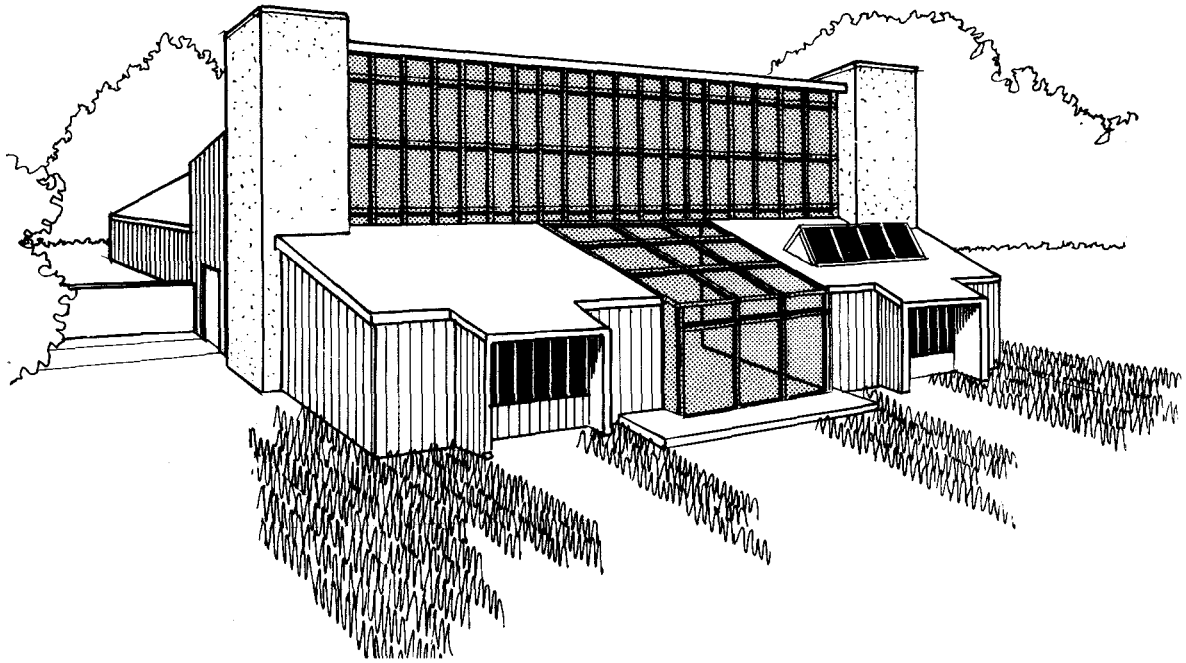
Bismarck, ND



Builder: Bismarck-Mandan Home Builders Associates, Bismarck, ND

Designer: Don J. Jiran, Architects and Planners, Bismarck, ND

Solar Designer: Ken Schwartz Engineering, Inc.

Price: $100,000

Net Heated Area: 1860 ft²

Heat Load: 149.1 x 10⁶ BTU/yr

Degree Days: 8923

Solar Fraction: 48%

Auxiliary Heat: 4.69 BTU/DD/ft²

Passive Heating System(s): Isolated gain, indirect gain

Recognition Factors: Collector(s): South-facing glass, greenhouse glazing, 593 ft² **Absorber(s):** Mass wall surface **Storage:** Concrete block mass wall—**capacity:** 18,068 BTU/°F **Distribution:** Radiation, convection **Controls:** Insulating drapes, wall vents, overhangs

Back-up: Gas furnace, fireplace

Domestic Hot Water: Flate-plate collectors, 48 ft²

The site of this home is near a small ridge of a south knoll. The home, which has natural redwood siding, fits in well with the other houses in this contemporary subdivision.

Winters in this area of North Dakota are extremely cold, but there is an abundance of sunshine. Temperatures drop well below freezing for months at a time and are combined with high wind speeds.

Earth berms and fir trees are located on the north and west sides of the house to dampen winter winds. Garage and closets are placed on the north to serve as buffers for the heated spaces and there is little glass on the north exposure. Fins on outer walls protect windows from winter winds. The .insulation value is R-40 for the roof, and R-26 for the walls; an air-lock on the south is used as the main entry.

