

Bunker-like home keeps out chilling winter winds

An Ottawa computer consultant has designed an energy-efficient bunker-like home with the help of a computer.

Geoff Cook's concept combines a south-facing expanse of glass with concrete and styrofoam walls.

The Cook house was built on a hill in west Quebec at a cost of \$100 000. It costs 25 cents a day to heat. One plug-in baseboard heater and a small wood stove provide supplementary heat for the house.

Resembles a bunker

The 297-square metre home, which local residents call "The Bunker" was not built in a conventional design. The footings were laid after the lot was substantially backfilled to provide a base for the house. The foundation, which extends to the footings, consists of a 15-centimetre layer of styrofoam at the base of the footings, topped by a 15-centimetre slab of concrete.

The north, west and east walls of the house are solid expanses of terracotta concrete, broken only on the north side by the front door. The south wall, measuring 5.5 by 13.4 metres, consists of large panes of doubled-glazed glass held in place by a grid of concrete.

The solid walls are built somewhat like a concrete and styrofoam sandwich with 25.5 centimetres of regular styrofoam and 5 centimetres of sprayed urethane foam nestled between two concrete walls, each 6.5 centimetres thick. Within the styrofoam, every 60 to 90 centimetres, are concrete studs.

The slightly sloping roof is covered with 136 tonnes of earth.

Absorbs heat from sun

The combination of materials literally absorbs heat from the sun, radiating it into the house and storing it long enough to keep the house warm at night. In addition the house is impervious to wind.

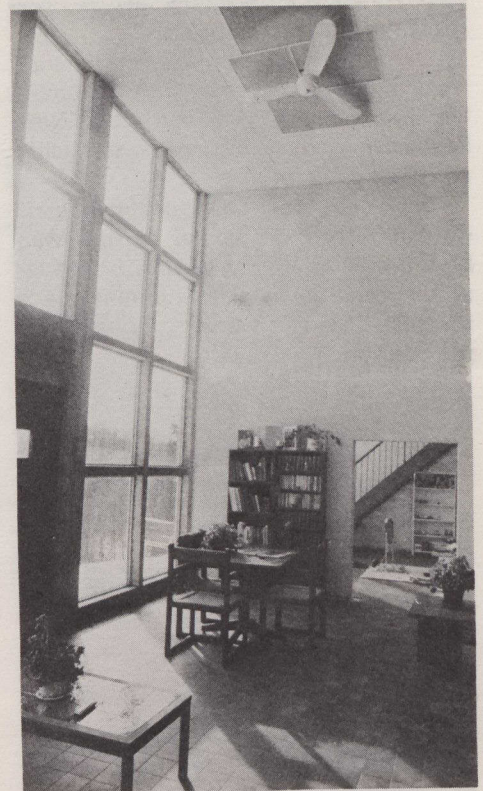
With conventional construction and heating systems, the walls of a house are usually cold. The walls of the Cook house are warm, radiating heat into the house.

The frigid temperatures and overcast skies of January provided the real test of the house. During that period, the house's thermo-humidograph consistently registered temperatures between 14 and 20 degrees Celsius, and humidity levels between 45 and 50 per cent. When the interior temperature fell below 15 degrees Celsius, the single (5 118 Btus per hour) baseboard heater would switch on. The Cooks also resorted to using their wood stove, buying two bush cords of wood so far this winter.

Two levels in interior

The interior of the house is divided into two levels. The upper floor, or entrance level, contains a living-dining room, den, bathroom, and kitchen-family room. All rooms overlook the ground floor "winter patio" and the playroom.

At the rear of the lower floor are a guest room, a bedroom, a storage room and a large ensuite bathroom off the master bedroom. All these rooms have



Winter patio with playroom at end.

windows and doorways, opening onto either the winter patio or playroom, that lets light into the back regions of the building.

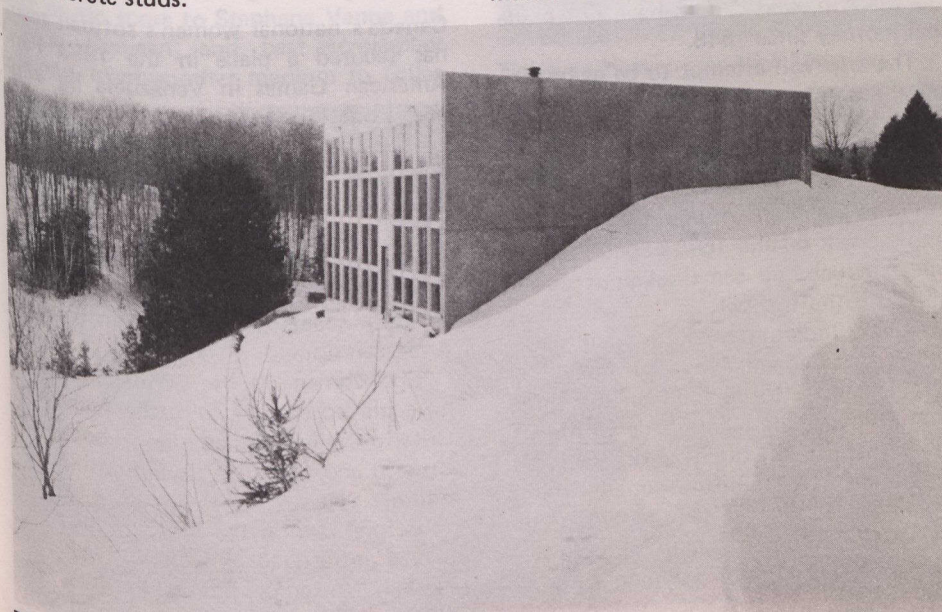
The house is designed in three distinct sections. The left side of the house is formal, with the living room above and the master bedroom beneath. The middle is the service area with bathrooms, storage facilities, entrance, and the den with its airtight Kingsman wood stove. The right side, with the kitchen and a child's bedroom, is the family area.

Excessive humidity levels

The house does have a few problems, most of which the Cooks plan to rectify this spring. The major difficulty is the high humidity level which results in pools of water along the base of the windows.

Cook has been modifying the design of the foundation to help combat the problem and he will present the modified plans to a group interested in utilizing his ideas in the construction of a 65-unit retirement village in Kentucky. For that project 30 centimetres of styrofoam would be placed along with granular fill around everything, including the footings.

In addition Cook plans to install a heat exchanger into his own home and is considering various methods of covering the windows at night and during overcast days.



The Cook home has a wall of glass and its roof is covered with earth.

Rod MacIvor photos