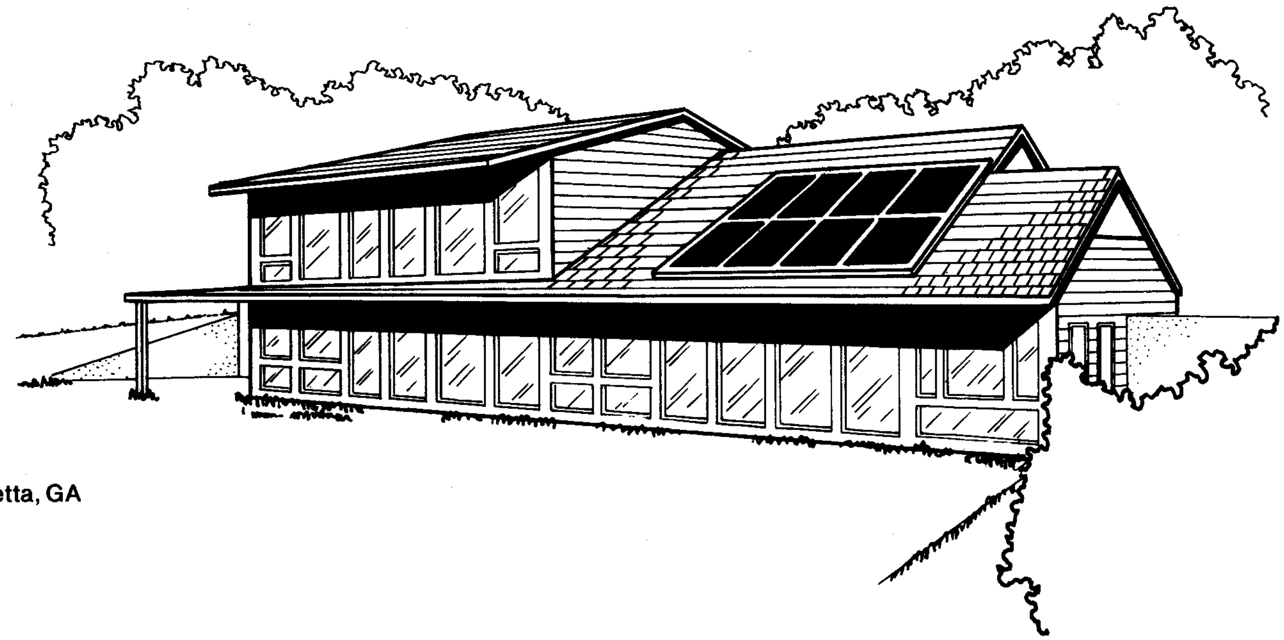
Roswell, GA



Builder: Charles Siler Builder, Inc., Marietta, GA

Designer: Richard M. Sibly, Atlanta, GA

Solar Designer: Richard M. Sibly

Price: $72,500

Net Heated Area: 1823 ft^2

Heat Load: 44.2×10^6 BTU / yr

Degree Days: 2961

Solar Fraction: 76%

Auxiliary Heat: 2.22 BTU / DD / ft^2

Passive Heating System(s): Direct gain, indirect gain (Trombe wall), isolated gain

Recognition Factors: Collector(s): Double glazing, single glazing, 607 ft^2 **Absorber(s):** Concrete walls, black metal plates **Storage:** Concrete slab floor, Trombe wall, rock storage area—**capacity:** 44,012 BTU / °F **Distribution:** Radiation, natural and forced convection **Controls:** Overhangs, shades, damper, vent

