

Case study: A house in McGregor

Architect Helene van der Merwe designed a straw bale house for a retired couple. As teachers, they have had access to school houses during most of their teaching careers so that they never needed to own their own home. Upon retirement, an economical building technique had to be found to contain building costs and, having adopted a simple, natural lifestyle, a dwelling employing the straw bale concept was ideally suited.

The house was built in McGregor, a picturesque village about 200km from Cape Town nestling at the foot of the Riviersonderend mountains. Rainfall is approximately 250-300mm per year, with temperatures ranging from freezing winter nights to very hot summer days. The architect and client opted for the wheat straw bale building system. Compared to conventional brick, cement and corrugated iron, straw bale building was much less expensive, fast to build, had far superior insulation properties and was much more environment friendly.

McGregor is an historic village, with all development subject to aesthetic guidelines. This determined that the framing would have to be on the inside of the bale walls, so that on completion the external shape would be little different from traditional plastered mud brick and thatch cottages. The top of the gables were protected by a thick layer of cob, and sealed with a mixture of boiled linseed oil and turpentine.

Plans were developed to facilitate incremental building, starting with a core of 40m² containing living and cooking areas and bathroom, with a sleeping platform in the rafters. Two further rooms can be added on in future. As plans were submitted for approval, Helene's clients started building - not on site, but on a 1:20 model. This was the first step in the process of making the building their own - transferring thinking from the architect's head into the clients' hands! This helped them a lot, as they had little prior building and carpentry experience. The plans were approved by the Breede Valley District Council, who are very impressed with the result.

Building process

Stone and concrete foundations were built to about 400mm above ground level, with reinforcing bar bale pins set in, and poles built into the foundation. Framework construction continued with beams being bolted into place; trusses were made on the ground and raised. A local team of thatchers fixed the 'latte' and thatched using an inner layer of smooth winter reed and outer layer of chunky 'palmiet'. Thin poles and cut timber were used to make splayed window frame supports. Windows and doors were mostly second-hand, now beautifully restored. Diagonal braces were bolted into place.

In preparation for wall building, early bale and plaster samples, exposed to all weather conditions for two months, were dismantled and found to be bone-dry inside. A plastic water-proof layer was placed on the foundation with flat shale on top to provide ventilation beneath

the bales. Bales were pinned with sharpened 'spanseriet' stakes at every course. This worked very well, but there was a little concern about rigidity of the longer stretches of wall between poles. One or two metal droppers were added. Heavy gauge galvanised wire U-shaped staples were punched in to join bales, and wire ties were stapled at the inner surface of poles and tied to the 'spanseriet' stakes. Bales were split to fit the gaps as needed, including tapered bales to butt against splayed window frames.

The cob plaster (earth and straw) was applied straight onto the straw, both externally and internally, and lime-washed to protect it. The floor was made from layers of cob, laid onto compacted earth. The finishing layer will contain earth, sand and bran, with some cow dung. Raw linseed oil seals the floor, and a beeswax polish protects the surface. Quarry tiles have been laid in the high-traffic areas as well as the bathroom.

Renewable energy systems

The owners intend to construct their own solar hot water heater. A solar photovoltaic system will be installed to provide electricity for lighting. A DC-AC inverter may be added for electric appliances. A small wood burning stove will provide space heating and can also be used for cooking in winter. This will be complemented by a small gas cooker, solar stove and insulated hot box. A small gas fridge will also be installed.

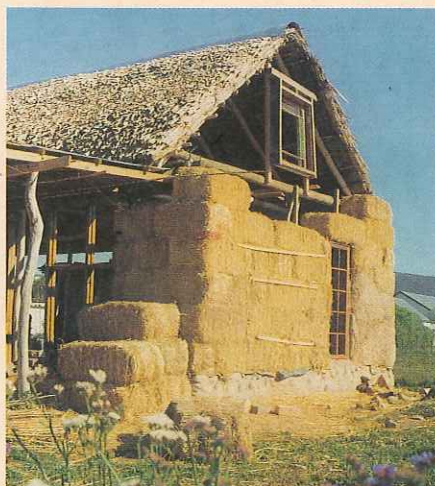
An Enviro Loo, a patented composting toilet which requires no water, has been installed. Grey water from shower and basin will be used for irrigation.

An economic, creative solution

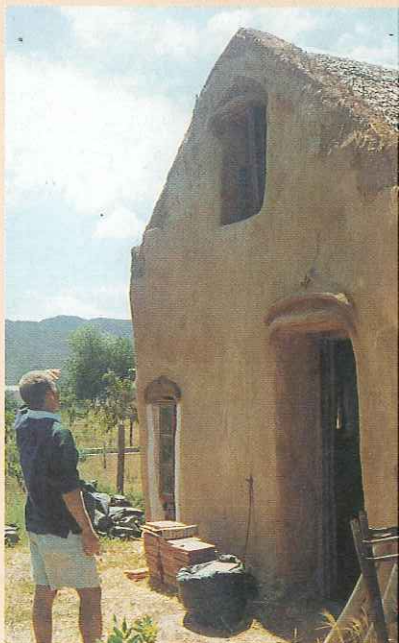
The owners, by doing the greater part of the work themselves with volunteer help from

family and friends, are saving tremendously labour costs. The building costs are in the region of R30 000, including materials, energy systems and the occasional hired help. Application has been made for the government first-time home owners subsidy which, if granted, will set a ground-breaking precedent. Although the subsidy was not granted last year due to sufficient funds being available in the relevant category, a letter was obtained from the national authority in charge of housing subsidies to the effect that approval could be granted on the basis of rational design, provided the rational design complies with requirements of the National Building Regulations, the designer assumes professional responsibility if the clients qualify on all other grounds and funds are available.

"As a designer working with these two special people," comments Helene van der Merwe, "I have become very aware that, ideally, architects should be sensitive to clients' wishes and provide sound spatial planning and technical advice. The owner/builder takes possession of the building process and can 'give birth' to a new space and a new life. This is never without pain and anxious moments, but the reality of the experience rests with them as participants: they are empowered to express their creativity in the process of building. Straw bale and cob building is particularly suited to owner/builder projects, as it is very easy to learn. This is demonstrated in this project by committed individuals, and holds hope and promise for positive developments in our communities and in the world."



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8. House in McGregor under construction (Photograph: Helene van der Merwe)

9. The plastered straw bale house, McGregor (Photograph: Helene van der Merwe)

10. The straw bale house in McGregor completed (Photograph: Helene van der Merwe)