



Design Guidelines for Implementing Energy Efficiency Strategies in Historic Properties Phases I and II

Projects # 11-382
and 13-382

Background:

A difficult question in the building industry is how to realize the current standard of comfort and energy efficiency while using previously built structures for modern purposes. The question is compounded when the older structures are designated as historic, thus requiring that the historic characteristics of the original structure be maintained. The Department of Defense has an immense inventory of historic buildings. Legacy project 09-452 states that there are “over 200,000 [buildings] which are older than or nearing fifty years of age, the first threshold for evaluating whether they are historically significant.” Despite the challenges of renovating historic structures, the DoD must comply with the building energy efficiency guidelines set forth in the Energy Independence and Security Act of 2007 (EISA 2007) and Executive Order 13514, Federal Leadership in Environmental, Energy and Economic Performance. The DoD also faces the challenge of ensuring that the buildings are secure and capable of handling the technological requirements of their intended uses.



Fort Bliss 1910, one of the DoD's historic structures.

Objective:

The Guidelines proposed will help CRM's, facility managers, and other historic building and energy efficiency professionals determine the best renovations for their unique projects. Each historic building has its own set of conditions that will influence the most appropriate energy efficient renovations for that specific project. What might work for one building might not work for another, even if the buildings are on the same installation, built around the same time, and are the same building type. The DoD currently lacks the tools needed for this investigation.

Summary of Approach:

This project, completed in two phases, (Project Nos. 11-382 – Phase I, 21 guidelines and 13-382 – Phase II, 19 guidelines), provides the research and development

of 40 different guidelines for improving the energy efficiency of these properties.

Three types of research were conducted: (1) a review of existing sources of information on energy improvements to historic structures; their payback formats, calculations, and the variables that impact cost benefit analyses; (2) a review of energy improvements to historic structures other than those we have designed in our own preservation experience; and (3) once the 50% draft of Phase I was developed, it was distributed to several CRMs from various branches of the DoD in different parts of the country and phone/email questions were asked of them. The information sought included feedback on impressions and usefulness of the guidelines as a tool for renovations and energy savings.

Each guideline provides a possible solution to common historic preservation renovation problems. The format for each guideline includes a brief description with photos or drawings, comments on the applicable Secretary of the Interior's Standards; an overview of the historic preservation implications, energy savings potential, and cost considerations. In most cases a Cost Benefit formula will allow input for the specific project at that installation. Guideline topics were selected based upon experience gained with the Case Studies project conducted with Van Citters Preservation for the DOD (Project No. 09452), our own professional experience, our work with the U.S. Green Building Council, literature searches, historic preservation technical information, input from our consulting engineers, and other sources.

The major issue for energy conservation improvements is often the Cost/Benefit Analysis or Return on Investment (ROI). Section 3, in Part 1, Introduction, “The realities of Cost/Benefit Analyses,” explains the issues involved in determining the cost and benefits of various improvements prior to their execution. They must be specific to place, climate, use, and the historic character of the facility. Wherever appropriate, a Guideline provides a method for making an approximation of cost and benefit in terms of energy savings. It is, however, important to realize that no such approach can guarantee a result because of the numerous factors beyond the control of the person doing the calculation. There is no way to predict future weather, staff behavior, fuel prices, etc. The calculation processes suggested should offer a good



guide to selecting among various options for improvement.

The guidelines are arranged according to the Construction Specifications Institute's (CSI) Master Format to allow for quick and easy reference. This format is used primarily as a way of arranging design and construction topics; not as a platform for specifications. Building managers and designers are familiar with this format and it is widely used in the construction industry. Guidelines are not arranged by building type because many building types have overlapping preservation needs (ex: improved wall insulation). However, we include a variety of design issues that address situations in offices, long-span structures, masonry structures, metal structures, etc. The engineers on our team have lent their expertise to help verify that our guidelines are accurate and that the considerations we note are as thorough as possible. Our engineering sub-consultants, The Response Group, prepared the Guidelines on mechanical and electrical improvements.

Benefit:

The DoD is required to meet federally legislated energy efficiency standards while also protecting its inventory of historic buildings. The Guidelines provide renovation solutions to help CRMs, facility managers, and other building professionals make educated decisions about the best energy efficiency renovation for a specific project. The Guidelines focus on DoD building types, and will discuss the climatic impact, since DoD buildings are spread throughout all regions of the United States. By using the Guidelines, CRMs will be able to quickly determine possible energy saving solutions to their renovation problems. They will also be aware of the effect such solutions have on the historic fabric of a building. Additionally, the Guidelines will be a tool for CRMs to discuss their project needs with the building professional.

Currently, the DoD does not have a single resource, a How-To-Guide, containing the energy efficiency information and the historic preservation effects that can be applied directly to a renovation project. The Guidelines will provide a possible solution, the historic preservation standard, historic preservation effects, energy savings information, and cost benefits in an easy-to-reference arrangement. We have coordinated with CRMs and facility managers throughout the process to ensure the applicability of the Guideline format.

Accomplishments:

The DoD was challenged to meet federally legislated energy efficiency standards, requiring renovation of their immense inventory of historic buildings. This compilation of Guidelines provides renovation solutions to increase energy efficiency while also discussing the effects on the historic character of the building. The Guidelines include a description of the approach, applicable Secretary of the Interior's Standards, Historic Preservation Effects, Energy Savings Potential, and Cost Considerations in a comprehensive, easy-to-reference How-To-Guide. These Guidelines help CRMs and facility managers determine the best renovation approach to their project.



The Force Protection and Anti-Terrorism requirements do not have to compromise the integrity of the historic structure.

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