Back-up: Gas forced-air furnace (48,000 BTU / H), woodburning fireplace

Domestic Hot Water: DHW preheat 40-gallon tank located at peak of solar chimney

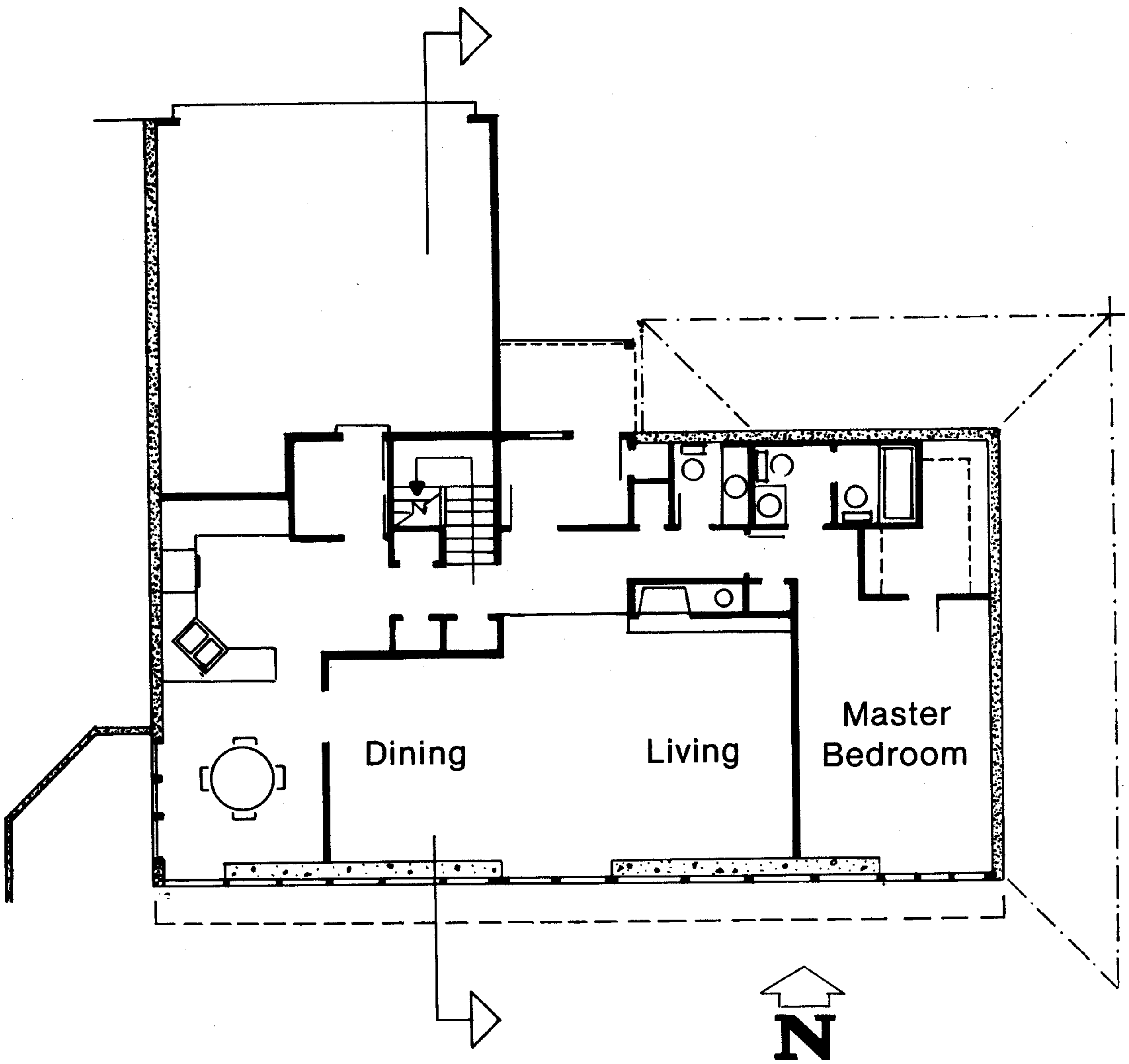
Passive Cooling Type: Radiant cooling to night sky, natural and induced ventilation, stack effect

The site of this project is a portion of vacant pasture on a gentle south-facing slope. The architect, recognizing the energy-conservation potential in landscaping, has combined plantings and earth berming to protect this rustic contemporary home from winter winds. The 5-foot high earth berms, located on the west, east, and north walls, also provide a thermal lag for reducing temperatures during the hot Georgia summer. The evergreens planted to the northwest side deflect and diffuse the coldest of winter winds. Together, the earth berms and plantings create a pleasing entrance from the street side and a private rear yard.

