



FLORIDA STATE CAPITOL

Tallahassee, Florida

The old Florida State Capitol, constructed in the 1840s and greatly enlarged over the years, has recently been rehabilitated for use as museum space and government offices. The neo-classical revival building has been returned to its 1902 appearance and is individually listed in the National Register of Historic Places.

Photographs in the Florida Photographic Archives show that as early as the 1890s decorative awnings had been installed, replacing shutters as sun screens. Wide-striped red and white operable awnings can be seen in postcards as early as 1902. By World War II, air conditioning units had been added to the building, and the awnings had been removed.

When rehabilitation plans were drawn up for the building, the initial intention was not to duplicate the awnings. Energy studies, however, showed that significant cost savings could be achieved by installing the awnings, and today the building stands with this highly colorful feature added.

Rehabilitation Design Problem

The effective use of awnings to reduce solar heat gain can be found on numerous historic buildings during the late 19th and early 20th centuries, and it still is a treatment with practical applications in certain climates. In hot climates awnings can eliminate the need to alter or replace existing historic windows for reasons of improved energy performance while also

reducing glare; can provide rain protection for windows opened for ventilation; and can bring a bright, cheerful addition to a building. Given the high visibility of such a window treatment, research should be undertaken to ensure that awnings previously had been used on the building; care should be taken to match the size, design, color, and basic appearance of the historic awnings where possible.

The Florida State Capitol project is a good example where replication of the awning treatment was undertaken primarily because of the cost savings realized through reduced energy usage.

The architect and the mechanical engineer for the work at the Capitol were concerned from the outset about the high cooling load created by the large glass area on the building's facade. The cooling load required to handle the solar gain from the 138 windows that measured 4' by 10' each was calculated at 55 tons. There were also significant air infiltration problems due to a lack of weatherstripping and window maintenance. It was estimated that mechanical equipment with a capacity of 102 tons refrigeration (which includes the 55 ton load for just the windows) would be needed to cool the 46,501 square feet of building area, and concern was expressed that the air velocity from such a system might have created drafty conditions in the smaller offices within the building. An engineering study of two offices on the west facade of the building showed that 72% of

PRESERVATION

Tech Notes

NATIONAL PARK SERVICE
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WINDOWS

NUMBER 7

Window Awnings

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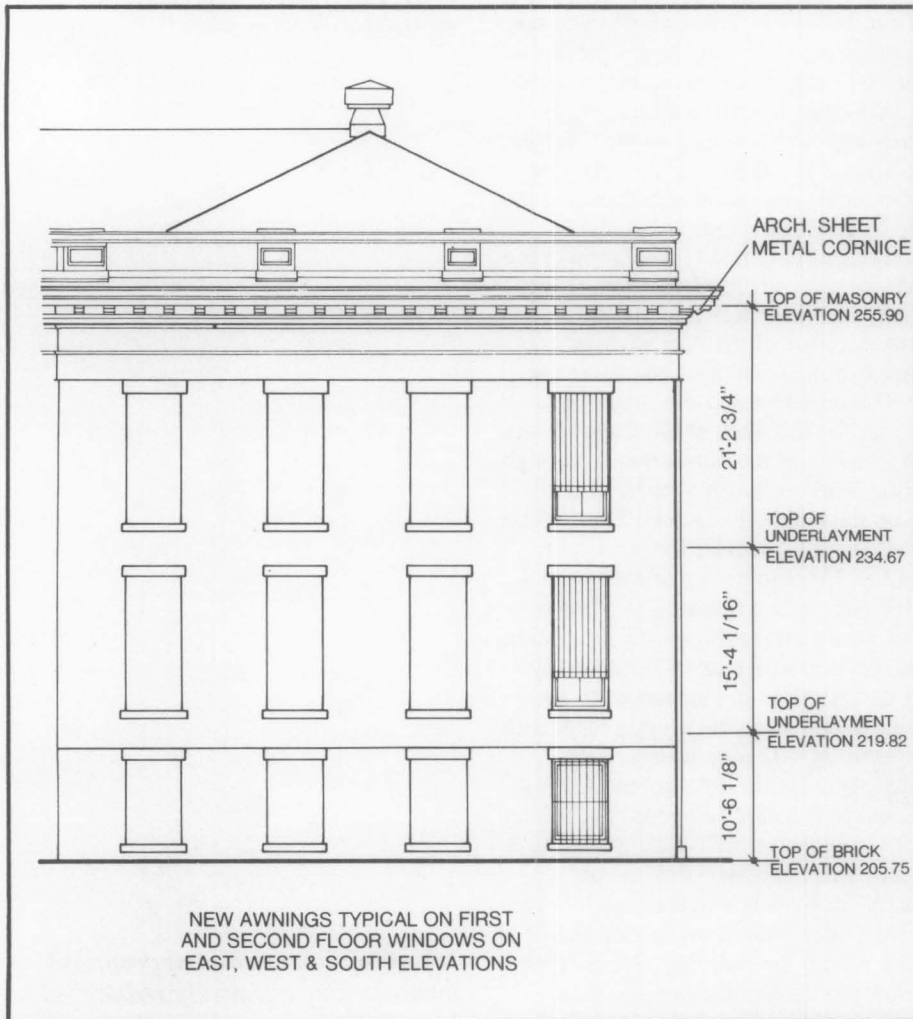
Preservation Assistance Division
National Park Service

