LEA’s Maine Lake Science Center
High Performance Renovation
Bridgton, Maine, 04009
8,000 Heating DD, 3,500 Sq. Ft.

House & Garage – Prior to 2014-15-Retrofit
Goal of Project

Convert residential log cabin with attached garage into a year-round institutional science center with lab, conference room, offices, & researcher housing
The Vision
A multifunctional facility in harmony with surroundings
Challenges

• Poorly insulated structure
• Unoccupied for several years
• Walk-out basement had humidity & condensation issues resulting in a mold & mildew odor in much of the cabin
• Original heating relied heavily on wood stoves all using one chimney
• Rodent issues in old building
• Significant interior reconstruction needed to function as an institutional building as well as exterior work such as advanced septic system & parking areas
• Transform building to one with low operating costs and sustainability features
Opportunities

• 16 acre woodland lot abutting new municipal 66-acre park
• 2-minute walk to supermarket & 5-minute walk to downtown
• Larger conference space badly needed for organization
• Housing for researchers is expensive & hard to come by
• New facility will provide hands on training & educational activities within the property
• Property & building to provide demonstration of conservation practices & energy efficiency
Timetable

- **August 2014** – Property purchased
- **September 2014** – Exterior ground work begins
- **October 2014** – New, advanced septic system installed, driveway & parking lot construction begins
- **November 2014** – Interior deconstruction begins
- **December 2014** – Dormer above garage added
- **January 2015** – Roof insulated, steel roof complete
- **February to March 2015** – Exterior rigid insulation added, cellulose blown in, deconstruction continues
- **April 2015** – Interior framing complete, plumbing, wiring, & heating roughed in
- **May 2015** – Drywall installed & painted, interior finish work begins
- **June 2015** – Plumbing, wiring & heating completed
- **July to August 2015** – Interior and exterior finish work, painting & staining completed.

*Center opens for first presentation July 9th!*
Original Structure

1980s log cabin, with 2 x 4 stick built ell & garage, 2” rigid insulation on cabin roof, fiberglass insulation in ell & garage
Original Downstairs

- Partially below grade
- 3 bedrooms & one bath
- Damp, musty smell
Original Garage
1.5 bay garage with oil boiler room & oil tank
Wall Renovations
Exterior or Interior 2” XPS
Dormer added above garage for office space
Roofs 4-6” XPS
Plus cellulose between rafters
All Cavity Walls & All Roof Rafters
Dense Pack Cellulose 6-8” or more
Windows & Doors

• Low E, thermal
• Some Re-use
• Minimal windows on north (except large meeting room)
Thin, high, steel collar ties replaced one large and low, log collar tie – thus providing for a better view of the presentation screen. One large steel beam was also installed to carry the weight of the roof without the need of an obstructive post in the center of the room.
Ground & Polished Concrete Floors

Finished, polished & aesthetically pleasing concrete floors on all ground levels eliminate the need for wall to wall rugs or wood which could provide breeding grounds for mold & mildew.
Renovated Downstairs
3-bedroom researcher housing, kitchen & living space
New Office Created Above Garage
served by ductless mini-split, LED can lights
Garage Converted to Open Lab
Heated by condensing propane boiler with efficient LED can lights
Cabin Main Floor Now Open Conference Space
ductless mini-spit heat/AC/dehumidification & monitor propane heater
Energy Recovery, DHP, Condensing Boiler

80% Efficiency

High efficiency heating & air conditioning

Ventilation with very limited heat loss & humidity controls

Efficient propane boiler

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Blower Door Results, IR Image, CO₂ Data

Stay tuned!

To Be Done Fall 2015
Maine Thousand Home Challenge

• Not a typical home, but provides housing & great example of possible upgrades for Maine homes

• 1000 Home Challenge inputs will be modified to address partial occupancy as well as events

• There is no submetering of separate building areas so threshold is based on entire building, lab, & office space
Thousand Home Challenge OPTION B & 50% Milestone Threshold in kWh/yr.

THC OPTION B Threshold (1 occ. 50% electric heat)

50% Milestone (1 occ. 50% electric heat)

Target Use: 18,544 kWh/yr.

OPTION B Inputs: ZIP Code: 04009; 3,500 Ft² FFA; 1 occupant; 50% electric heat

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Lessons Learned

• Letting in uncontrolled “fresh air” in is not always a good idea in a climate with hot humid summers & ice cold winters

• “Tight” structures need ventilation & humidity control for indoor air quality & mold prevention

• Polished concrete in basement/first floor eliminates mold sources, looks good, & is easy to clean

• New, energy efficient homes would all benefit from a “User’s Guide”

• Reconstruction always costs more than you estimate!
Finished Project

Summary R Values
Roofs  R = 30+
Walls   R = 30+
Windows R = 3
(Logs Left as Logs in Meeting Area)
For more information about the Maine Lake Science Center please visit: www.mainelakes.org

Funding for the Maine Lake Science Center was made possible from donations from the Morton Kelly Foundation, an Anonymous Family Foundation, the Kendall and Anna Ham Foundation, the Davis Conservation Foundation, the Stephen and Tabitha King Foundation, the Margaret Burnham Charitable Trust, and the Norcross Wildlife Foundation as well as generous financial support of LEA members, and numerous local business and community members who donated time, equipment and services.

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