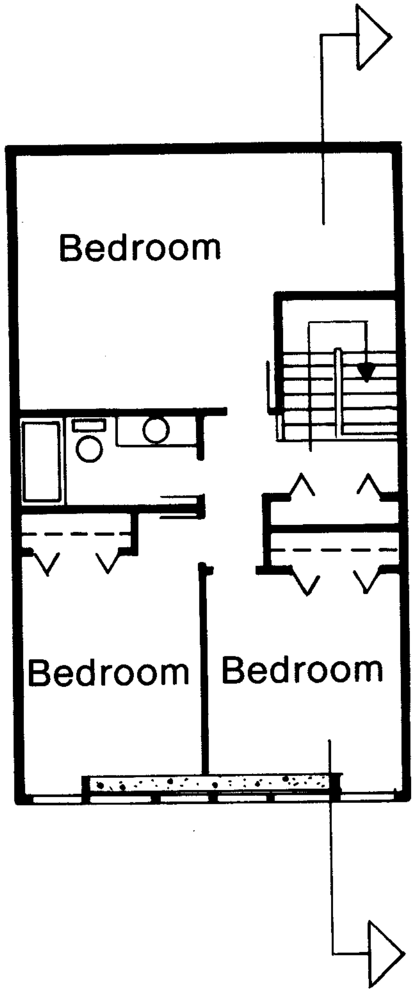
The style, floor plan, and siting of this house place strong emphasis on market appeal and demonstrate that tradition can mix well with passive design. The 2-story floor plan is one that has had great success in the area. The overall design follows a line that has been well accepted by Atlanta area home buyers.

This house is notable for the innovative passive heating approaches that provide a major part of its energy needs. Three passive **collection** types are used: (1) over 100 square feet of south-facing double glass collects heat for all of the major living and sleeping spaces except the kitchen; (2) nearly 300 square feet of double-glazed Trombe wall fill the entire balance of this south wall, providing long-term storage; (3) an isolated system is formed by approximately 200 square feet of single glazing that covers a portion of the south-sloping roof.

