Energy Efficiency Alternatives for Historic Buildings in Extreme Cold Weather Climates

Project # 13-703

Background:

Currently Department of Defense (DoD) installations within Alaska are being held to the same energy efficiency requirements as installations located in much more temperate climates. The lack of research for viable sustainability options for historic buildings in extreme cold weather climates and their inability to meet the Secretary of Interior Standards has led to the continued use of sustainability options created for more temperate climates that catastrophically fail when applied to historic buildings in a northern region like Alaska where winter temperatures routinely reach -60° Fahrenheit. This leaves only solutions that may meet Army standards for energy efficiency, but may counter to the goals of Cultural Resources Managers managing historic buildings.

Objective:

This study reviews the current DoD energy efficiency requirements using current building materials, while assessing specific building concerns associated with this unique climate and seeking potential replacements for current building materials with the hopes of increasing the longevity and use of historic structures. The goal of this assessment find ways of meeting or exceeding DoD energy efficiency requirements, minimizing costs for repairs, and maintaining the historical importance of heritage structures. This study specifically seeks to identify sustainable and energy-efficient practices for the treatment of historic buildings that are viable within the Alaskan region—and in like regions—and analyze various aspects of sustainable and energy-efficient rating systems, DoD energy efficiency mandates, and modern energy-efficiency techinques.

Summary of Approach:

This project was completed through a combination of document research, site visits, and interviews. The first phase involved developing a bibliography of appropriate sources. Following this, site visits were made to a variety of Alaskan military installations. Finally, interviews were conducted with subject matter experts from a range of different fields and occupations, including cultural resource managers, cold climate building experts, and engineers.

Benefit:

Improving the functionality and use of existing historic buildings on installations supports the military mission in numerous ways. In cold weather climates, where energy is a greater cost and building repairs can be more specialized and costlier by default, the use of existing structures versus expensive new construction may be even more mission-critical. Successfully retaining function and operation of historic structures can also add to the esprit de corps of the unit, as building a sense of pride is often associated with predecessors who walked the same halls. Sustainable buildings with a historic sense of place can enhance the well-being of Soldiers and DoD civilians, balancing the sense of continuity from past to present with current standards of efficiency. Strategically lowering operations and maintenance expenditures can free up monies to be used elsewhere toward sustaining the military mission.

Accomplishments:

Increasing energy efficiency of historic buildings can be broken down into with several steps, including 1) indentifyig the historic features, 2) determinging the building's energy use, 3) performing a cost-benefit analysis, 4) designing and implementing specific projects, and 5) performing follow-up monitoring.

Obstacles to this process include a lack of energy audits and energy use metering. Without a baseline of energy use, all attempts at energy efficiency are specultation at best.

Simple strategies for historic buildings may be best, including inslution application at attic and foundation; lighting changes; controls improvement and maintenance; and prevetiaon of air (heat) leakage.

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