

Strawbale Technology

Overview

Strawbale technology has been around in wider use for a few decades, but it only in the last few years that it has started to enter mainstream consciousness. That being said, it is still viewed as an alternative building method, despite it having mainstream appeal and professional acceptance amongst owners, builders, engineers, designers, architects, and CMHC*. There are also standardized building codes in many US states.

Unlike other 'new' building systems, strawbale technology does not come from within the construction industry. Strawbale has appealed as a sustainable solution because of a grassroots desire to build more efficiently and effectively. The technology has hit a nerve in our collective thinking as we redefine and reassess the concept of housing, sustainable building systems, and energy efficiency.

*Canadian Mortgage and Housing Company

The Alberta Climate

Our climate proposes many challenges to creating and maintaining long-lasting strawbale buildings. Battle Lake Design Group, Inc. has worked with Habib John Gonzalez of Sustainable Works, Ltd of Nelson, B.C. since 2004 to fine tune strawbale construction for our harsh and variable environment. Habib is considered on of the foremost experts on strawbale construction in Western Canada. He is also a contract researcher for CMHC. Simplicity of construction, integration with standard foundation, framing methods, design, and assembly that provide superior protection from weather and moisture during the construction phase and for the completed building have been the areas of our focus.

We have also developed an excellent partnership with Acius Engineering, a structural engineering firm from Edmonton, that not only provides engineering and stamps on our designs as required but has taken a proactive role in the promotion of strawbale buildings.

Reasons to Use Strawbales

- Local and readily available material
- High level of energy efficiency high R values and elimination of thermal bridging
- Potential lower construction costs
- Design benefits easily adaptable to a variety of design styles - allows for the creation of curved walls and organic shaped surfaces
- Low tech/human scale lends itself to community based construction, with good results for people with entry level building skills
- Quiet excellent sound barrier with pleasing interior acoustical properties
- Strength twice the load bearing capacity of a typical 2x6 wall

- Fireproof 2.5 hour fire rating
- Healthy indoor environments and air quality there is no vapour barrier, as a result indoor air quality is better than in 'conventional' structures
- Significant environmental benefits
 - reduction of energy to heat and cool
 - annual renewability of the resource
 - low embodied energy
- Product is not, and cannot be, patented or become proprietary
- Possesses high stability under seismic stress

Overview of Strawbale Building Techniques

Strawbale buildings can be divided into two main categories:

1. Load bearing
2. Non load bearing

Load bearing buildings have a 'top plate' or box beam on top of a compressed strawbale wall. The roof or second storey is supported on this plate.

Non load bearing buildings depend on a post and beam or 'light frame' construction for structural support and the straw bales are an infill or 'wrap' around the structure.

Foundations

Strawbale buildings can be adapted to conventional basement and joist flooring systems. When set at grade a rubble trench and stem wall system or modified strip footing is used. An essential part of any strawbale foundation are the toe ups and associated flashing and insulation.

Walls

Bales are laid in a running bond pattern with a top plate or beam and stucco wire on both sides sewn through the bales on each bale course. A scratch coat and colored finish coat of cement/lime stucco is applied on both sides forming a fireproof, structural skin panel.

Second floors and roofs

Floor systems are usually conventional dimension lumber or I-joists with walls and roofs conventional frame construction. Strawbale can be used for second floor walls but does not adapt well to gable ends and angles under roofs. If second floor framing is stud construction it is recommended the framing be wrapped on the exterior with rigid foam insulation to reduce thermal bridging and increase R values.

Doors and Window

Doors and windows are contained in framed bucks. The extra thickness of the walls allows for deep window wells, seats or alcoves around these openings.

Interiors & Finishing

Interior walls are usually conventional frame walls and can be finished with drywall, wood or any suitable material. Cupboards are mounted or hung from horizontal wood ledgers or girts that are bolted through the straw bales before the stucco is applied. Electrical wiring is run between the bale courses before the stucco wire is applied. Electrical boxes are secured in the bales by a wooden wedge and tied to the stucco wire and 'cemented' in place.

Applications Where Strawbale is Not Suitable

Straw bales are not suitable for below grade installation or any location where they would be exposed to excessive amounts of moisture and water. Suitable roof overhangs need to be designed into all strawbale buildings to provide protection.

Summary

Straw bale construction is a visible part of the interest in the revival of 'natural building'. These buildings are in part constructed of minimally processed, renewable material and is readily at hand in Alberta. The vapour-permeable cement and stucco provide us with an alternative to being enclosed in a 'plastic-wrapped' indoor environment, VOC's, toxins and poor indoor air quality. They can be more spontaneous, free form, organic and connected. They may be best described as not low tech, but as appropriate technology. As we in Alberta become aware of our need to lessen our 'footprint' on the planet, strawbale can be the smarter way to build.