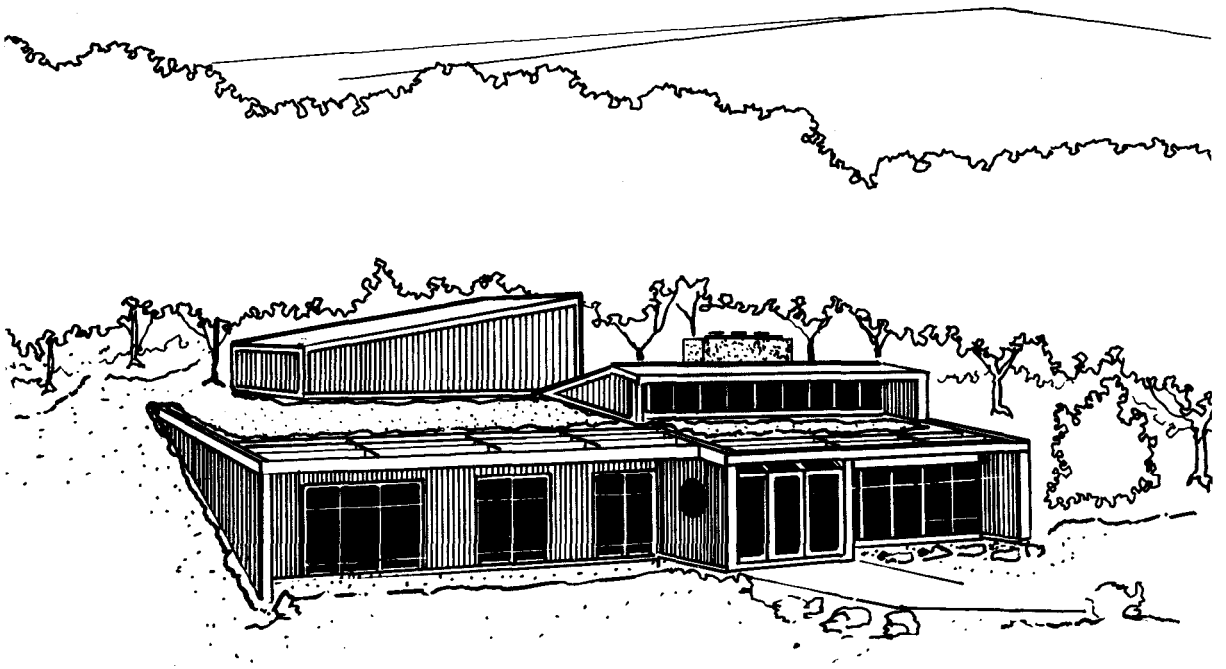
Eureka, MO



Builder: G. T. Kinnikin and Associates, House Springs, MO

Designer: Robert Lutz Architects, St. Louis, MO

Solar Designer: Ener-Tech, Inc., St. Louis, MO

Price: $115,000

Net Heated Area: 1783 ft²

Heat Load: 47.8 x 10⁶ BTU/yr

Degree Days: 4900

Solar Fraction: 58%

Auxiliary Heat: 2.27 BTU/DD/ft²

Passive Heating System(s): Indirect gain (Trombe wall)

Recognition Factors: Collector(s): Double-glazed windows, reflective white marble chips, 292 ft² **Absorber(s):** Dark concrete Trombe wall **Storage:** Concrete Trombe wall—**capacity:** 54,264 BTU/°F **Distribution:** Radiation, natural convection **Controls:** Moveable insulation, overhangs, vents

Back-up: Electric resistance heating, fireplace

Passive Cooling Type: Earth sheltering, convection

Nestled into the south-facing slope on a 3-acre, wooded site, this energy-efficient home is earth sheltered on the north, east, and west sides by earth berms. St. Louis winters are fairly brisk, with occasional periods of extreme cold. Prevailing winter winds are from the northwest. Summers are not excessively warm. The main concern is to moderate winter heating loads. The underground massing, sod roof, and earth berms greatly decrease the building's winter heat loss and reduce the summer cooling load as well.

Trees on a ridge to the north of the home provide winter wind protection. The garage, built on the same ridge, also helps to protect the house. Garage and asphalt pavement uphill from the home divert drainage to either side of the site. Drainage is accomplished by placing double draintile at the foundation. The sloped roof provides quick water runoff.

