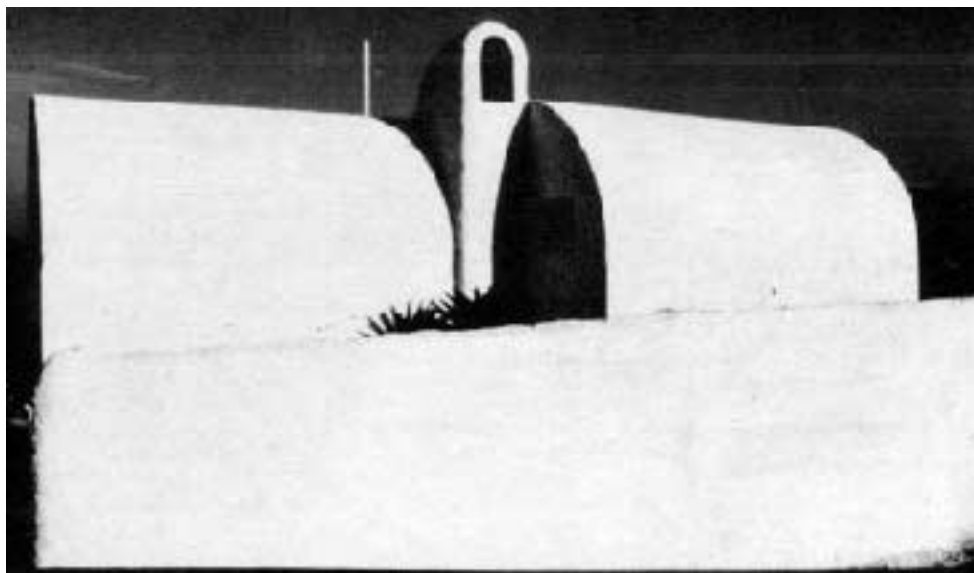


## A Dirt-Cheap Method of Building Houses

By Lewis Lorini



Debra Denker, Geltaftan Foundation

*This prototype of inexpensive ceramic housing incorporates three vaults and a wind-catching scoop into a 500-square-foot dwelling. Its creator, architect Nader Khalili, was inspired by ancient Iranian structures.*

Imagine building permanent houses anywhere in the world with whatever is on the site. Not the building materials common to the area, but the material actually on the site – namely the terra firma. The sand; the clay; the dirt.

That has been the dream of Iranian-born California architect Nader Khalili and the mission of the Geltaftan Foundation, an organization Khalili founded to study and promote fired-earth structures.

Bothered by the cost of housing, both to the planet and to poor Third World countries, Khalili has spent the past 12 years developing a method of making permanent structures anywhere from the most com-

mon substance on the Earth, which is of course the earth itself.

The idea was sparked by a motorcycle trip through his native Iran where Khalili noticed that the oldest structures in that ancient civilization were kilns, some large enough to walk into. What if a kiln was a house, he mused in *Racing Alone*, a book based on that trip.

Khalili's method, called Ceramic Houses, involves using dirt, sand, and clay to make bricks that are used to form earthen, vaulted structures. The structures are then baked in place, like a clay pot, into a hard ceramic material using large kerosene burners inside the structure. Essentially, the house becomes

the kiln that fires itself.

"These materials are everywhere. All rock and dirt were at one time volcanic material that can be fused with heat," Khalili says.

The other key aspect of his designs is the use of arches in place of pitched roofs. Eliminating pitched roofs eliminates the need to use wood or other bearing beams in the buildings.

Although ceramic houses are being built around the world, one of the best examples is a structure in New Cuyama, Calif., that was designed and built by Khalili and his Geltaftan Foundation colleagues.

The prototype structure combines three modular vaults in a way that creates maximum living area for the

amount of material used. The design of the 500-square-foot dwelling uses no interior doors as the rooms flow into each other. A wind catcher, a traditional method of passive cooling in the Middle East, was added to funnel cool sea breezes that blow daily into the house.

Instead of using bricks and building the structure in place, the New Cuyama prototype was built by spraying material onto wood forms in a guniting process. Vaults were formed in a vertical position and after completion lowered into a horizontal position. The innovative technique is intended to simplify vault construction and make it possible for unskilled labor to make these structures.

Although Khalili envisions a gunited adobe process being used in the Third World, the New Cuyama structure was made of a different material to satisfy the private party who financed the project. A patented material called Ksankalite was used. It is made of a combination of natural materials including volcanic cinders, sawdust, sand, vermiculite, and cement.

Another component of the New Cuyama building that will not be necessary in the Third World is steel rebar, which was added to satisfy California building codes.

While most of Khalili's efforts are focused on the Earth, he has investigated the possibilities of using this building technique on the moon for the National Aeronautics and Space Administration.

And rebuilding battle-torn Kuwait and Iraq could be another practical application of this low-tech, inexpensive method of building, Khalili says. ■



Geltaftan Foundation

*In the New Cuyama prototype building, spaces are defined by arches, and the rooms tend to flow into each other. There are no interior doors.*



Debra Denker, Geltaftan Foundation

*As a model for Third-World housing, students and volunteers build this 27-foot dome in New Cuyama, Calif., entirely out of standard unfired clay brick. The foundation is a circular trench packed with sand.*