straw-bale building system

Adam Hochstetler Amy Lewis Justin Russell

Ball State Straw Bale Project

Ball State University's straw bale project is located on the Cooper-Skinner property in Muncie, Indiana. Land use goals for the property include educational activities that are compatible with the concept of the area as an outdoor laboratory. Research, field trips, class projects, workshops, and interpretive presentations are encouraged for students in grades K-12 of schools in surrounding communities and Ball State students. In accordance with these goals, the straw bale project would be the first immersion/demonstration/research project on the site. This project aims to connect people to sustainable relationships among buildings, sites, people, prosperity, and the planet. The straw bale project also seeks to build on the research and land use plan that is already in place for the property.

Building Site Adaptations

Indiana's climate creates construction techniques that must address a warm or cold climate. Designing a straw bale building in central Indiana must address the buildings orientation, weatherization, shading, and ventilation.

Orientation- The building longest wall should face due south with the majority of the windows facing south to obtain optimum winter heating. The least amount of windows should be on the east and west side. The south facing windows should also overhangs to keep out the high summer sun.

Weatherization-Weather-stripping all of the doors and windows will help reduce the unwanted heat and cooling loss. Open windows in the summer will allow for the building to cool in the summer.

Shading- Overhangs and arbors will help keep the high summer sun out of the building while still allowing a low winter sun to penetrate and help warm the building. Using natural shades such as trees is a great way to help reduce the suns heat on the east and west sides of the building.

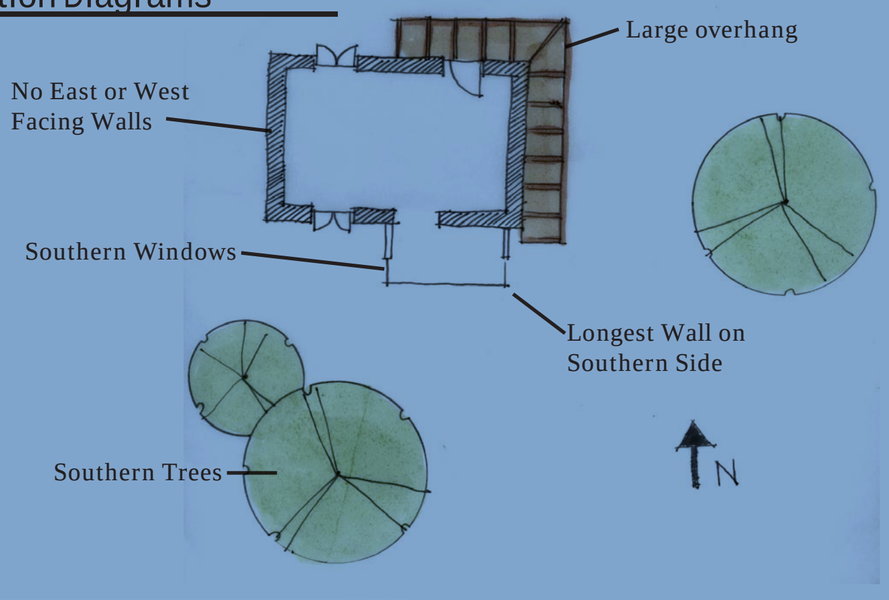
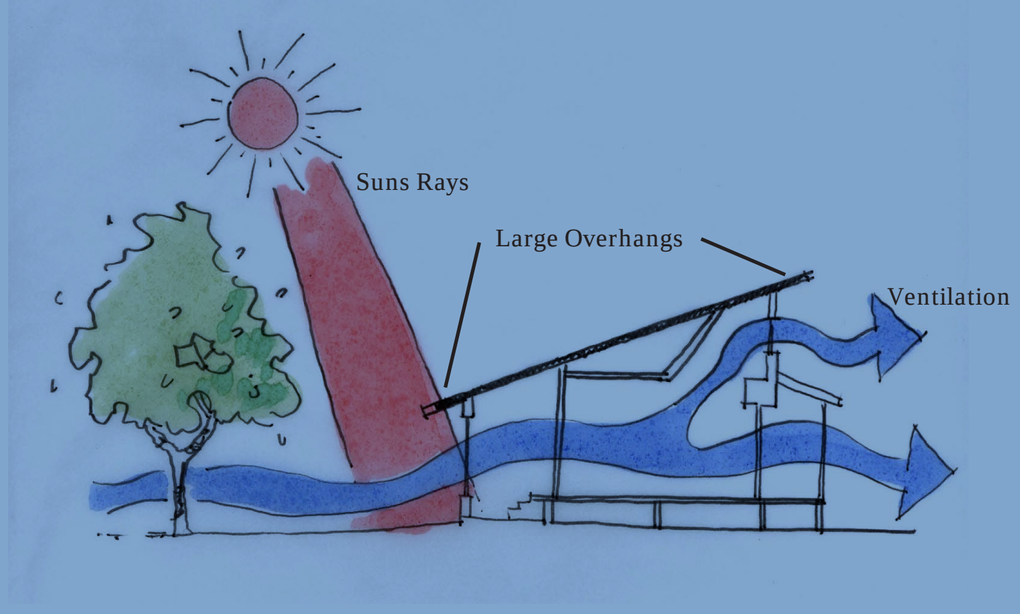
Ventilation- Careful window placement and interior design can capture cool breezes in the summer. High ceilings and interior courtyard are also great ways to improve ventilation.

Straw Bales as a Building Material

The use of straw bales as a building material often raises many concerns amongst builders and homeowners because of the characteristics of straw and its susceptibility to the elements. Fire, moisture, insects/pests, and longevity of the straw bale are some of the major concerns that people have about the product. And rightfully so, given that straw is very flammable, it is biodegradable, and it makes great bedding for pests. However, all of these issues have logical explanations to disprove them as myths and show that straw bales can be a premium building product.

Fire: Straw bale walls have been tested for fire resistance. In these tests, straw bale walls have proved themselves far superior to standard wood-framed walls.
- -Straw bale walls are naturally fire resistant. While the dry straw that makes up a bale is easily combustible, the compact nature of a bale does not entrap enough air to readily support combustion.
- -A good analogy can be drawn by comparing the combustibility of a single sheet of paper to that of an entire tele phone directory. A single sheet of paper will ignite and burn quickly, but if you drop a phone book on a fire, you'll probably put the fire out.
- -The straw bale walls are coated with plaster and in order for the fire to reach the straw, it must first burn through the very fire resistant plaster layer.

Moisture: Moisture is detrimental to all building products. Wood, brick, and even concrete will deteriorate when exposed consistently to moisture. Wet straw will mold and eventually decompose which leads to undesirable odor and tructural failure. It is absolutely vital to keep straw bales removed from moisture during the con struction process.
- -Moisture can enter the walls of buildings in two ways: through vapor penetration and through direct air leaks.
- -The plaster coating on the straw bale walls is an effective barrier against damaging air leak age.
- -Large roof overhangs are an effective way of preventing most direct rainfall from contacting the straw bale walls.

Insects & Pests: Common ways that insects and pests get into our homes and survive in our homes are through doors, by establishing nests, and finding food sources in our house walls and floors.
- -Plaster coating makes for a tough barrier for pests to penetrate.
- -Even if the plaster is penetrated, the straw bales are too densely compacted to make for comfortable nests, unlike loosely packed batt insulation.
- -There is little food for any living creature in straw. Outside of any unusual amount of seed heads in the straw, there is little to offer pests in the way of desirable food source. It is very important to check the seed content in the straw bales before using them.

Adaptation Diagrams