Alternative Building Systems

Rebuild Green Expo
Sonoma County, California
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RENEWABLE MATERIALS

Photosynthetic

Rapidly Renewable

Locally Available

Ultra Low CO₂

Minimally Processed
Simonton House – Purdum, Nebraska 1908

Burritt Museum – Huntsville, Alabama 1938
Appendix S: Strawbale Construction

SECTION AS101
GENERAL

AS101.1 Scope. This appendix provides prescriptive and performance-based requirements for the use of baled straw as a building material. Other methods of strawbale construction shall be subject to approval in accordance with Section 104.11 of this code. Buildings using strawbale walls shall comply with the this code except as otherwise stated in this appendix.

SECTION AS102
DEFINITIONS

AS102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the International Residential Code for general definitions.

BALE. Equivalent to straw bale.

CLAY. Inorganic soil with particle sizes less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

CLAY SLIP. A suspension of clay particles in water.

FINISH. Completed compilation of materials on the interior or exterior faces of stacked bales.

PRECOMPRESSION. Vertical compression of stacked bales before the application of finish.

REINFORCED PLASTER. A plaster containing mesh reinforcement.

RUNNING BOND. The placement of straw bales such that the head joints in successive courses are offset not less than one-quarter the bale length.

SHEAR WALL. A strawbale wall designed and constructed to resist lateral seismic and wind forces parallel to the plane of the wall in accordance with Section AS106.13.

SKIN. The compilation of plaster and reinforcing, if any, applied to the surface of stacked bales.

STRUCTURAL WALL. A wall that meets the definition for a load-bearing wall or shear wall.

STACK BOND. The placement of straw bales such that head joints in successive courses are vertically aligned.

STRAW. The dry stems of cereal grains after the seed heads have been removed.

STRAW BALE. A rectangular compressed block of straw, bound by ties.

STRAWBALE. The adjective form of straw bale.

STRAW-CLAY. Loose straw mixed and coated with clay slip.
116 lb. of CO₂ per 3-string Straw Bale  

source: Craig White, RIBA / White-Design
Load-Bearing – aka ‘Nebraska Style’
Non-Load-Bearing – aka Post & Beam – Flat & Notched
Non-Load-Bearing – aka Post & Beam - External
Non-Load-Bearing – aka Post & Beam – on Edge w/I-Joists
“I think it pretty much survived on its own, with some patrols for hotspots. [It] looks like once power is restored all our systems are go. We are SO LUCKY! Go Strawbale construction!”

— Homeowner
Redwood Valley Residence - With a wrap-around porch that is deep on the east and west ends, and shallow to the north and south, this home is an off-grid performer that stays comfortable all year. It was built on a flat pad on an otherwise sloping site, but retaining walls could be located at the line of the porch columns to make this design fit a variety of sites. It is 841 sf with 2BR and 1BA.
Non-Load-Bearing – On-End Between Standard Wood Framing
720.2 Concealed installation. Insulating materials, where concealed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

Test Material: 001, Straw Bale

Test Standard: ASTM E84-98 Standard Test Method for SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS (ANSI 2.5, NFPA 255, UBC 8-1, UL 723)

Test Date: May 11, 2000

Test Sponsor: Katrina Hayes

Test Results: FLAME SPREAD INDEX = 10
SMOKE DEVELOPED INDEX = 350
REDUCE GLAZING ON NORTH & WEST
Light Straw Clay

images courtesy of Paula Baker-Laporte / EcoNest
Other Clay/Straw

Vallejo’s Petaluma Adobe, Sonoma County, CA

[in the Building Code since ca. 1940]
Cob Oven - International Straw Building Conference – New Zealand
WASP's BigDelta 3-D Printer using Clay, Mud and Plant Fiber

source: inhabit.com
Bamboo

images courtesy of Darrel deBoer Architect and BamCore
BAMCORE EXTERIOR WALL SYSTEM

An isometric view of BamCore's revolutionary wall system

Top mounting track
High-recycled content 20 gage galvanized sheet metal runs 10' laterally and ties the top of panels into their vertical position. Truss or ceiling joists connect to the top track through a patented sheet metal bracket (not shown).

BamCore Prime Wall Panels
Low-embodied energy, engineered panels constructed from four 1/4" layers of timber bamboo and two 1/8" veneers on each face, laminated with a formaldehyde free glue. Panel attachment to tracks and splines with 8" o.c. self-taping screws.

Joint splines
High-recycled content 20 gage galvanized sheet metal 3" wide splines connect adjoining panels vertically.

Corner Splines
High-recycled content 20 gage galvanized steel sheet metal broken to 90 degrees holds the corner joint true, plumb and square.

Bottom mounting track
High-recycled content 20 gage galvanized sheet metal runs 10' laterally and ties the bottom of the panels into their horizontal position. Track width determines wall thickness. Tracks anchored to subfloor or foundation anchor bolts as specified in structural plans. Shear holds are incorporated into bottom attachment (not shown).
Cork  Durra Strawmit Panel  Wood Fiberboard
Sheathing
Cellulose  Wool  Cotton / Demim

Insulation
kgCO$_2$e after sequestration (from *Making Better Buildings*, Chris Magwood)
Register now for the California Straw Building Association’s (CASBA) annual West Coast Natural Building Conference!

APRIL 5-7
WESTERBEKE RANCH, SONOMA

Friday Evening: ‘Straw Building 101’
Saturday: Keynote by Jacob Deva Racusin
   Designer/BUILDER/Bldg Scientist
Hands-On Building Throughout!

This Year’s Topics Include:
• finding work in natural building
• finding contractors experienced with straw bale or LSC construction
• lower-cost building methods
• fire resistant building features
• clay finish plasters

for more information & to register, visit www.strawbuilding.org

Several CASBA member firms are offering free or discounted plans and design services to fire victims - write to info@strawbuilding.org or visit www.strawbuilding.org/Find-a-a-Professional

For information on fire-resistance in Straw Buildings:
www.strawbuilding.org/resources/Documents/Fire-ResistiveStrawbaleWalls.pdf
The devil is in the details —
the science and art of designing and building
durable, efficient, straw bale buildings

This book is a must-read for anyone designing, building, or earning money
for straw bale buildings.

This is the book I have been waiting for — the complete guide to straw bale construction.

This is the book I have been waiting for — the complete guide to straw bale construction.

Co-created by some of the greatest straw bale architects and builders who have ever lived, it is highly readable, comprehensive, and absolutely relevant to the economic challenges of our times.

An illustrated guide for design and construction.

Whether you are an architect, engineer, contractor, or straw bale builder interested in creating informed choices, Straw Bale Building Details is the indispensable guide to current practice in straw bale design and construction.

CASBA

This book is a must-read for anyone interested in building with bales.


CASBA is the Straw Bale Building Association (CASBA) is a non-profit organization dedicated to furthering the practice of straw building through research, testing, and documenting innovations in this building form. CASBA is headquartered in Berkeley, CA.
Hempcrete

images courtesy of Chris Magwood / Endeavour Centre