

Ward + Blake featured in The New West magazine

February 11, 2008

Ancient Building Blocks of Dirt

How a few homes in the West are reviving the oldest construction material.

By Dan Whipple, 2-11-08



Consider dirt. It's old, and it's making a comeback as a construction material under a new name: rammed earth.

Rammed earth is exactly what it sounds like.

Hard-packed dirt, as a building material, predates all others. Under the right conditions, it endures. About 22 centuries ago, the Qin Dynasty built parts of the Great Wall of China using rammed earth. Some portions still stand. There's an earthen building near Luxor, Egypt, which was built some 3,300 years ago.

In the Southwest adobe construction has been used for millennia. Across the West you can sometimes find the remains of shacks built of piled up sod — soddies — that were among the first pioneer dwellings to shield themselves during their first winters.

When you look around the West at all the treeless spaces, it's a little surprising that earthen construction hasn't taken a greater hold on the architectural imagination.

Linda Kiisk, associate director of facilities planning at the University of Wyoming describes it this way: "Rammed earth basically works like the formwork of pouring a concrete wall. But instead of concrete, you are using soil from the site. The material is tamped down. This can be done with sledge hammers by hand or with a pneumatic device. Then you pull the forms off, and you have a stable wall."

Jug Brandjord, a Casper, Wyo., contractor says that enthusiasm for the technique has picked up recently, perhaps due to rising energy prices.

"It's not a landslide or anything," he said.

Earthen homes are wonderfully energy efficient, said Tom Ward of Ward+Blake Architects in Jackson, Wyo. He has designed several for second-home seeking clients in that upscale neighborhood.

The walls of a rammed earth home are sometimes two feet thick — the acoustics are wonderful — giving the house what's called "thermal mass," Ward said. Throughout the day, as an exterior wall is exposed to the sun, it absorbs energy, and then slowly releases it at night.

In 1983 Brandjord studied and compared the energy use of rammed earth and conventional homes. He estimates an earth house uses one-third as much energy.

Although not every kind of soil is suitable for a rammed earth building, excavated material from the site can often be used.

Kiisk believes that holds one of the major advantages in rammed earth: "In terms of spirit energy, rather than quantitative energy. You feel connected to the earth."

"In terms of being environmentally sensitive, it doesn't require a lot of outside resources to do this sort of construction," Ward says.

On the other hand, it is labor intensive, which reduces any cost advantage that the materials saving might offer.

"In locations where you have an abundance of inexpensive labor, it is an effective way to build," Ward says. "In Jackson where labor costs are extremely high, it hasn't priced itself out of the realm. But it isn't low cost."

Brandjord agrees. The construction cost of rammed earth is about the same as a stick-built house, he says.

Brandjord, a thoughtful, soft-spoken man, came to rammed earth through a roundabout route. He trained as a geologist after serving in the army in Korea. While working as an oil company geologist in North Dakota in 1957, he met an engineer from Seattle who bought his uncle's ranch near his hometown near Williston, N.D., in an early incarnation of the back-to-the-land movement.

“He was doing it the old-fashioned way,” Brandjord says. “He entertained his neighbors quite a bit. He let the calves wean themselves, that sort of thing. He was always gonna build a rammed earth house. He never did, but he got me thinking about it.”

Brandjord has build more than 30, including some circular ones in which he used an old oilfield tank as a form.

The technology of rammed earth has taken a step forward recently for its use in earthquake prone areas like Jackson. Tom Ward has patented a post-tensioning system using rammed earth with steel reinforcing rod to increase the relative strength of the wall system. He was inspired to this after seeing video of earthen structures withstanding earthquakes well in Turkey.

Ward has built his own earthquake resistant 3,000 square foot rammed earth home in Jackson, on a bluff overlooking the Snake River.

There are things to look out for with rammed earth. It is important to build the foundations high and the eaves far out to keep water from the wall. Construction has to be scheduled carefully so the walls don't freeze during the curing process.

After construction, however, the walls can be left more or less alone. Ward says he treats the outside with a simple acrylic-based masonry sealer.

And inside his own house, he applied a mixture of ten percent Elmer's glue and 90 percent water, which dried in a clear matte finish. “That's one of the things my wife was concerned about,” he says. “She didn't want dust from the walls getting all over the house.”

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