# A Straw Bale Bunkhouse for a Sustainable Farm

**by Jan Scilipoti – Lopez, Washington**

Henning Sehmsdorf and his wife Elizabeth operate S&S Homestead - a small, organic, sustainably-motivated farm, providing vegetables and meat to our community. In fall 1998, Henning and I started discussing his idea for a straw-bale 'bunkhouse' to house long-term interns on the farm. Strawbale, with its ties to sustenance and to well-managed agriculture, seemed a perfect complement to the ideals expressed by their farming methods.

Henning, a former college professor, wanted to combine the building of the bunkhouse with education, by having farm interns help design and build it as part of internship, and by hosting a series of weekend workshops. As will happen in life, our plan changed as the project progressed. First, the call for workshop participants went largely unanswered. Then, our lead builder left for a full-time construction job.

We decided to cancel the workshops and focus on the building instead, reasoning that we had enough to do without arranging workshops in addition to building. Our building team consisted of myself, Henning, his full-time intern (William McKee), and a summer intern (Brian Huntington). When our builder left, William's fiancé Elizabeth, and Henning's son Johann offered help. With them on the team, we decided that a lead builder would not be necessary. In hindsight, the project schedule was affected dramatically without an experienced builder on site.

Still, my memories are punctuated with sweet moments of unexpected volunteers donating their skills and time, of delightful discussions on all sorts of topics, of starting to work together as a team, and of delicious meals composed primarily of food grown on the farm. Overall, it was an experience that strengthened our understanding of straw-bale construction, job-site management, and interpersonal relationships. The success of the building itself is reinforced by those who come to visit. We often hear that "It looks like a little house nestled in the Alps!" As a German immigrant who has devoted his life to small farming in the Northwest, Henning finds this most appropriate.

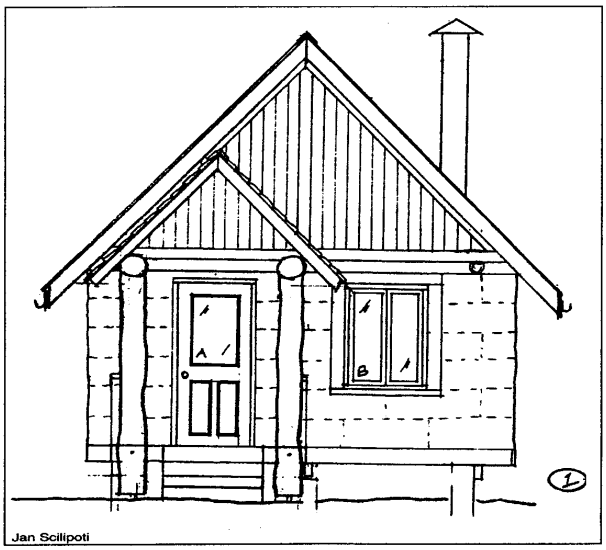
**The Design.** In March 2000, we began meeting weekly to plan the project. We discussed and came to decisions about:

- Research (regarding materials, methods, and local availability of supplies)
- Budget (for materials, tools, and labor)
- Design (program, site planning, systems for heating and power, foundation, floors, walls, structure, exterior cladding, insulation, roofing, doors/windows, interior finishing, 'beauty' elements)
- Construction Drawings
- Construction Schedule
- Permits
- Materials Procurement and Storage
- Workshops (scheduling, marketing, lodging, food, costs, liability, educational programs, 'fun' aspects of tours, slides, music)

To design the bunkhouse, we identified basic functions. The floor plan should allow for tea prep, studying at a desk, relaxing, sleeping, storage, and yoga. Meals, bathroom, shower, and laundry facilities would be available at the house. As drinking water would be brought in containers, plumbing would not be necessary. A "Humanure" composting station would eventually be built for convenience near the bunkhouse. Power use would be as minimal as the owner/builder code allows. A wood stove would provide heat.

From sketches, we progressed to a plan for a rectangular, 400sf (37 $m^2$) straw-bale infill structure with a gable roof, loft and covered front porch, following the code for an owner/builder project in San Juan County. No structural inspections were required, other than limited life-safety concerns. This allowed us to use peeled round logs from the site for the post and beams, and earthen plasters over our bales without any lath or chicken wire.

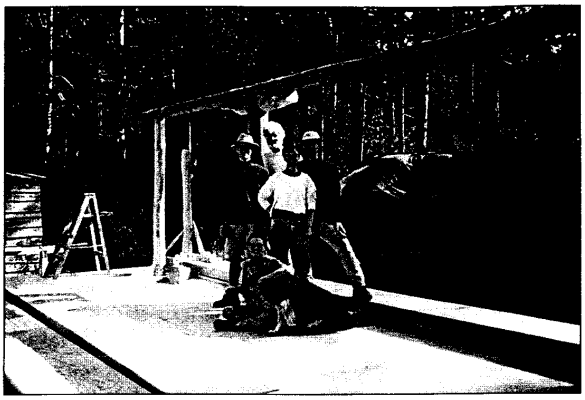
In terms of detailing, we wanted to: Keep it simple for our unskilled team, limit the impact on the builders and the environment, by considering material use and toxicity, and avoid metal or plastic straps under the earthen plaster. We planned to compress the bales with the roof load instead. We designed simple, aesthetically-satisfying detailing at window and transitions between materials.