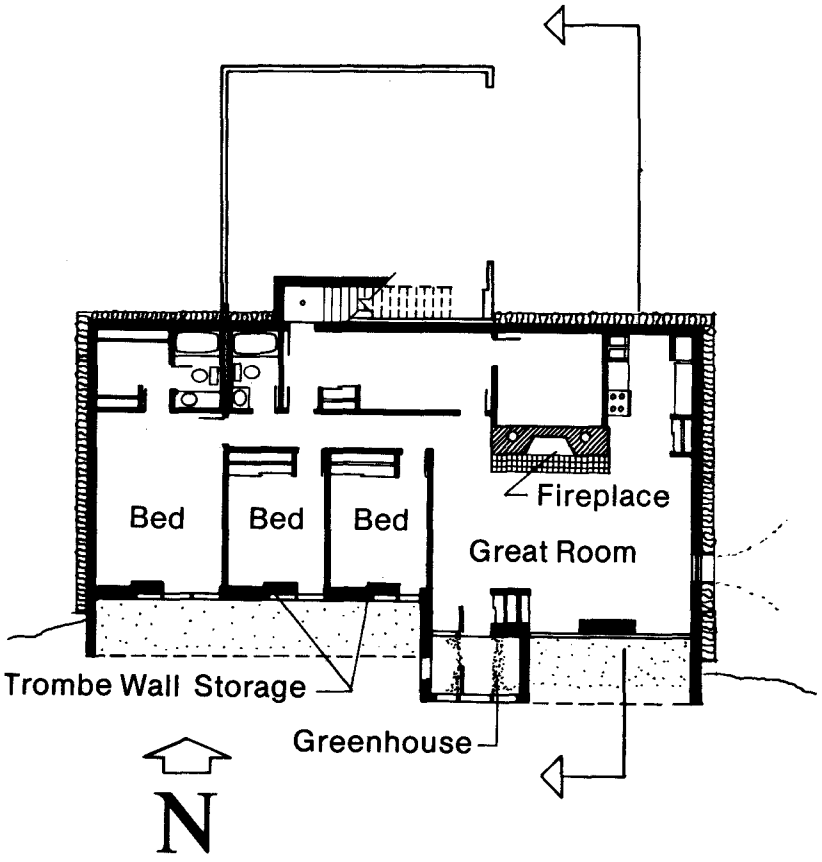
The rustic style of this 1-story house is similar to most of the surrounding houses. The front is trimmed in cedar with some visible stone work. The rooms have been carefully placed. The main living spaces are located on the south side of the house for exposure to the sun, while on the north side unheated storage areas and closets act as buffers. All windows face south. The underground design of the house greatly moderates temperature fluctuations inside.

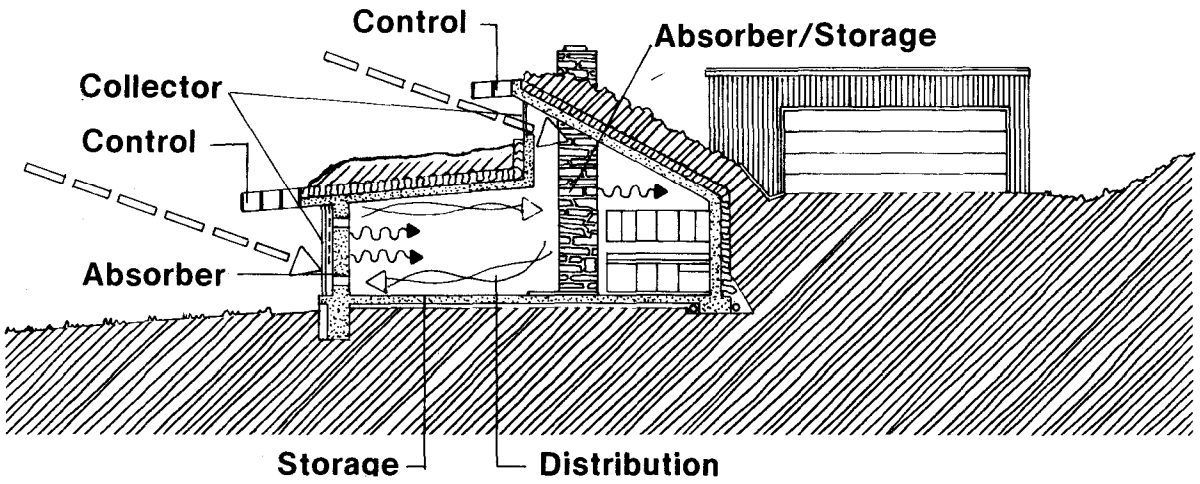
Each of the three bedrooms and the living/dining area receive heat collected through the south-facing windows. Each of the four main rooms (three bedrooms and living room/dining area) also has an individual Trombe wall using part of the south window **collection** space. Each wall is con-

structed of 16-inch thick concrete. White marble chips are placed under each double-glazed window to reflect additional sunlight onto the wall. Heat is **absorbed** by the darkened surface of the wall and **stored** in the concrete. Heat is **distributed** into the rooms by radiation, and within the room by natural convection.

A fireplace is used as the major source of back-up heat. Combustion air for the fireplace is ducted from the outside to prevent loss of warm interior air. The concrete mass of the fireplace provides heat **absorption** and **storage** for wood combustion heat and for sunlight **collected** by a clerestory window. Electric resistance heating is also provided, and it can be operated in the individual room to allow supplemental heating only where needed.

Moveable insulation is provided on all windows to control night heat loss. All Trombe walls are vented to the outside to allow manual exhaust of excess heat. Overhangs on each window reduce heat gain to the home in summer. Most windows can be opened for summer cooling. The clerestory on the east side of the home may be opened to induce summer venting. There is an air-lock entry into the home that reduces the magnitude of air changes, helping to reduce both heating and cooling loads.





This plan is from the book
“Passive Solar Homes – 91 new award-winning, energy-conserving single-family homes”,
The U.S. Department of Housing and Urban Development, **1982**

The solar homes designs in this book were the winners of HUD’s fifth (and final) cycle of demonstration solar homes. The 91 winning home plans in the book were selected from 550 applications from builders.

This was a time of great interest and activity in the passive solar home designs – many of the winning homes show a level of innovation not found in most of today’s passive solar designs.