A Cool Texas Remodel

A remodeled ranch stays in the same footprint, but gains a master suite and a passive-cooling strategy

BY ALAN BARLEY

For the past 25 years, I've been working with my business partner, Peter Pfeiffer, designing sustainable homes here in Austin, Texas, and around the country. We've found that the most practical way for a house to work in our hot climate is to build it like it's sitting under a big, shady umbrella. When you are out in the sun, you wear a broad-brimmed hat and light-colored clothes. The same ideas apply to designing houses.

A hundred years ago in Texas, houses didn't have furnaces and air conditioners. Folks had to lay out their homes in logical, practical ways to deal with the harsh climate. Deep overhangs, porches, and thermal convection were basic passive-cooling tools that made living in this area more comfortable in the summer. They are the same passive strategies we use today.

Because of our approach to sustainable building, we were sought out by a young professional couple who had purchased a one-story home built in the early 1940s that had good bones and perfect orientation. Their new house was approximately 1300 sq. ft., and they gave us three main goals for the remodel:

- Keep within a tight budget.
- Enlarge the living space to approximately 2000 sq. ft.
- Rearrange the house's existing footprint for better function.

Sustainable passive design

What works in central Texas doesn't necessarily work in Montana or New Jersey. Each of these climates requires a unique response. Designing site-specific means that the layout of a house takes its cues from the features of the particular site that it's built on. Factors such as solar orientation, prevailing breezes, topography, septic, access, views, water, trees,

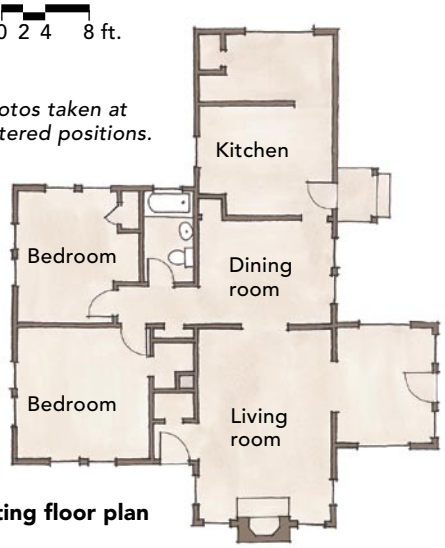
Drawings: Martha Garstang Hill. "Before" photos: Alan Barley.

and neighbors show you how a house wants to be laid out.

Here in Texas, century-old passive-cooling techniques combined with modern-day radiant barriers and insulation allow houses to stay cool during much of the year without having to resort to air-conditioning. Because the house is now cooler and more comfortable, the air conditioner can be smaller and used less frequently, and in turn, it costs less to purchase and to operate. Seen in a larger context, the house also uses less energy from the grid.

In the end, the more passive strategies a house uses, the less expensive it is for the

Photos taken at lettered positions.



GO UP, NOT OUT

The bones of the original house were left intact or recycled, and the remodel didn't expand the footprint of the house. The garage, carport, and existing floor plan were left in place. Rather than use the space in the backyard, the architects added a second floor with a master suite and an additional bath and bedroom. The stairs fit easily between the dining and living rooms. A new front porch creates a better sense of street integration, and a new deck connects the kitchen to the backyard. Photo facing page taken at A on floor plan.

Worth the space. *The only additions to the house were a front porch and a kitchen-accessible deck. Sheltered by deep overhangs and two sidewalls, it's the ideal outdoor room for Austin's hot summers. Photo taken at B on floor plan.*

SPECS

Bedrooms: 4

Bathrooms: 3

Size: 2240 sq. ft. of conditioned space (increased from 1319 sq. ft.)

Cost of remodel: $125 per sq. ft.

Completed: 2005

Location: Austin, Texas

Architect: Barley & Pfeiffer Architects; Donna Tieman, project manager

Builder: Ken Kahanek

Better living through demolition. *The original kitchen was segmented by partition walls. After the walls were removed, the unified space became brighter and, with new cabinets, more functional. Photo taken at C on floor plan.*

homeowner. The fewer moving parts, the less chance for things to break down.

An upper floor makes sense on many levels

With these ideas to guide the big picture, we suggested a few specific items to make this house habitable for today's lifestyles. We wanted to add a new master suite and another bathroom. If we removed the fireplace, the living room could be opened up more to the street. The owners wanted to be able to walk directly from an expanded kitchen out to a rear deck. All the mechanical systems, electrical, and plumbing, as well as the entire exterior, would have to be reworked, too.

Our clients had a few thoughts on how the spaces should be organized. They suggested adding the new master suite at the rear of the house, extending into the backyard. Because they wanted to maintain a connection with the street, the living room could remain facing front. The original two bedrooms and the bathroom required only face-lifts.

We pushed back a bit on their desire to add the master suite on the first floor. We were hesitant to put an addition anywhere on the south that would stop breezes from moving through the house. The possibility of children in the future also meant we wanted to leave as much yard space as possible for play.

With these issues in mind, we proposed the idea of going up, building over versus expanding the existing footprint. We then could just bolster the existing framing and foundation. By keeping existing yard space intact and by reusing as much of the house's structure as possible, we saved cost, materials, and shade trees.

