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Agriboard straw buildings stand tall

The federal government purchases more than \$200 billion worth of goods and services each year, which gives it a leading role in protecting the environment. Now federal agencies are beginning to incorporate environmental considerations into their purchasing practices in order to preserve and protect our natural resources.

“The Army is committed to good environment stewardship and the long-term sustainability of its installations,” said Tad Davis, U.S. Army deputy assistant secretary for environment, safety and occupational health. “We can’t send our soldiers out to engage in the global war on terror without training them as they need to fight, but we don’t have to sacrifice the environment to provide that training.”

This case study provides an in-depth look at Fort Hood’s decision to use Agriboard, a product from Agriboard Industries, in the construction of two warehouses. Located in central Texas, Fort Hood is a 340-square mile (217,337 acres) installation and is the only post in the United States capable of stationing and training two armored divisions. It also meets the training and support requirements for many smaller units and organizations. Fort Hood has more than 70,000 people and more than 19.8 million square feet of buildings.

Currently, Texas has about 50 buildings made from Agriboard. Another 20 are scheduled for construction in 10 different states, according to Tim Evans, Agriboard’s vice president of marketing and sales. Fort Hood is the only Texas military base with Agriboard buildings. Its warehouses, approximately 3,200 square feet each, were finished in 2004 and 2005. A third administrative building, which will be 5,000 square feet, is in the design phase.



This Agriboard building shows the individual panels of compressed wheat straw and how they're put together.

Agriboard is made from wheat or rice straw or hay and may be used for commercial or residential buildings. The slabs are created by compressing wheat fiber between two strand boards and then glued into single panels up to 9 feet wide and 24 feet long. Texas farmers supply the wheat or rice straw, which is delivered to Agriboard's central manufacturing plant near Fort Worth.



The same building is shown in the last phase of construction.

Base managers and employees have come on board to support Fort Hood's many environmental initiatives. They have accepted and implemented the construction of the Agriboard buildings with ease, leading to the program's success. The staff has many valuable lessons to share with other agencies about the use of this biobased building material.

Environmental and Safety Benefits

Agriboard has many positive effects on the environment. Buildings constructed from these straw panels also have important safety features. These benefits include:

- Rapid renewability. Straw is grown and harvested in multiple annual crops, ensuring a continuously renewable supply.
- Recycled materials. Over 80 percent of Agriboard's panels consist of straw left over after the grain has been harvested.
- Low or no Volatile Organic Compounds (VOCs). VOCs are organic chemical compounds containing high enough vapor pressures to vaporize and enter the atmosphere, harming the environment.
- Decreased landfill use.

- Wind Resistance. The Federal Emergency Management Agency (FEMA) has certified Agriboard as the only material that can be used in the construction of above ground tornado structures.
- Blast Resistance.
- A Two-Hour Fire Rating. A fire could occur on the inside or the outside and it won't burn through the Agriboard structure for two hours. Standard stick frames have about 10 minutes before being engulfed in flames.

Construction Cost Benefits

Agriboard buildings take significantly less time and labor to construct, offsetting the higher material costs. Workers erected each warehouse at Fort Hood in two days and completed a single building in two months. In general, construction times with Agriboard can be decreased by as much as 75 percent. This is because the majority of the building is done at the Agriboard factory, rather than the job site.

In addition, Agriboard does not require specially trained installation crews. The typical Agriboard crew consists of one supervisor, one skytrack (forklift) operator, and four laborers, using common construction tools. The average installation time for 9 feet by 24 feet (216 square feet) panels is no more than 45 minutes, and the typical hourly charge for installing one panel is about \$80. The hourly charge for general construction for the same job with conventional wood would involve more laborers and hours, doubling the cost.

This unique construction material also keeps energy costs down. "When it's really hot, we go into the warehouses and they're really cool and it's easier for people to work," said Jennifer Rawlings, Fort Hood environmental protection specialist. The warehouses have no air conditioning units, however. That's possible due to the panels' density. Four-inch thick panels give a building an R-17 rating, while a building with 8-inch thick panels receives an R-30 rating. (R-factors measure the insulation or thickness of a building.)

Although it's difficult for military installations to justify the higher initial cost of Agriboard (the Armed Forces requires lower baseline construction costs than commercial buildings), Rawlings believes that sustainable design and construction will be a permanent fixture in the Army's future. "It's just the learning issue," she said.



Jennifer Rawlings, environmental protection specialist at Ft. Hood

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