Session Track: Sustainable Heritage Conservation
Session Code: CS09a

Paper: Monitoring and Analysis of the Thermal Performance of Replacement and Restoration Window Treatments

Presented by
Bradford Carpenter
Simpson Gumpertz & Heger, Inc.
Rockville, MD USA

Speaker(s) Biography
Bob Score is a Project Architect at Harboe Architects in Chicago, Illinois with over fifteen years of experience in historic preservation architecture. He has work on the restoration of commercial and cultural properties throughout the United States. Mr. Score is active in the preservation field. He was chair of the Historic Resources Committee of the Chicago Chapter of the AIA from 2000 to 2002. He also was a Director of the Association for Preservation Technology from 2006 to 2008. Mr. Score is currently helping to found the Western Great Lakes Chapter of the Association for Preservation Technology. Mr. Score speaks regularly to various professional organizations and at conferences on preservation topics. Some of his recent projects include: Sullivan Center Cast Iron Restoration and Cornice Restoration, Unity Temple Preservation Master Plan, Marquette Building Cornice Restoration and Lafayette Building Renovation.

Brad Carpenter is a Senior Engineer in the Building Technology group of the Washington, D.C. office of SGH. Before joining SGH, Brad worked at Newport News Shipbuilding designing mechanical systems for nuclear submarines and aircraft carriers. Following graduate studies in preservation technology at Virginia Tech, Brad gained two years of experience with the Architect of the Capitol in Washington, D.C. where he managed numerous restoration and renovation projects at the U.S. Capitol Complex. During his seven years at SGH, he has participated in numerous projects involving investigation, repair and rehabilitation, and new design of building envelopes. Brad has investigated and designed repairs at numerous historic structures such as the US Capitol complex including the Library of Congress, House and Senate Office buildings as well as the New York State Capitol, The Renwick Gallery of the Smithsonian, the Old Medical School building at the University of Virginia as well as the culturally significant Leigh Street Armory in Richmond, VA.

Abstract
The Lafayette Building was built in 1940 to serve as the headquarters of the Federal Loan Agency and the Reconstruction Finance Corporation (RFC) in Washington DC. The building is listed on the National Register of Historic Places as a contributing structure in the 15th Street Historic District. It is also listed as a National Historic Landmark, as part of the World War II and the American Home Front theme.

The Lafayette Building still retains its 1200 original painted steel, double hung windows. As part of a larger building renovation project, Harboe Architects and Simspon Gumpertz and Heger designed and conducted analysis of two window treatment mock-ups at the Lafayette Building. The purpose of these mock-ups was to fully develop two alternative treatments for the most typical window condition at the Lafayette Building and then gather quantitative data about both treatment options. This information was used to identify the advantages and disadvantages of the two options and to recommend which window treatment should be included in the Lafayette Building Modernization. In addition, this project was designed to obtain a LEEDs Silver rating. The treatment of the windows and their thermal performance was an integral part of the sustainable design effort for this project.

One of the mock-ups included the restoration of an original steel double hung window with the addition of a new interior blast resistant storm window. The second mock-up included removing an original steel double hung window and replacing it with a new blast resistant, thermally broken aluminum window with insulated glass. The new window closely matched the original configuration, dimensions, profiles and sight-lines of the original window.

The completed mock-ups were tested for air and water infiltration. In addition, the thermal performance of the two window systems was monitored from March 2006 through July 2006 in order to compare the thermal performance of the two alternatives and to identify the potential for condensation at both systems.

After the construction of the mock-ups was completed, magnitude of estimated costs was prepared.

Analysis of the completed mock-ups and testing program identified that restoration of the original windows provided better thermal performance and lower project cost than the alternative replacement windows.

This presentation will present the restoration and replacement options that were considered and the testing and analysis program that was conducted to identify the expected thermal performance of the two options. It will also identify lessons that were learned by constructing and testing the mock-ups of the options. This presentation will provide analytical data that demonstrates that restored window treatments can be designed to provide better thermal performance than replacement widows at a lower construction cost.7

Session Track: Sustainable Heritage Conservation
Session Code: CS09b

Paper: The Sustainable Preservation of Our Modern Legacy: Process and Collaboration at the AIA Headquarters

Presented by
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Tina Roach, AIA LEED AP
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Speaker(s) Biography
Tom Jester, AIA, is a Project Manager at Quinn Evans | Architects in Washington, DC. With more than 15 years of experience, Mr. Jester has been involved in numerous adaptive use and restoration projects and has prepared a number of master plans and historic structures reports. He holds a Master of Architeture from the University of Maryland, a Master of Science in Historic Preservation from the University of Pennsylvania, and a BA in American Studies from Colby College. He served as the editor of Twentieth-Century Building Materials: History and Conservation (McGraw-Hill, 1995), the first major book on the subject. Mr. Jester was also instrumental in organizing the Preserving the Recent Past and PRP II Conferences. A frequent speaker on the topic of preserving modern era buildings, he currently cochairs the APT Technical Committee on Modern Heritage.

