

## Sustaining the Future by Revisiting our Historic Properties

*Climate change wasn't a consideration back in 1928*

By: **Ellen Anselone**, AIA, LEED AP BD+C

Principal, Vice President | Finegold Alexander Architects

**Rebecca Berry**, AIA, LEED AP

Principal, Director of Sustainability | Finegold Alexander Architects

Jones Library in Amherst, Massachusetts—designed by Putnam & Cox in 1928—is distinguished by its robust stone facade. The Town of Amherst and the Library's Building Committee hired Finegold Alexander Architects to shepherd this historic public library into its next century of service. Front and center is sustainability: what strategies will reduce levels of energy consumption, and can an addition be designed to minimize the environmental impact of an expanded facility?

While the project is in the schematic design stage, the library's Sustainability Committee tasked Finegold Alexander with designing a low carbon project. This involves examining energy and operational carbon use as well as the embodied carbon of the building's materials and construction. To this end, we conducted detailed energy modeling and completed a full Life Cycle Assessment (LCA) with Tally software.

### **EUI Goal/Net Zero**

An analysis of the proposed design indicates a predicted Energy Use Intensity (pEUI) of **34.4 kBtu/sf/year**, showing a **52% decrease** in energy usage over the median site EUI for library buildings in the U.S., which is **71.6 kBtu/sf/year**, as listed by the Commercial Building Energy Consumption Survey. A series of Energy Conservation Measures (ECMs) would further decrease the project's site EUI. With select ECM's, Net-Zero Energy could be achieved through purchased off-site renewable energy.

### **Eliminate Use of Fossil Fuels**

The existing building is serviced by natural gas. The proposed design eliminates gas-powered systems, replacing them with systems that are powered by electricity, including a proposed high efficiency VRF system for space conditioning.

### **Low Embodied Carbon Materials**

The feasibility study focused on a conventional steel-framed structural system. We prepared a schematic package with an alternative heavy timber hybrid structural system. A comparative LCA examined the environmental impact of the structural systems, showing that the timber structure—although higher in first cost— resulted in less Global Warming Potential than the steel structure.

The system and all building materials will be refined throughout the design process to produce the best balance between available budget and the library's sustainability goals.



### **Whole Building Life Cycle Assessment**

The LCA for Jones Library found that the materials and construction of the proposed design embodied carbon is: **1,433,189 kgCO<sub>2</sub>eq**. The design team also produced a LCA that evaluated the new addition alone, determining the embodied carbon of the new addition is: **1,274,228 kg CO<sub>2</sub>eq**.

While these numbers might suggest that the proposed construction will have greater environmental impact than a “build nothing” approach, operational energy use of the library must also be considered. Based on the current EUI of the existing building (**73.2 kBtu/sf/year**) and assuming 22% of that energy is heating from natural gas, over 60 years the Global Warming Potential is **18,288,925 kgCO<sub>2</sub>eq**. In contrast, the study showed that the proposed design has an operational carbon use of **11,382,681 kgCO<sub>2</sub>eq**, or a **38% reduction in** operational carbon over the existing facility. This demonstrates that careful planning can provide for a public library that meets the needs of today’s citizens, while preserving our planet for generations to come.