STRAW BALE CONSTRUCTION

Growing A Sustainable Home

Although straw bale homes may sound like a new development in construction they have actually be in use in North America for over 100 years. In fact some early examples of straw bale homes, built in the sand hills of Nabraska in the late 1800's, are still standing and in use today!

Despite this straw is often viewed as an undesirable by-product of agriculture. This is because straw, unlike hay, is made from the stalks of plants which have matured, been harvest and died. As a result straw has no nutritional value and cannot be used as animal feed. Consequently, millions of tons of this renewable and durable material is baled and left to rot in fields across North America annually.

Did you know…?

Most of the exterior walls in the Camp Kawartha Environment Centre were constructed using wheat straw. However the curved south wall was actually made using hemp stalks. You can also choose from a variety of other grain plants such as oats, barley, rye, rice, or flax to build a straw bale wall.

Why Choose Straw?

There are many reasons to choose to purchase or build a straw bale home. These structures are architecturally unique, ecologically sustainable and economical.

The characteristics of straw as a building material allow for a variety of architectural features such as rounded edges, smooth corners and unique arches or angles. Walls can be built to appear either thick and uneven, like North side the Camp Kawartha Environment Centre, or straight and square like our East and West walls.

Photo Credit: Shelby Parker

From an ecological stand point, straw is an excellent building material. Not only is the supply renewed annually but straw represents a significantly smaller amount of **embodied energy**, the quantity of energy consumed over a objects lifespan (including fabrication, transportation and disposal) than material used in a conventional frame home.

An additional benefit of choosing a straw bale home can be found in cost savings. Straw is an easily obtainable, and often local building material. Since straw can be produced from any grain bearing plant it can generally be found across Ontario, including in the Peterborough area.

Did you know…?

The straw used throughout the Camp Kawartha Environment Centre was sourced from Lakefield while the hemp for the rounded wall, window frames and bench was purchased from a farm outside of Madoc.

The cost of building a straw bale home will depend upon a number of variables including; location, labour required, size of building and desired features. On average a straw bale home will cost anywhere between $130 and $150 per square foot. With thoughtful planning the cost can be as low as $60 to $80 per square foot if you are able to supply volunteer labour and make use of reclaim materials.

However it is important to consider the savings generated from the superior insulative value of straw when determining the overall cost. The natural insulation provided by straw bale buildings in conjunction with passive solar design, as found in the Camp Kawartha Environment centre, can reduce average home heating requirements by up to 60%.

Did you know…?

On average a wall in a conventional home has an R-value, a measurement used to express how well a wall insulates, of between 12 and 20. On the other hand a straw bale building, such as the Camp Kawartha Environment Centre has an R-value of between 30 and 40.

How is it Done?

Straw bales can be used to build a **load bearing** wall, where the weight of the roof and any additional stories, is carried by the bale walls. In this system bales are stacked in place using a staggered configuration, like bricks, to add stability. In tests straw bale walls have been strong enough to support multiple stories and over 6000 lbs per linear foot!

Photo Credit: Shelby Parker

Straw can also be used as **infill** or a material used to fill voids. Typically when this technique is used the straw bale walls are not load bearing.

Did you know…?

The East & West straw bale walls at the Camp Kawartha Environment centre, which are examples of a load bearing wall system, were built off site in a workshop. By building the walls inside instead of at the work site builders are able to produce an even wall more efficiently.

After any type of straw bale wall has been erected, it must be plastered to protect the straw from moisture. An average of 2 to 3 coats of plaster are added to both interior and exterior walls by hand or using mechanical sprayers.

Photo Credit: Shelby Parker

Did you know…?

Many different types of plaster can be used to protect straw walls from direct contact with degenerative forces such as moisture. At the Camp Kawartha Environment Centre on the South, East & West walls a lime based plaster was applied while on the North wall a earthen plaster was used.

Final Facts

Safety is a common concern people express when thinking about straw bale homes. However due to the tightly packed nature of straw bales there is insufficient oxygen to sustain fires easily. In fact over the past two decades straw bale homes have preformed exceedingly well and in fire tests have proven to withstand temperatures of over 1900º F for 2 hours.

Insects and other pests pose no more of a risk to straw bale homes than they do to conventional structures. Straw bales should be protected on all side by plaster. In addition, as straw is high in silica content and low in organic matter it has no nutritional value and therefore will not attract pests.

Bibliography

Magwood, Chris. (2005). *More Straw Bale Building.* Gabriola Island, BC : New Society Publishers

Austin Energy (www.austinenergy.com/)

Camel's Back Construction (www.strawhomes.ca/)

MidWest Renewable Energy Association (www.the-mrea.org/)