Tina Roach, AIA, LEED AP, specializes in building renovations and sustainable design. For the past 10 years at QE|A, she has participated in the restoration, renewal, and greening of university buildings, public schools, a landmark market, and the AIA Headquarters building. She is an active member of the APT Technical Committee on Sustainable Preservation, and has presented on the topic locally.
Education:
University of Texas at Austin, Master of Architecture, 1998
Certificate in Historic Preservation
University of Chicago, Bachelor of Arts in Art / Architectural History, 1990

Abstract
Modern era buildings present new and different stewardship challenges from a technical and philosophical perspective, but opportunities also exist to renew and preserve this part of our building stock in a sustainable manner. Buildings from the modern era, particularly those from the post war era to the 1970s, are rapidly reaching the age where renewal is necessary. For these reasons, it is critical that approaches to making modern heritage buildings sustainable be developed.

This paper will present the integrated design process used by Quinn Evans | Architects to develop the American Institute of Architects Headquarters (AIA HQ) Renewal Master Plan, and describe the master plan recommendations for the sustainable renewal of the AIA Headquarters and its historic campus. The AIA HQ was designed by The Architects Collaborative and completed in 1973. Built at a time when energy was cheap, the building includes many features that are not inherently sustainable. Although the building is not yet a designated landmark, the master plan addressed the stewardship of a future landmark building as the greening agenda was pursued.

The paper will stress the importance of an interdisciplinary design team and the collaboration that is essential when undertaking a sustainable preservation project involving a significant modern era building. A three-day greening charrette provided opportunities for many disciplines to explore conflicts and synergies between various sustainability and stewardship issues and scenarios. Experts in energy modeling, HVAC design, life cycle, water cycles, lighting, landscape architecture, workplace design, and owner s representatives worked with Quinn Evans to consider state-of-the-shelf and state-of-the-art greening technologies that could be applied to the AIA HQ and balanced with the building s stewardship values.

The AIA asked the team to go beyond LEED, a common benchmark for greening buildings today. One primary goal was to reduce fossil fuel consumption by 50% by the year 2010 and to promote further reductions by 10 percent or more in each of the following five years. The first step toward this goal was to develop a baseline computer energy model that identified the total electricity and natural gas consumed by the existing building systems and plug loads, as well as assessment of inefficiencies or opportunities. Next, the energy model was used to test design options window modifications or replacement, wall or roof insulation, and other envelope and systems modifications. The relative energy efficiency benefits were then weighed against stewardship, daylight quality and quantity, and life-cycle considerations.

The future of sustainable preservation lies in the charrette process and tools such as computerized energy modeling and water inventory, alongside future tools such as life-cycle analysis and computerized daylight modeling. This paper will demonstrate how an interdisciplinary and scientific approach that benefits from computerized simulations can enable informed decision-making weighing stewardship of historic fabric and spaces alongside energy efficiency, reduced consumption of fossil fuels, a net-zero-water footprint, and improved workplace environments that reduce absenteeism and increase productivity.7

Session Track: Sustainable Heritage Conservation
Session Code: CS09c

Paper: LEED + Tax Credit = Green + Green

Presented by
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Speaker(s) Biography
Ward Bucher, AIA, is a Principal of Bucher/Borges Group PLLC, an architecture firm based in Washington, DC. His 36 years of experience includes hundred's of preservation projects. He is also the author of the Building Preservation Dictionary.

Abstract
This paper will focus on the inherent conflicts between the goals of historic restoration and sustainable construction. The specific strategies employed for each goal will be discussed as well as the cost implications of these alternatives. The processes for LEED certification and tax credit applications will be summarized.

Two different projects will be used as examples: the restoration of a 19,000 square foot National Register listed house as a multi-cultural center and the restoration of a circa 1754 store as a non-profit office building.

The first project was designed as a state and federal tax credit project and a LEED Gold project. Typical conflicts included:
" Light colored roof required for LEED credit vs. historically correct color
" Need for large assembly space vs. historic layout
" Increased outside fresh air intake vs. original openings
" Fresh air ventilation with single pane windows vs. insulated windows
" No air conditioning and inefficient radiators replaced with typical ducted central HVAC vs. high-efficiency, individually controlled heating and cooling
Specific solutions included underground addition with green roof, geothermal heating and cooling, non-irrigation landscaping with native plants, air intake through original blind dormers, individually controlled heat pump consoles and lighting, and operable interior storm windows.

Due to state and federal tax credits (both historic and new market) the owner was willing to include extensive restoration of the interior in the project. Public funding helped with the cost of the geothermal system that will substantially reduce heating and cooling operating costs in the future.

Both LEED and historic tax credits had to be considered in the conceptual design phase. Due to the once a year window for applying for tax credits, the design was incomplete when the application was submitted.

The second project is illustrative of a direct conflict between new technologies and the rigid application of preservation strategies. A very green oriented owner pushed for the maximum use of green strategies, such as a photovoltaic system, and was unconcerned about preservation impacts.

A balanced proposal that undid prior renovation damage to historic fabric and proposed passive and active energy generation systems was rejected by a state easement committee. The committee concluded that appearances of the photovoltaic film and porch enclosures were objectionable even though they were reversible. The main green component remaining in the project is a pair of rain gardens that filter rain water before outflowing to the storm water system.

The presentation will give attendees multiple cutting-edge strategies and hard data that can be used in the real world of historic preservation.