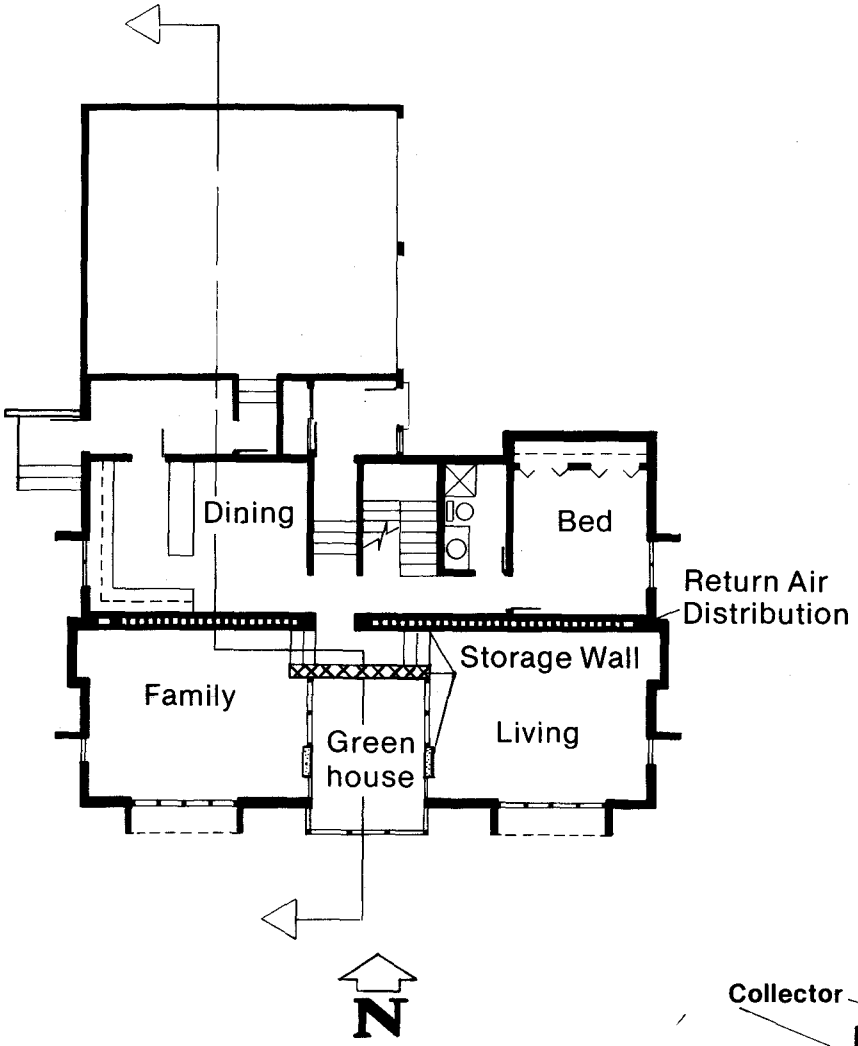
There are three distinct collection systems in operation in the home. The main system is a 21/2-story mass wall running through the middle of the house. The upper level of the wall is fronted with triple glazing. Sunlight enters through the south glazing, strikes the darkened surface of the wall, and is absorbed and stored as heat.

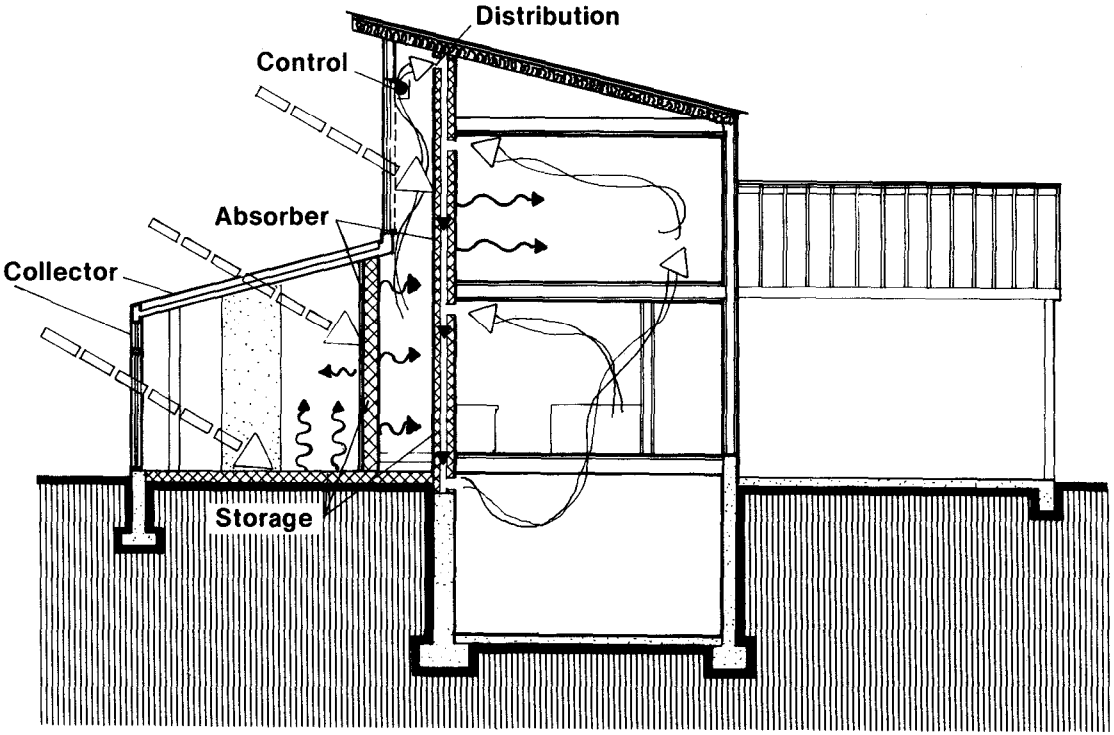
On the lower level, sunlight enters through the front rooms and strikes the unglazed lower portion of the storage wall. There it is absorbed and stored as heat in the mass of the wall.

The greenhouse is located in the front center of the house and doubles as an air-

lock entryway to the home. Mass walls are on the east and west sides of the greenhouse and a single-glazed Trombe wall is at the back of the greenhouse. These serve as additional heat **storage** for sunlight entering the greenhouse through the glass walls and roof.

For the rooms adjacent to the storage walls heat is **distributed** by radiation from the surfaces. Return air is brought back from the ridge through the large storage wall to preheat the return air to the furnace. If the air brought back is warmer than the storage wall (as during the day), this heats the wall. If the air is cooler (as at night), the air will pick up heat from the wall to preheat the return air to the furnace. The gas furnace distributes conditioned air through a conventional duct system to the rest of the house.





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.

www.BuildItSolar.com