Absorbers include three major surface areas, two of which are black-painted con-



Main Level Plan



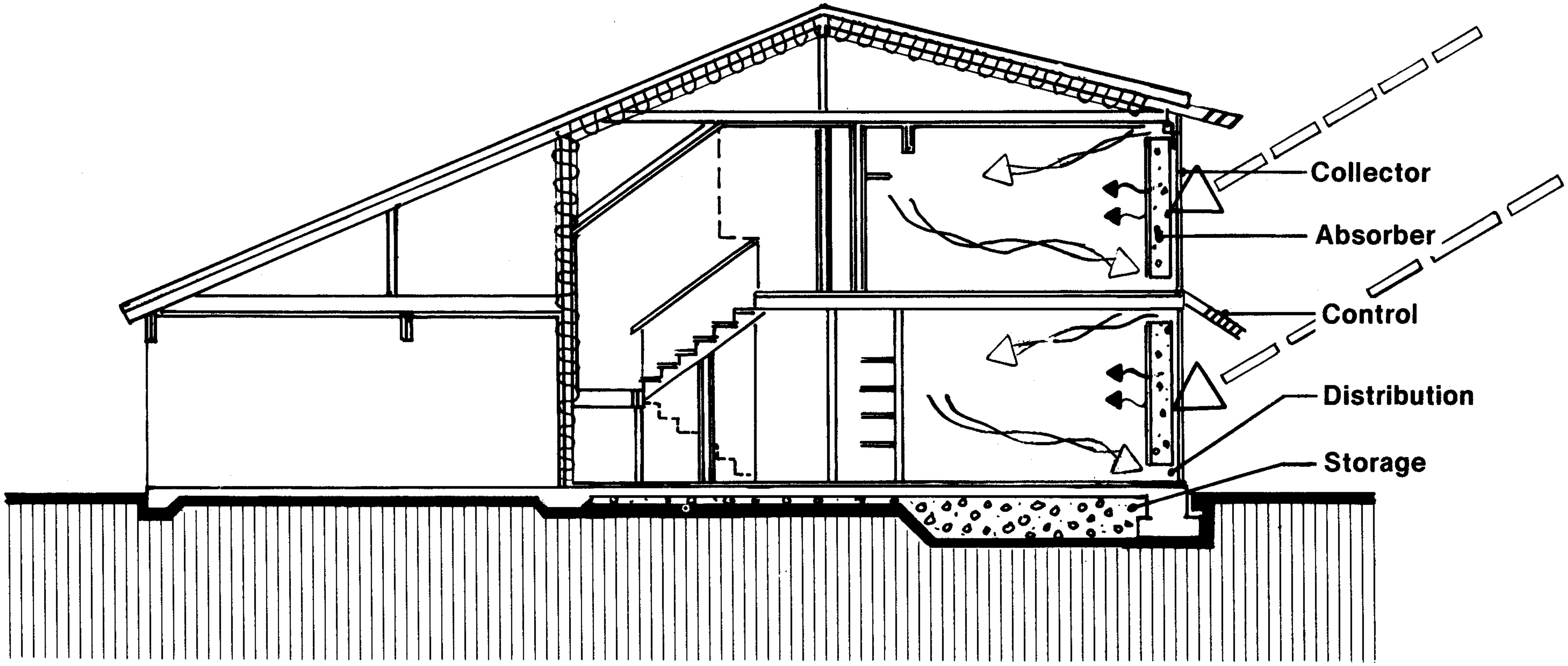
Upper Level Plan

crete walls. The other is blackened metal plates installed below the glazed part of the south roof.

Storage for the direct radiation is a massive concrete slab floor, as well as 8-inch concrete block perimeter walls with exterior insulation. The Trombe wall uses 12-inch concrete-filled blocks to store heat for later use. Heat from the roof collector is stored in a 500-cubic foot rock storage area below the living room and master bedroom floors.

Radiation and natural convection **distribute** heat throughout the living spaces. The rock storage bin also radiates heat, but these flows are delayed and continue for many hours after sunset. They provide heat for the living spaces during cloudy and nighttime periods. Natural convection occurs both within rooms and throughout the whole house.

A strong convection loop is established in the winter when the Trombe wall is being charged with solar energy. The air in this partially closed loop leaves the bottom of the rock storage, is heated and as it rises, passes between the glass cover and blackened masonry of the Trombe wall. It is then further heated as it turns and rises up the face of the site-built roof collector. This air is then ducted past a domestic water preheat tank to a high point in the roof where a fan draws it down into the rock storage area below the living and bedroom



floors. From there it directly heats the room above.

This house makes use of a number of **control** features that respond to outside climatic fluctuations in order to maintain inside comfort. The roof overhang and fixed louvers shade the southern glass and Trombe walls from April until September. Polyethylene-faced backdraft dampers automatically prevent reverse thermosiphoning of the Trombe walls, and the solar roof permits these devices to be vented to assist interior air circulation during periods when heating is unnecessary. A decorative living room fan helps to eliminate air stratification by forcing warm air at the ceiling back down into the room.

Back-up heating is provided by a fireplace and a small gas-fired forced-air system activated by a clock thermostat. A conventional cooling system sharing the heating unit's fan and duct system provides back-up air conditioning. A gas-fired water heater tank supplies the balance of the domestic hot water needs. All back-up systems, including the fireplace, water heater, and furnace, receive their combustion air directly from the outside, rather than waste already heated inside air.

Walls not shielded by earth berms have 6-inch studs sheathed with 1-inch rigid insulation. The roof is insulated with 12-inch fiberglass batts. The floor slab is poured on 1 inch of rigid insulation. The building is carefully zoned with garage, service, and storage areas on the north side. The entrance is a well-planned, naturally lit air-lock vestibule.

This Roswell, Georgia, house effectively combines outstanding passive design with a popular style to achieve both energy efficiency and great marketability.

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.

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