

RESIDENTIAL Concrete

hanley wood

OFFICIAL PUBLICATION OF THE
CONCRETE HOME BUILDING COUNCIL

This minimalist home is an inspiration for those looking to achieve energy efficiency and sustainability in a small space.

PHOTO: JEFF GALLO



Sustainable HOME OF THE YEAR

Sandwich insulation creates the ultimate energy-efficient envelope. BY WILLIAM D. PALMER JR. »

Achieving a LEED platinum rating, the highest level, for a home means doing everything feasible to make it energy efficient and sustainable. For the Gallo residence in Minneapolis, which the owners named 5ive, that included concrete sandwich panel walls.

This simple structure packs a lot into 1760 square feet. The exterior walls are loadbearing concrete panels infilled with double-pane, argon-filled glass. “Essentially we chose the technology before we designed the building,” says Jeff Dwyer, Shelter Architecture, Minneapolis. “The client had a very small budget and wanted a very modern home that would be as sustainable as possible. Our economical sustainability model is to get the envelope really efficient. You can do so much more with an envelope than you can with alternative technologies and we knew we were going with a commercial glass system so essentially the entire envelope was prefabricated.”

The concrete wall panels that form the house’s structural shell were precast using Thermomass, a sandwich panel system with concrete wythes on the outside and rigid polystyrene foam insulation in the middle. Fiberglass composite connectors—which eliminate thermal shortcuts—connect the two wythes. The panels for 5ive have a 4-inch structural



The bare concrete provided the wall finishes both inside and out, and was complemented by the use of wood for cabinets, fixtures, and floors. PHOTO: JEFF GALLO

interior wythe, 3 inches of insulation, and a 2-inch-thick exterior concrete facing, resulting in an R-33 wall—double that of timber construction. “We started with the idea of using that technology [Thermomass], then designed everything with vertical continuity,” says Dwyer. “All of the panels and windows were completely vertical and we designed the house aesthetically to work within that logic. The panels have great thermal properties that even go beyond insulating concrete forms, so we were really excited about that.”

YELLOWSTONE GREEN

Sustainable Home of the Year Runner-Up

Two single-family homes recently built in Yellowstone National Park achieved LEED certification partly by using insulating concrete forms (ICFs). Constructed as employee housing by Xanterra Parks & Resorts, Greenwood Village, Colo., which operates the concessions and lodging in several western national parks, these homes were the first Yellowstone buildings to achieve LEED certification. The use of ICFs was directly responsible for more than 20% of the LEED points.

The Quad-Lock ICFs were composed of double-thick panels on the exterior (4¼ inches of insulation) and regular panels (2¼ inches

of insulation) on the interior with 6 inches of concrete in between. This configuration resulted in walls with an R-value of 32. Plastic ties are designed to be inset into the foam panels, both to eliminate any thermal bridges and to provide a homogenous surface for cement stucco finishes.

Jim Hanna, director of environmental affairs for Xanterra, stated that the ICFs construction “was able to triple our homes’ R-values over standard construction materials, an important accomplishment in the heat-sapping winters of Yellowstone. The ICFs walls are excellent heat sinks that augment the effectiveness of the houses’ passive solar design, maintaining a comfortable living environment year-round and minimizing the number of days we have to heat the buildings.”



Many sustainable features were incorporated into the Yellowstone homes, including photovoltaic panels, passive solar configurations, and insulating concrete forms. Thicker foam panels were used on the exterior face of the walls to achieve an R-32 rating. PHOTOS: QUAD-LOCK BUILDING SYSTEMS



Because many of the panels were freestanding prior to installation of the roof diaphragm on this tight site, wall panels needed to be braced from the inside, resulting in more braces than typical. PHOTO: FORECAST LLC

“The insulation in our sandwich panels is always a complete edge-to-edge installation, meaning the insulation goes from top to bottom of the panel and right to the edges,” says Mark Finholt, owner, ForeCast LLC, Lakeville, Minn., which served as the consultant for the concrete wall systems. “We are very conscientious to create a complete insulation envelope that is not compromised by solid sections of concrete or conducting ties.” To accomplish this, walls extend past the roof into a parapet and 16-inch-thick R-60 roof insulation runs up the inside of the parapet and over the top of the con-

crete sandwich panels, where it was capped with Cor-ten steel flashing. “That way the insulation all ties together and there are no thermal bridges that can transfer heat from the interior living quarters,” says Finholt.

“The window frames and windows are the weak point of the envelope at only an R-3 or R-4,” says Dwyer. Shelter’s building design takes advantage of natural lighting,

but reduces solar gain and lowers summer cooling costs by relying on the mechanical system rather than the sun’s heat. “We used the windows in any way we could to our advantage for energy efficiency, other than them performing thermally,” he says. “The position of the windows was determined by the system, so we went with the mechanical strategy instead of the passive strategy and got the most efficient mechanical system we could find. When you get through all the science and look at all the alternatives, you can’t beat a good envelope and a good mechanical system.”