the second floor were still in serviceable condition and were already fitted with storm windows. Consideration was therefore given to the installation of 2/2 replacement sash and frames on the first floor that would match the visual qualities of the remaining historic windows and at the same time incorporate the energy efficiency features of double glazing and weather stripping. Another important goal was to reduce cost without altering the appearance of the windows or affecting their performance.

Design Solution
Studies have shown that when treated with a water repellent coating, and properly fabricated and installed, new wood windows will provide long service. Since the exterior wood siding, trim, upper floor windows and painted masonry would all require periodic repainting, this maintenance consideration was not a major factor in the decision to install wooden replacement windows.

A full-scale measured drawing was made of an existing second floor window as a guide in detailing the replacement window. This investigation revealed that the single-glazed 2/2 sash were 1 3/8" thick, and that the entire width of the box frame was exposed on the exterior.

In reaching the decision to install wooden windows, the important techni...
The ten new windows were to be delivered fully primed and assembled. Of the ten windows, six were detailed for masonry openings and four for frame openings. No more than two windows were the same size, and there were seven different sizes in all. Only the six principal windows, averaging 21 square feet each, were of 2/2 configuration. Replacements for the four smaller jalousie windows, positioned in less prominent rear or side locations, away from the front of the building, were designed in 1/1 light configuration, but were otherwise identical to the larger windows.

Two types of a commercially-available rigid metal weather stripping, formed from rolled zinc sheets, were installed in preference to a less permanent vinyl, foamed plastic, or spring-metal weather stripping. At the heads, jambs and sills, the weather stripping consists of a continuous flange over which fit the grooved rails and stiles. At the meeting rail, the weather stripping consists of two interlocking hooks (see figure 2). The weather stripping protrudes only a short distance above and below the meeting rails along the jambs and is almost totally concealed when the windows are shut. It is extremely durable and is virtually unaffected by corrosion or chemical decomposition.

The spiral balances also allowed the use of a less expensive L-shaped, shop-fabricated frame, and the look of the historic box frame was accomplished with masonry-anchored nailers, steel framing clips, and flat interior casing stock (see figure 1). The new wooden frame was thus identical in appearance to the historic frame on the building. The width of the historic frame was reproduced along with the wooden brick molding used to trim the exterior of the masonry openings (see figure 4).
Project Costs

The ten windows were fabricated to specification, including such features as wood preservative treatment and sash locks, for $2520 ($13.40 per square foot).

The installation work, undertaken in 1983, included preparation of the window openings; installation of the windows and interior stops; and the attachment of exterior brick molding and all interior trim, which had been selected from flat or molded stock. Priming unprimed elements and caulking were also included in the installation work, which totaled $1800 ($9.52 per square foot).

Total cost of the ten windows less finish painting, which was done as part of the general exterior repainting, was $4320 ($22.92 per square foot). Wooden frame half screens mounted on the interior and set in aluminum tracks were also furnished and installed for a total of $490 for the ten windows.

Project Evaluation

The window work on the Lawrence-Wentworth House shows the practicality of replacing windows on a selective basis. In replacing only the first floor windows, significant cost savings were achieved and the 2/2 Victorian windows on the second floor were saved. This project clearly shows that energy conservation and other cost-reducing measures can be achieved in replacement windows that reproduce the visual qualities of the historic windows.

The use of spiral balances and insulating glass, the increase in the sash thickness, modifications to the box frames, and the slight widening of the integral wood muntin were accomplished in a sensitive way in keeping with the Secretary of the Interior's "Standards for Rehabilitation." This approach has limitations, especially when dealing with very thin historic muntins, where to accommodate the weight of insulating glass and for suitable glazing, the width of the muntin would have to be increased substantially. In many cases, however, involving two- and four-light sash, this application can be adopted without perceptibly increasing the width of the muntin or diminishing the historic character of the window.
Figure 4. The new wooden windows on the first floor with insulating glass installed closely matched the historic windows which were preserved on the upper floor. Photo: Charles Parrott

This PRESERVATION TECH NOTE was prepared by the National Park Service in cooperation with the Lowell Historic Preservation Commission, and the Center for Architectural Conservation, Georgia Institute of Technology. Charles E. Fisher, Preservation Assistance Division, National Park Service, serves as Technical Coordinator for the TECH NOTES. Special thanks go to the following people who contributed to the production of this TECH NOTE: John H. Myers, Center for Architectural Conservation, Penelope S. Watson of the Lowell Historic Preservation Commission, and Preservation Assistance Division staff, particularly Michael J. Auer, Martha A. Gutrick, and Mae Simon. Photo on page 1 by Jim Higgins.

This and many of the TECH NOTES on windows are included in “The Window Handbook: Successful Strategies for Rehabilitating Windows in Historic Buildings” (available late 1984), a joint publication of the Preservation Assistance Division, National Park Service and the Center for Architectural Conservation, Georgia Institute of Technology. For information, write to The Center for Architectural Conservation, P.O. Box 93402, Atlanta, Georgia 30377.

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ISSN: 0741-9023

PTN-6 January 1984