

NESEA Student Project Submittal

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Architectural Technology Major

Category: Residence, Passive Solar and Solar Electric

Location: Theoretical Location of Keene, NH

Key Features:

- 1.) highly insolated; Walls: R 45, Roof: R 60
- 2.) Large Solar Masses for heat collection
- 3.) Active PV panel array; 4800 watt system
- 4.) Battery collection for PV panels
- 5.) Active Window Shading
- 6.) Internal Water wall for additional heat collection
- 7.) Active heat distribution system; pumping water through pipes imbedded in the concrete in the solar mass
- 8.) 80% of the window area is on the south and south east side
- 9.) Attractive Design
- 10.) Substantial amount of natural light
- 11.) Solartek blankets over all north and south windows for additional isolation over the windows during the night hours. They would be raised and lowered automatically.
- 12.) DHW would be electric but only backup, the majority of DHW would be provided by a water to water heat exchanger with the active water collection system. The DHW would be stored in a highly insolated storage tank, such as, a SuperStor tank

There are a few major concepts that are involved in this design. The first is that the home is oriented slightly to the south east. This is to allow a higher percentage of direct gain in the morning hours. Statistically a home is the coldest in the morning so by orientating the home to the south east, you receive the extra heat needed in the morning. Another key feature of this design is the large amount of solar mass. The home has the initial thick slab in the green house and the sunroom. The other solar mass is the water wall on the back of the sunroom. This is to collect heat from the slab and from direct gain. The water in the water wall would be circulated through the slab and then to the rest of the home to either give off heat to the rest of the home during the winter or take heat away from the home during the summer. The natural light windows are located high in the roof to provide natural ambient light to the north side of the home. Pertaining to the site, there would be trees on the east and west side of the home. This would provide shade in the summer and allows sun through during the winter.

Building Program: 1.) 3000-4000 Square Foot Building
2.) UA value of less then 300
3.) For a single family at a modest size
4.) Provide PV panels for auxiliary electricity
5.) Try to design a home that would not need to use fossil fuels for heating or cooling

Square Footage: First Floor: 2270.2 ft²
Second Floor: 1232.77 ft²
Total SF: 3502.97 ft²

Building Cost: Estimated cost: \$120.00 per ft²
Total Estimated cost: \$420,356.00

Performance: Theoretical Performance = 14,400,000 Btu/yr, 11,000 Btu/hr
Actual Performance = Unknown