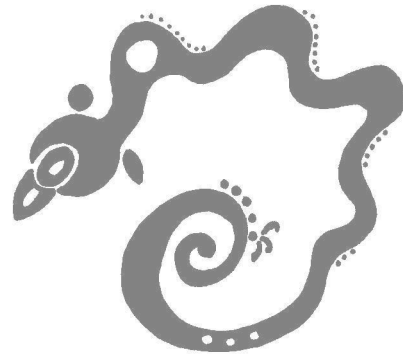




DOWN TO EARTH DESIGN
 design | education | consulting
 with an exclusive focus on eco-sensible buildings



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STRAWBALE



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WHAT IS STRAWBALE?

Straw has provided a beneficial construction material for as long as there has been agriculture. The settlers of Nebraska conceived of using baled straw as a super-insulating wall system over 100 years ago when they found few other building materials available. Historic strawbale structures (some over 75 years old) still exist in a variety of climates: hot to cold and dry to humid.

Straw comes from the stalk of any grain plant (oat, wheat, rice, barley, etc.). Straw is high in cellulose, similar to wood, so provides little or no food source for animals (unlike hay).

There are two basic types of strawbale construction: loadbearing (or Nebraska style) and non-loadbearing (or infill). Loadbearing construction supports all of the building loads on the strawbale walls. Non-loadbearing construction uses an independent structural system with strawbales infilling between. Building with strawbales is simple & requires no expensive tools.

FINISHES

Strawbale walls must be protected by water-resistant but breathable finishes, such as earthen-based or lime-based plasters. Cement-based surface finishes are not recommended in wet or humid climates, as cement allows water to penetrate and accumulate inside the wall. Clay and lime plasters provide beautiful, durable, affordable, and easy to apply finishes that are suitable for strawbale walls.

BENEFITS

- high insulation (over R=35) & sound absorption
- simple, easy-to-learn construction techniques
- structure can utilize standard construction techniques
- inexpensive material that is usually available locally
- natural and completely biodegradable material
- renewable material in a single growth season
- requires very little energy to produce
- diverts farming waste (*grain harvested as cash crop*)
- aesthetics of a thick-walled structure

CHALLENGES

- requires careful detailing to prevent water infiltration (preferably by an experienced design professional)
- necessitates educating yourself, the builder, and permitting officials
- may require more interaction with building officials
- labor intensive techniques; can be expensive if hiring

PROPERTIES

INSULATION

Strawbale walls provide the most affordable highly-insulating wall system available. Tested R-values exceed R-35 and thermal mass plasters on each side of the wall improve the thermal performance even more.

FIRE RESISTANCE

Loose straw is highly flammable, however bales of straw are compacted tightly enough that they deprive any would-be flame of needed oxygen. The plaster finishes provide additional fire resistance.

MOISTURE DETAILING

Moisture remains the largest concern with strawbale walls, as with any biodegradable construction material in a wet or humid climate. There are two main ways that moisture gets into walls: infiltration as vapor or flowing in as a liquid. High moisture content enables fungi to grow and creates the environment for the bacteria that cause decay in cellulose-based materials.

Liquid water is kept out through careful detailing at wall bases, wall penetrations, and tops of walls. Airborne vapor can only cause problems if it becomes trapped inside the walls, so surfaces are allowed to "breathe" by eliminating moisture barriers and condensation points.

RELATIVE COST

Materials for strawbale walls are lower cost than for standard frame construction (typically 1/5 the total cost; versus 1/2 for standard construction). Labor costs to install strawbales and plaster walls run higher. Simple-to-learn construction methods allow home owners to gain savings through sweat equity. Labor costs are offset by significant savings in long-term energy costs.

PEST RESISTANCE

Straw contains no nutritional value for pests, thus minimizing concern for infestation. Rodents do not have a convenient cavity wall in which to nest and plasters provide an additional physical barrier.

BUILDING PERMITS

Strawbale construction meets the existing building code throughout the United States, thanks to pioneers who paid for third-party testing of strawbale properties. Each code includes a provision for unusual materials and methods. When submitting for a building permit, demonstrate to permit officials specifically how strawbale meets the existing code.

RESOURCES

WEBSITES

www.dcat.net
www.thelaststraw.org
www.strawbalecentral.com
www.buildnaturally.com/EDucate/Articles/Strawbale.htm
www.buildnaturally.com/EDucate/Articles/DryStrawbale.htm
www.buildnaturally.com/EDucate/Articles/Permitting.htm

BOOKS

[Buildings of Earth and Straw: Structural Design for Rammed Earth and Straw-Bale Architecture](#) by Bruce King

[Serious Straw Bale: A Home Construction Guide for All Climates](#) by Paul Lacinski and Michel Bergeron

[Straw Bale Building: How to Plan, Design & Build with Straw](#) by Chris Magwood and Peter Mack

[The Beauty of Straw Bale Homes](#) by Athena Swentzell Steen and Bill Steen

[Straw Bale Construction: A Manual for Maritime Regions](#). By Kim Thompson, Jennifer Corson, Michelle Nokken, Chris Watts, and Ken Wilkie



HANDS-ON WORKSHOPS

DOWN TO EARTH DESIGN teaches workshops on building with strawbales.

WORKSHOPS INCLUDE:

- overview of strawbale construction, including detailing & permits
- demonstration of shaping and installing strawbales
- guided hands-on experience building strawbale walls

Check our website www.buildnaturally.com for additional information.