MASTER

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ABSTRACT

A program of applied research has been developed for the design, construction and monitoring of an innovative concept of solar heating and cooling called "solar atrium."

The solar atrium concept is adaptable to residences and smaller commercial and institutional buildings. It is designed to be constructed of materials and equipment that are economical and readily available. Cost-effectiveness of installation and operation is a primary design objective.

The solar atrium is a further development of efforts begun in the 1930's and 1940's to design houses that would obtain a major portion of their heating from the sun.

The early "solar house" experiments proved the benefits of large glazed areas for trapping solar energy. However, they were not equipped to collect and store surplus solar energy, nor were they equipped to control heat losses through glass areas at night or during cloudy days. The solar atrium incorporates the large glass areas of the earlier houses and adds facilities for heat storage and control of heat losses through glass.

The solar atrium has been designed and will be constructed for testing within a demonstration model single family residence. The atrium and residence will be instrumented and monitored to obtain data on the system operation and electricity costs over a full year heating and cooling season. Life-cycle costs will be generated, including costs of installation, operation and financing. Cost-effectiveness will be measured by comparing the life-cycle costs generated for the experimental residence with those of a similar residence of conventional design without the solar atrium. Comparisons will also be made with other existing passive and hybrid solar homes.

1. Progress Since Last Report

1.1 Construction

In this reporting period construction of the test model residence continued. At this time, the residence is approximately 75% complete, with various construction items completed as noted below:

1. Excavation and back fill	100%
2. Septic system	100%
3. Foundation walls & rock box	100%
4. Concrete work and pool	100%
5. Rough framing & sheathing	100%
6. Windows and exterior doors	90%
7. Roofing	90%
8. Drive	80%
9. Insulation	100%
10. HVAC rough-in	100%
11. Plumbing rough-in & water service	100%
12. Electric rough-in & electric service	100%
13. Stucco	30%

Attached photos of the construction site illustrate construction progress at the date of this report.

1.2 Instrumentation

All instrumentation has been ordered. At this date the following instruments are in hand:

- a. Pyranometer
- b. Thermal sensors
- c. Miscellaneous wire and plugs

1.3 Publicity

In the past reporting period the project was exhibited in Philadelphia, in the month of May, in the annual exhibit of the Philadelphia Chapter of the American Institute of Architects. The exhibit will be shown at various locations in the Philadelphia area throughout the remainder of the year.

The project was also presented in a slide lecture by Mark Ueland on June 24, in a lecture series sponsored by the Philadelphia Cultural Consortium.

2. Schedule For Next Reporting Period

2.1 In the next reporting period, construction will be completed and instruments installed.

We estimate that construction will be complete and instruments installed by the first week of September. The house will be occupied on September 4th and we will begin recording data shortly thereafter.

APPENDIX 1

Photos of Construction Site

View of upper atrium

View of upper atrium

View of atrium and pool

View from Southeast

View of North wall

View from South

View of skylight
and collection duct