Jan Scilipoti

**Building Components:**

In the Pacific Northwest, we experience frequent rain and moist conditions. To protect bales from ground moisture and splashing, they sit on a suspended deck, which also greatly reduces cement use. The structure hangs from three sills that are bolted to six posts, which are bolted to nine concrete piers, with footers below. The three deck sills support 2 x 8″ (50mm x 200mm) floor joists at 16″ (400mm) o.c. with R-19 fiberglass insulation.



*Brian, Henning, Elizabeth, Bill, Jan, and Ursa on the completed deck. The round posts and beams will be exposed inside the structure. We're standing on the roof bearing assembly.*

Six posts and four beams (round logs, harvested & peeled on site) support the deck, walls and roof, and are exposed on the interior. We held the bales back about 3-4" (75-100mm) from the posts. I would recommend increasing the space to 6-8" (150-200mm) between the posts and bales, to leave plenty of room to plaster behind them. The exposed round posts and beams are one of our most successful elements! Beautiful.

We also decided to extend the beams from the interior across the top of the bales to the exterior. We wanted to see the beams supporting the rafters on both the exterior and interior. We still appreciate the effect, but it did require extra commitment to build the top plates and the dimensional lumber gable ends around the beams.

Our bales and the top plates went up easily in a day with our normal work team of five. It was a wonderful decision. Everyone had meaningful work to do, and the bales were installed without 'bale frenzy.' We tried temporary corner braces, and were very impressed with the resulting corners: tight and well-aligned.

We used a weed wacker with a heavy-duty nylon to trim the bales. This created a great supply of chopped straw — perfect for earthen plasters – which we stored in garbage bags under the deck until needed. We chose earthen plasters to keep the walls permeable and natural. Our clay-based soil came from another construction site, and a local pit provided sand for the project. We sifted the dry clay through a 1/2" (12mm) screen, then put it into water in a barrel. By letting it sit for a few days, an excellent slip was formed with little effort.

To chop the straw, we used a chipper/shredder inside the bale walls to contain the flying straw. Dusty and loud, but effective. We mixed all plasters in an electric cement mixer. We loved it! [It was quiet, easy to operate, and gave us consistent, additional Italian fresco technique to color the walls, which entails applying earthen pigments into fresh lime plaster.] The integral technique looks especially nice with the organic curves of the bales.

Because we were plastering in the fall, we completed the earthen coats and one lime coat on the exterior before starting on the interior. These exterior coats dried successfully into a smooth, dense, hard finish. Weeks later we started on the interior coats, but had not yet installed the wood stove. As a result, mold was starting to form in small areas because the plaster dried so slowly. About the time we installed the wood stove, we also finished the interior lime coat. Then, we kept a fire going to help with the drying process.

The moisture from the interior plasters moved to the exterior, and poofs of lime plaster bubbled open from the inside. Since then the exterior plaster has dried once again, and seems to be as hard and firmly attached as it was initially. In the spring, we will scrape off the loose bits of exterior lime plaster, and smooth a fresh coat over it. Since we were planning on doing this anyway for additional weather protection, we feel grateful for a lesson that did not compromise our walls. Next time, I will be sure to install the wood stove before the interior plaster goes up, and to provide plenty of ventilation to allow the moisture-laden air to exit the building through something other than the bales.

Henning chose to install vinyl windows in the bunkhouse, for their lower cost and maintenance, ordering the 'almond' color. We're very happy with them aesthetically. To house the windows, we built simple square bucks out of 2 x 10" (50 x 250mm) lumber. Even with temporary bracing, however, we found that it was a feat to keep the bucks square, level, and plumb.

We settled on metal roofing, because of precedent on the farm, and plans to install a catchment system in the future. To keep installation simple, we decided on a gable roof. For useable head-space in the loft, we planned a 4/12 pitch. In hindsight, I would lower the pitch of the roof. Given its intended use, the loft is almost too generous, and the 4/12 pitch created a steep, high structure that required heavy, large rafter/collar tie units. For an inexperienced crew, this tested our strength and height skills. Reducing the pitch would also reduce the size of the gables, saving on lumber.

We found a local installer who had success with skylights in metal roofing and hired him (the only 'sub-contractor!'). We were very glad we did. We've had major storms with no leaking, and it would have taken us weeks do ourselves. The two skylights (one operable above the sleeping loft, and the other fixed above the living area) were well worth the cost and the effort. The light coming through them is magical. *(Continued on pg. 34)*

**Size:** 24'-6" x 17'-6" (7.5 x 5.3m) outside face of bales;
312-sf (29m$^2$) useable on the main floor;
435-sf (40m$^2$) total useable including loft area
**Time frame:** Groundbreaking July 9, 2000; substantial completion on November 30, 2000
**Materials:** $ 12,000 including 7.8% tax and permit fees
**Labor:** $ 2,000 and several work-trade arrangements
**Total cost:** $ 32 / sf ($344/m$^2$), plus the subjective costs of work-trades (based on 435-sf)
**Time on site:** 2,000 Man-hours (5 unskilled builders, 3 days a week)
**Time in design meetings:** 16 meetings, 2 hours each
**Time preparing documents:** 60 hours for Design Development, 30 hours for Construction Documents