Installing historically appropriate awnings can effectively reduce solar heat gain.

the required cooling load in a typical first floor office and 56% of the load in a typical second floor office was due to exposed glass surface. With the windows contributing to 54% of the overall air conditioning load, some measures were necessary to reduce the heat gain from the windows.

Some of the sash were in good condition, and it would have been possible to add tinted heat-absorbing insulating glass by rabbeting out the existing sash frames. Alternatively, tinted glass could have been installed both in existing sash that were repairable as well as in the numerous sash replacement units needed. There were concerns, however, over such visual changes to the historic appearance of the building; finally, cost considerations were an important factor weighing against the use of insulating and new tinted glass. Rising energy costs and the savings from the reduction in the size of the HVAC system made the reinstatement of the awnings both a practical and economical alternative.

Figure 1. Large awnings were specified for all but the north elevation in order to reduce solar gain. Drawing: Courtesy, Shepard Associates, Architects and Planners, Inc.



Rehabilitation Design Solution

It was determined that installation of the awnings would appreciably reduce heat gain and cut energy consumption during Florida's long hot weather season and also enable the Capitol project to remain within its \$7 million budget. This was possible, despite the purchase cost of the awnings, in part because of the cost savings resulting from the ability to reduce the size of the HVAC system. The size, shape and installation angle of the original awnings as shown in the archival records were duplicated in the new work.

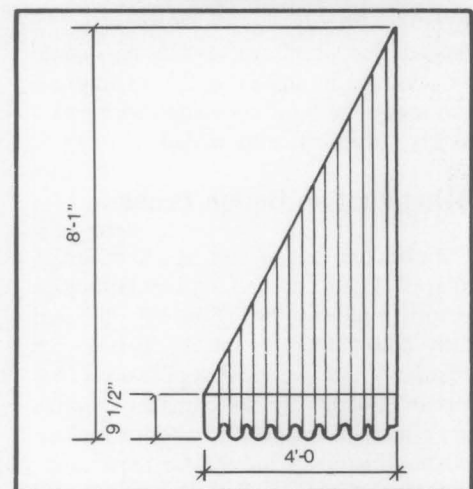
Since the primary facades of the Capitol faced east and west, awnings were needed on the two main floors on all but the north side (see figure 1). Solar heat gain, which originally would have consumed 54% of the required cooling load, was now estimated to be 31.5% of the equipment load, and allowed a downsizing of the HVAC system by 25 tons. In typical first floor offices, the exposed glass surface would now only account for 46% of the required cooling load down from 72%. On the second floor, there was a similar change from 56% down to 30%.

Fabrication And Installation

A decision had to be made on the type of material to be used for the awnings. Canvas awnings had been used on the building from the 1890s through the 1930, but records showed that the canvas lasted only three to four years in the Florida climate. A modern material of acrylic fibers with an eight-year life expectancy was selected instead to reduce the long-term maintenance needs. A local marine products company was located that sold the acrylic fabric.

The awnings were fabricated to the architect's design of 4' wide by 4' deep with a height of 8'-1" and a 9 1/2" scalloped valance (see figure 2). The 100% acrylic fabric has vertical stripes four inches apart. Regrettably the production of the acrylic weave did not allow for pure color separation, and as a result the striping is in reality red and a very light pink; still the impression of red and white is maintained.

Figure 2. Early photographs were used in determining the appropriate design and size of the new awnings shown in the photograph. Drawing: Courtesy, Shepard Associates, Architects and Planners, Inc.; Photo: Courtesy, Florida Bureau of Historic Preservation.



The awning fabric can be readily removed from the frame for replacement and cleaning. Standard galvanized steel awning frames designed to draw vertically against the window frame were used. Since the windows in the Capitol were sealed shut for weatherization purposes and to keep a more constant load demand on the HVAC system, the pivoting points on the standard frames were easily made rigid, preventing retraction of the awnings.

The decision to fix the awnings in a fully opened position did have some cost trade-offs, since solar gain through the windows during the short cold weather season would have been desirable. There also would be an advantage to be able to adjust the awnings to allow natural light when the rays of the sun were not directly shining on the windows. In addition, the viewing area through the window would be permanently reduced in the upper portions of the windows. Operable awnings could have been provided by having the mechanical opening hardware extend through to the inside. This more costly feature was not selected for use in the Capitol.