Building up also had the benefit of reducing energy costs. In the new two-story scheme, one air conditioner would serve the first floor and another unit would serve the second floor. With the main bedrooms all on the new second floor, the first-floor unit could be shut down at night, leaving the second-floor unit to keep the occupants cool.

Stairwell brings passive cooling

Adding a second level gave us the opportunity to use the stairwell to encourage the stack effect. (See "How It Works," pp. 16-17.) We placed the stairwell between the living and dining rooms and stole some floor space from each room. The new kitchen almost doubled in size, giving us space to add more southeast-facing windows for the breeze.

Positioning a group of four operable windows high on the stairwell under an extended overhang sets the stage for a convection current. Heat rises in the house and vents out the stairwell windows, in turn pulling in cool air from the lower level. The extended overhang protects the stairwell windows from the hot western sun. In the spring and fall, the outside air temperature is typically cooler than inside. Before leaving for the day, the homeowners can open the stairwell and southeast windows partially and shut off the air-conditioning.

Combined with a radiant barrier in the attic and properly sized roof overhangs, this practice lets the house vent itself naturally during the day and reduces heat buildup. When the owners arrive home in the late afternoon and the temperature is hotter, they shut windows and turn on the air-conditioning, which works less to cool the house and, in turn, reduces energy costs.

By locating the master suite upstairs, we made the house bigger without increasing its footprint. The more a house can be stacked, the more efficient it is to build, so we added an extra bedroom. We also fit a bathroom upstairs with a washer and dryer closet.

We still had to make the house respond to the street and to provide a deck off the new kitchen. A new front porch created additional outdoor living space and made the street side of the house more inviting. The new porch roof also eased the integration of the second-floor additions. In the back, we designed a partially covered deck off the kitchen that allows outdoor seating and provides a great view of the yard. □

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Elements of cool in a hot place

Shade

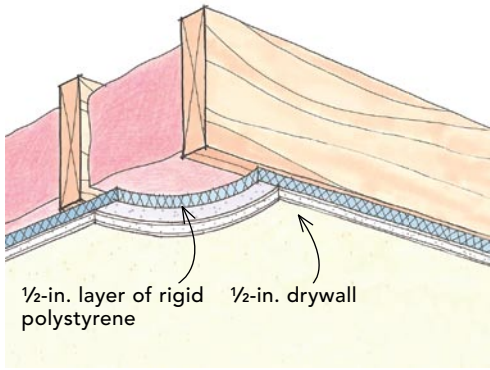
Deep overhangs above short second-story windows keep the upstairs rooms in the shadow of the eaves for the better part of the day. The mature trees next to the house also help to shade the roof.

Zoned conditioning

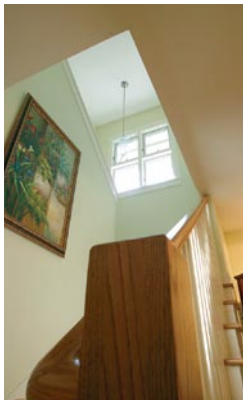
Instead of one large air conditioner, there are two smaller units, one upstairs and one down, controlled by a programmable thermostat.

Insulation

To keep the budget lean, the house is insulated with fiberglass batts: R-13 in the walls, R-36 in vaulted ceilings, and R-22 in flat ceiling joists. Baffles promote airflow between the soffit and ridge vents and help to cool the roof. A ½-in. layer of rigid polystyrene between the second-floor ceiling drywall and the ceiling joists thermally isolates the attic.

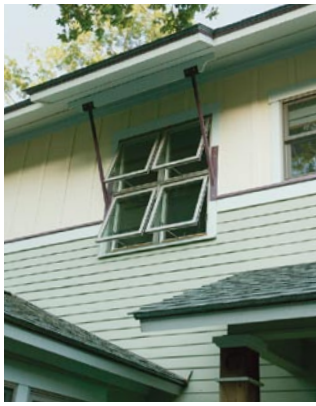


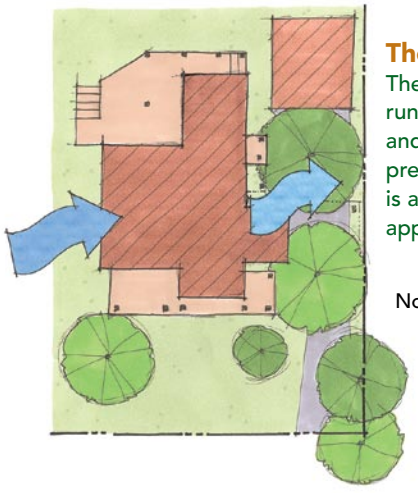
Stairwell with benefits. *Placed between the living and dining rooms, the new staircase and its high windows add natural light to the living room and contribute to air circulation. Photo taken at D on floor plan.*



Stack effect

The stairwell helps to cool the house except during the hottest months. When the breeze-side and stairwell windows are opened slightly, the resulting airflow pushes the rising hot air out of the upper stairwell, which in turn pulls in cooler air from windows downstairs.





The prevailing breeze

The long axis of the house runs southwest to northeast and exposes one side to the prevailing southerly wind, which is allowed to enter through appropriately placed windows.