Water walls warm south bedrooms

Massive walls and floors, including south-facing water walls, provide about 75 percent of heating needs to this house in Santa Fe, N.M.

The 2,300 square foot house was designed by architect William Lumpkins, engineer Buck Rogers, and Susan Nichols, who with her husband Wayne, are the founders of Communico, Inc., builder of the house.

The wishbone shaped structure wraps around three sides of a courtyard. This configuration admits natural light and solar radiation to most of the living areas (floorplan below)

The predominant solar feature is a water wall which extends along the south side of each of the two bedroom wings (photos top and bottom right). A six-inch cavity within each wall contains water in plastic bags. The bags are sandwiched between two-inch layers of concrete.

The exterior side of the water walls is painted black. The walls are separated from double-glazed windows by a four-inch thick air space. Air in the space is heated by the sun and distributed to the living area. Solar heat is stored in the water walls.

In winter, the shutters are closed to insulate the water walls at night and on cloudy days. On bright days the shutter is lowered to reflect more sunlight onto the walls.

The north wall, made of 10-inch thick solid concrete, is sunk five feet into a hill. A large clerestory and windows facing the courtyard provide direct gain solar heat to the north part of the house (photo far right).

The floors, which store solar heat, are made of four-inch thick concrete finished with quarry tile.

There is R-30 insulation in the sidewalls and R-36 in the ceiling.

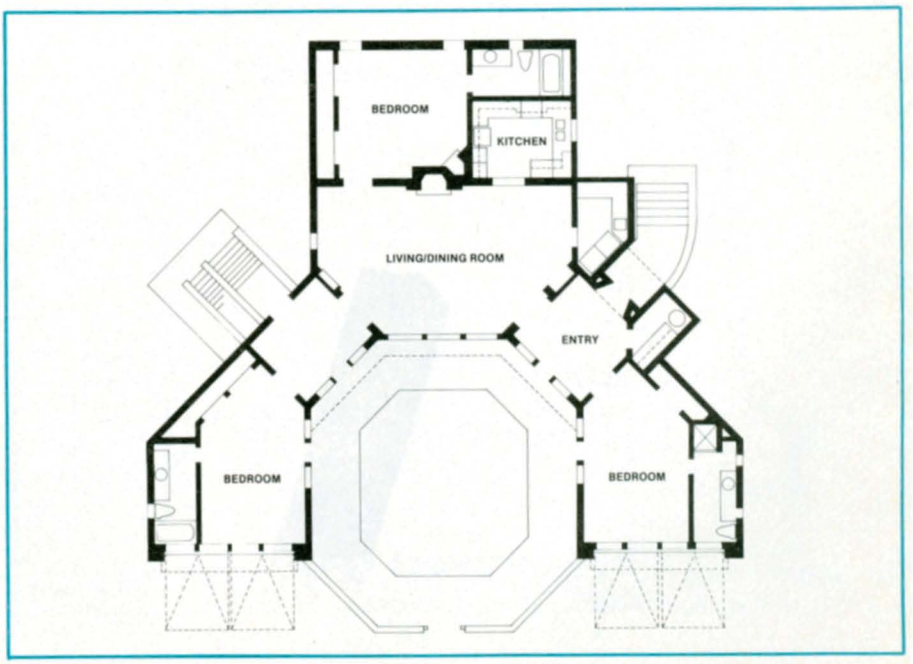
Two airlock entries, or greenhouses, on the northeast and northwest sides of the house, act as insulating spaces.

Electric baseboard heaters with individual thermostats in each room supply back-up heat.

Overhangs reduce solar heat gain during the summer, as does closing the shutters on the south water walls. Natural ventilation is used for cooling.

Susan Nichols said the only change she would make in the design would be more space for water within the south walls.

The house sold for $125,000, including $25,000 for the five-acre lot. The Nicholses received a $10,000 solar grant from HUD which covered the extra costs of the masonry, glazing, shutters, water walls and a solar hot water heater.

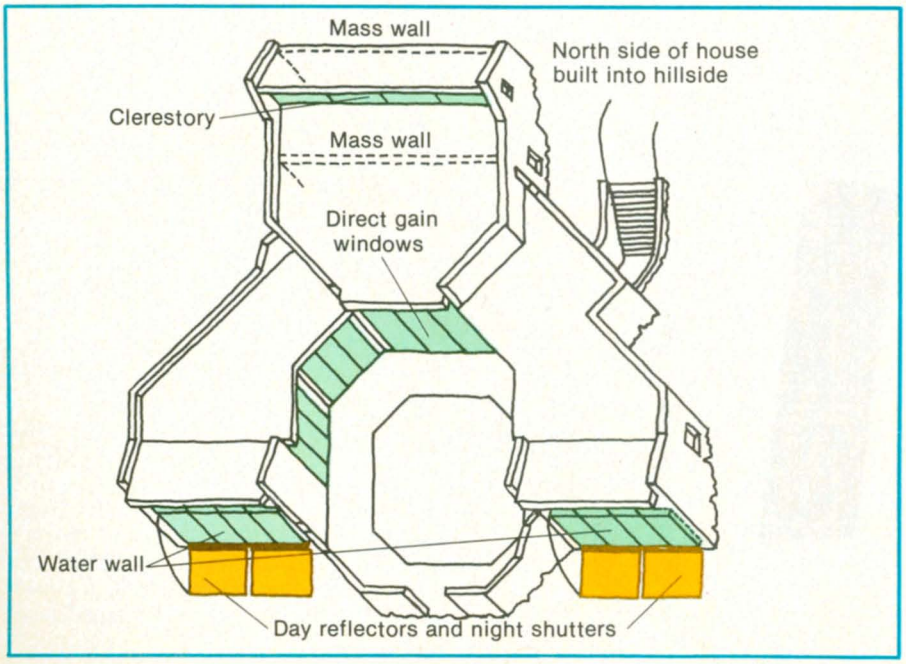


Passive solar features and good insulation reduce heating costs by about 75 percent in this 2,300 square foot house in Santa Fe, N.M.

Photos: Elliott McDowell

Glazed water walls store and distribute heat to the south arms of the house. Shutters, in foreground, cover the walls at night and reflect more sunlight onto them during the day.

A large clerestory opens above the north living areas, including this bedroom.



Parts of the house are heated by direct gain. Solar radiation enters through windows and a clerestory; then the heat is stored in the massive walls and floors. Heat is also provided, especially to the south wings, by solar radiation that warms air in a space between the water walls and the glazed collectors. Heat is stored in the water walls.