The hardware for the awnings, including the anchors and attaching devices, were primarily galvanized or zinc plated steel. Prior to installation, the contractor was required to examine the windows and to correct any condition that might have prevented proper installation of the awnings.

Cost

Eighty-four awnings were purchased for the Capitol; eighty-two were installed on the two main floors throughout all but the north side of the building. The remaining two were saved for replacement needs. The cost of material and installation was \$26,500—approximately \$315 per large window. Along with the benefits of energy savings as a result of reduced heat gain during the long warm weather season, the awnings have eliminated the problem of glare in the main ceremonial spaces of the building. In certain rooms, the awnings also have eliminated the need to purchase and maintain interior shades or draperies (see figure 3).

The awnings are proving to be cost effective with a full payback projected within 3 to 4 years (even counting the projected high maintenance cost), largely because of the reduced energy consump-

Figure 3. By reducing the glare and solar gain, the awnings have eliminated the need to purchase and maintain interior shades and draperies in various offices. Photo: Courtesy, Florida Bureau of Historic Preservation.

tion and as a result of the downsizing of the HVAC system.

Project Evaluation

The Florida State Capitol project has shown that awnings can be an effective means of reducing heat gain. Commonly used in the past as a passive design feature to keep a building cool, awnings have received renewed interest in the 1980s because of their energy-conserving qualities.

The use of the acrylic fabric as a substitute material for the original cotton duck canvas avoided the problem of shrinking that canvas exhibits. Moreover, acrylic is not affected as badly by mildew. It is also anticipated that the reinstallation of the awning with their protective overhang will provide some additional cost savings through extended life for the windows.

The decision to make the frames rigid to prevent retraction of the awnings on the Florida State Capitol did prove to be unwise, since seasonal high winds, exacerbated by large adjacent new construction, caused greater damage than had been anticipated. To correct this condition, the windows, which had been screwed shut and sealed, were easily reopened; the awnings were rigged so that they can be drawn back in high winds; and various sleeves and pins were removed from the frames, returning them to their original operable condition. Now whenever inclement weather is anticipated or more sunlight is required in certain rooms, maintenance personnel can

easily retract the awnings. The awnings now are performing admirably and this highly distinctive historic feature has generated considerable local interest (see figure 4).

Figure 4. While the awnings were installed in order to save on energy costs, the restoration of this highly decorative and colorful feature enhances the historic appearance of the building. Photo: Courtesy, Florida Bureau of Historic Preservation.



PROJECT DATA

Building:

Old Florida State Capitol
Capitol Complex
Tallahassee, Florida

Owner:

State of Florida

Project Date: 1979-1982

Project Team:

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Tallahassee, Florida

Florida Bureau of Historic Preservation
Preservation Consultants
Division of Archives, History and
Records Management
Department of State
State of Florida

Materials:

Awning Fabric and Hardware-
Jacksonville Ship Chandlery
Jacksonville, Florida

Project Costs:

The 84 awnings cost \$26,500; approximately \$315 apiece fabricated and installed.

This PRESERVATION TECH NOTE was prepared by the National Park Service in cooperation with the Center for Architectural Conservation, Georgia Institute of Technology; funding assistance was provided by the Office of Solar Heat Technologies, Conservation and Renewable Energy, U.S. Department of Energy. Charles Fisher, Preservation Assistance Division, National Park Service, serves as Technical Coordinator for the PRESERVATION TECH NOTES. Information on the awning installation work at the Florida State Capitol was contributed by Herschel E. Shepard, FAIA, who served as the restoration architect for the project; James M. Hammond, Mechanical Engineer with Evans and Hammond Inc.; and David E. Ferro, Preservation Architect, Division of Archives, History, and Records Management, State of Florida. Thanks also go to the following people who contributed to the production of this Tech Note: John Myers, Center for Architectural Conservation at the Georgia Institute of Technology, and Preservation Assistance Division staff, particularly Michael J. Auer, Martha A. Gutrick, Brenda Johnson, and Mae Simon. Cover, Florida State Capitol Photo: Courtesy, Florida Bureau of Historic Preservation.

This and many of the PRESERVATION 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.

PRESERVATION TECH NOTES are designed to provide practical information on innovative techniques and practices for successfully maintaining and preserving cultural resources. All techniques and practices described herein conform to established National Park Service policies, procedures, and standards. This Tech Note was prepared pursuant to the National Historic Preservation Act Amendments of 1980 which direct the Secretary of the Interior to develop and make available to government agencies and individuals information concerning professional methods and techniques for the preservation of historic properties.

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