

Strawbale builder sees potential market in retrofitting

BY LEE ROSS | SPECIAL TO NMBW

Cadmon Whitty is working to revise the story of the three little pigs.

Whether you've built your house out of stick, brick or even adobe, he says you can still learn something from the little pig who built with straw. Whitty's company, **Paja Construction** (paja means straw in Spanish) retrofits homes with straw and builds straw bale privacy walls and houses.

While strawbale construction is old hat in New Mexico, Whitty, who has been doing it for years, is taking it one step further by using the construction on existing homes.

"I'm hoping that retrofits will catch on," says Whitty.

A retrofit is when straw is added to the outside of an existing structure. If installed properly, straw is a green, renewable material with great insulating properties. In a test by **Sandia National Laboratories**, an 18-inch thick bale had R-values ranging from R-44 to R-52. R-value is a measure of how well a substance prohibits heat exchange. With some variation, a wood-frame home is required to have at least R-14 insulation.

There are a number of other advantages to using straw bale. Because it is so light-weight, people who have worked with the bales often say that stacking them is like playing with building blocks. And, if installed properly, a straw wall is water-



Whitty

proof, won't allow animals and insects inside and allows very little air exchange so it is also fire-resistant. But beyond all that, Whitty says, he just likes the material.

"I had a predisposed interest in straw bale," says Whitty, who has 15 years of experience working with straw bales and 26 years of experience in construction. The switch to straw came when he went to a straw bale workshop taught by Steve MacDonald in Gila, N.M.

Although conceptually it is quite simple, straw bale can be problematic if not installed properly. Whitty is even involved in a few lawsuits against straw builders in New Mexico, ones he'd rather not name, that he says used poor construction methods.

He gives the example of an outdoor fire place, constructed from straw bales, that wasn't sealed properly. When the bales inside the walls caught fire, the chimney continued to smoke and smolder for days after the fire in the hearth was out. Despite these problems, Whitty still has an affinity for straw.

"I still find myself in love with it," says Whitty. "I look at a house that's straw bale and wish I didn't have to stucco it, that I could just look at the straw forever."

One reason for his reluctance to stucco the inexpensive bales might be because in a retrofit, stucco is the biggest expense. Another expense can be re-roofing the



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Cadmon Whitty is retrofitting this North Valley home using straw bale methods.

house. Whitty resides at a home he retrofitted in the SE Heights.

After retrofitting his own home with straw bales, beefing up the insulation in the ceiling and adding new doors and windows, Whitty says he shaved \$130 off of his monthly PNM bill, which went from about \$180 a month to just \$40 or \$50, although he admits that not all of the savings were due to the straw he fitted to his walls.

To do the entire 1,000 square feet around

his house, add new, high R-value windows and doors and install better insulation for the ceiling ran about \$12,000 dollars. It is a cost he estimates he will recoup in energy savings after about eight years. He was also able to tuck 14-inch wide bales under the overhang of his existing roof.

For his current retrofit project, he had to extend the eaves to cover the new wall. In a retrofit, the windows also have to be

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redone to match the extended wall. Since they have to come out anyway, Whitty replaced his with higher R-value versions. Whitty also has to install what is called a rubble foundation.

Unlike a regular foundation, a rubble foundation is relatively easy to put in. Because straw bales are so light, the state only requires the foundation be dug to the frost line (in New Mexico this is just a few feet below the surface).

The trench is then filled with gravel and sand and only capped with concrete, rather than going to the expense of filling the entire trench with concrete.

Whitty says getting permits for a strawbale retrofit is pretty much like getting permits for any remodeling job. He got his in about two hours. Strawbale construction is in the New Mexico building code. However a structural engineer must verify that the strawbale portion of the job is OK.

"In terms of low-cost foundations and basically optimizing the system, nobody does it like Cadmon [Whitty]," says Catherine Wanek. Wanek is the president of the **Straw Bale Construction Association of New Mexico**. She makes instructional videos about straw bale and also publishes "The Last Straw Journal," a publication about straw bale and other natural building materials. Wanek has retrofitted a corner of her own building, in Kingston, N.M., with straw bales.

In addition to Whitty's innovations,

Wanek says she would also advocate using a layer of clay between the existing wall and the retrofit. The clay can absorb water, she says, which helps avoid mold and rot, and, in the process, also absorbs toxins, much like a clay water filter would. But she says each retrofit is different and presents its own problems.

"It's more challenging than it sounds," she says. She added that straw bales are extremely versatile. They are used in high-profile homes, but the material is cheap enough to be used in low-cost housing as well.

"Super-insulation is the key element to get our energy costs down," says Wanek.

In fact, Whitty and Wanek both see green building, proper insulation and alternative energies as ways to make strides to alleviate the causes of global warming.

According to the Department of Energy (DOE), the fossil fuels used to generate electricity for a single home will cause more carbon dioxide than two average cars. A 2000 audit found that homes and buildings accounted for half of all energy-related carbon dioxide emissions in the U.S.

Peggy Loftfield, a Feng Shui practitioner, designed strawbale homes before hiring Whitty to retrofit her North Valley abode. She and her husband, Earl, bought their 1,000-square-foot home for \$140,000 and Loftfield says the additions and renovations will easily double that price.

Loftfield says she has had a longstanding interest in green building and energy effi-

ciency. While searching the Internet, she came across Whitty's Web site and later followed up by taking a tour of his home to see his completed retrofit.

"When I found out about the retrofit possibility, it really added another dimension to the project," she says.

They had to extend the eaves on the home's asphalt shingle roof to add the straw bale and she says the retrofit alone ended up costing about \$5,000. They also upgraded the windows and doors, with the highest insulating fixtures they could get, and had insulation blown into the attic.

Other green features of the house include passive solar heating (air is heated in a solar panel on the roof, then circulated into the house), bamboo flooring in the kitchen and a grey water system to water the outdoor plants.

Loftfield also plans to retrofit her 450-square-foot garage and turn it into a guest house and laundry room.

The water from the laundry machine will also be part of the grey water system and she would like to install a system to catch rainwater as well.

While they probably could have torn the house down and built a new house for a similar amount of money, Loftfield says she thought tearing down the old place would be "wasteful, and not necessary."

"I'm glad that we did it," she says. "We created a 21st century home out of a 1950s-style home. I just want people to see that it can be done."