Think Green
Practices and Products for Sustainable Building
Think Green

Earth Work

A Northern California home draws more than inspiration from its site.

Nearly every room in the H-shaped plan opens to an outdoor living space.

Green building means different things to different people. More importantly, it means different things in different places. Site-specific design and construction lie at the very heart of sustainability. Local climate—as local as the microclimate of the site itself—influences virtually every aspect of a sustainable building, from orientation, to materials and detailing, to mechanical systems and finishes. Local materials save energy consumed in transporting the heavy, bulky stuff used to make a building. In an ideal world, climate-responsive buildings would be created from materials found on or near the site itself. Imagine digging a big hole and making a house out of what came out. Better yet, take a look at the house pictured on these pages, because that is exactly how it was built.

The owner, Sandy Lawrence, maintains a small vineyard on the 70-acre property and included a wine-storage “cave” in her plans for a new house. Architect Michael Baushke, builder Roy Beaman, and earth-construction innovator David Easton balanced the equation by turning the insides of the cave into the outside of a house. Using a process called PISE, which he invented, Easton mixed soil from the excavation, soil from a nearby quarry, and Portland cement into a slurry and shot it against open wall forms (see “PISE,” page 57). The result, which blends site with structure and structure with finish, is both environmentally sound and earthily elegant.
Building with locally sourced materials earns green points, and you can’t get more local than the site itself. The exterior walls of this house are composed primarily of the same earth that the building stands on.
During the day, the heat works its way through the 18-inch-thick walls just in time to take off the evening chill.

"The reason I chose earth construction," Lawrence says, "was because I did not want to destroy the gorgeous natural environment, which backs up to a rugged mountain landscape. The home had to be as close to the natural landscape as possible, so that there would be a less intrusive imprint on the land. And the color of the exterior walls is very close to the color of the mountain in the arid months, because the walls are made with dirt from this land. Earth construction was the most aesthetically pleasing and environmentally compatible solution." The thick, monolithic wall section performs well in Napa's relatively warm, dry conditions and also addresses concerns about indoor air quality and exposure to chemicals used in the manufacture of common building materials. "A lot of my clients are [becoming] more interested in the health aspect of living in a house without pressure-treated lumber, sheetrock, and paint," Baushke says.

Baushke knows PISE, and its inventor, well. "I have a pretty long history with David. I actually worked for him for a couple of years on his wall-building crew." That experience influenced Baushke's design for this house, which divides living spaces into two pavilions bridged by a glass-walled living room. "Typically," he says, "we'll break down the house into smaller rectangular volumes," which can then be formed and shot in sequence. In this mild, Mediterranean climate, the scheme works from a livability standpoint as well. The single-story, H-shaped floor plan gives nearly every room direct access to an outdoor living space. The living room, with its two sets of 6-panel sliding doors, straddles the line between indoors and out. "It can be opened up, so the north and south courtyards can be contiguous," Baushke says. In such an outdoor-oriented house, the architect believes, "There should be more doors than windows." A dining room doesn't need six sets of French doors to have a function-
In the master bath, a redwood deck floats in a bed of smooth river rock.
Cast soil-cement pavers cover the floors of every room.

al connection with the outdoors, but the psychological effect they produce is profound. “Just feeling that you can walk out that door gives you the freedom of space.”

As a result of this outward focus, Baushke says, “The immediate exterior of the house is as important as the interior,” and it too reflects a preference for local materials. The courtyards are paved with stone from a nearby quarry. Boulders excavated on the site form borders for planting beds. Landscape plantings lean heavily toward native plants, which can weather the region’s periodic droughts without irrigation. Not everything could be sourced on

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site, of course, but the “imported” materials reflect the same earthy aesthetic and green sensibility. An unfinished steel trellis and corrugated Cor-Ten steel roof have already acquired their protective layer of rust, and will require no further finish or maintenance. The exposed timber framing is salvaged old-growth Douglas fir. Windows and doors are Swedish pine units with integral interior shutters. The foundation is a conventional concrete slab.

But the material that makes up most of the house, and determines its essential character, is the same stuff a shovel would turn over out in the yard. Eighteen inches of earth-cement, rebar, and nothing else, the exterior shell acts as a time-buffer for changes in outdoor temperature. During the long cooling season, the heat of the day works its way through the wall to the interior just in time to take off the evening chill. By morning, the walls have cooled enough to keep the house comfortable through the day.

A hand-scraped, or “screeded,” finish gives the exterior an appealing texture that is easily distinguished from that of poured concrete, rammed earth, and stucco. Because they take on the smoother texture of the forms against which the earth mixture is sprayed, interior surfaces are more refined, but still varied enough to have character without paint, stain or any other finish. A wetter soil-cement mix, cast in forms, gives a slightly contrasting color and smoother texture to the door and window lintels, the dining room’s substantial fireplace and chimney, and the pavers that line the floors throughout.

It is common to speak of a building as having “grown out of its site.” But few earn that praise as honestly as this one, in which the metaphor approaches literal fact. Everywhere is evidence of the means—as elegant in concept as in result—by which earth becomes shelter. “To me that’s the marriage between architecture and site,” says Easton. “We turned the cave inside out.” —B.D.S.

Project Credits: Builder: Beaman Construction, Napa, Calif; Architect: Apparatus Architecture, San Francisco; Living space: 3,136 square feet; Site: 70 acres; Construction cost: Withheld; Photographer: Mark Luthringer (except where noted). • For product information see page 142.

PISÉ Building with earth is nothing new. Much of the Great Wall of China was constructed of mud compacted in lifts between temporary forms. That technique, now called rammed earth, has undergone a minor revival in this country, largely due to the work of builder David Easton. “He was really the instigator in the rebirth of rammed earth out here in California,” says architect Michael Baushke, who collaborated with Easton’s Rammed Earth Works to produce the shell of this house. PISÉ, the method Easton used to construct the exterior walls, emerged from what Easton calls “a search for a more industrial installation process, still using the same material.” Like rammed earth, PISÉ consists of a suitable soil mixed with 7 to 10 percent Portland cement and water. Rather than mechanically compacted in a closed form, however, PISÉ (pneumatically impacted stabilized earth) is sprayed against a one-sided form that allows for faster construction and easy incorporation of reinforcing rod. The process resembles that of Shotcrete, a sprayed concrete long used for building swimming pools and other irregularly shaped structures. During construction, a “nozzle man” works his way around the building in an ascending spiral. Two “finishers” create the final exterior surface with long metal screeds, guided by piano wire stretched horizontally between temporary 6x6 corner posts. “PISÉ opened incredible new opportunities for us to build more sophisticated buildings,” says Easton, who has proven the technique in commercial projects for such high-profile clients as Longmeadow Ranch Winery and Fetzer Vineyards. In addition to being faster and more “engineerable” than its traditional antecedent, Easton says, “It demystified rammed earth, because PISÉ is basically just Shotcrete with a different mix.”

PISÉ in action: Workers from Rammed Earth Works spray a mix of soil, cement, and water against a form, then “finish” the surface with a long metal screed.

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