Building Affordable Houses

By including his subcontractors in the design process and watching every penny, a Midwestern builder creates attractive starter homes for $45 per sq. ft.

BY FERNANDO PAGÉS RUIZ

The Cordobas almost gave up their dream of owning a new home. With three kids, they needed four bedrooms, a yard and room to grow. They found low-interest financing but could qualify for only a $95,000 loan. Every builder that they talked to told them that a new house at that price couldn't be done. Every builder but me. Five months after the Cordobas called me, they moved into a brand-new, 1600-sq. ft., four-bedroom home in a new subdivision in Lincoln, Nebraska. They financed it within their means, and they even got a few amenities—such as a deck and a microwave oven—that they hadn't expected.

I did all right, too. The 12% profit ($12,000) I made was a much better return than the 8% I typically realize when I build expensive homes. But beyond money, I also earned genuine satisfaction helping the Cordobas to achieve their dream, much more satisfaction than I get from helping wealthier people put up McMansions.

Building affordable homes provides workmanship challenges, too. It does not mean building cheap, shabby houses. Too many warranty calls eat up the profits; and unattractive homes don't sell at any price. The construction of a first-rate home on a reduced budget requires careful attention to thoughtful design and quality.

Blue-collar approach to design yields big savings

When I decided to focus my home-building business on the affordability niche, I scoured the country in search of ideas. I attended conferences and seminars, and visited numerous builders of affordable housing. To my disappointment, most were building complex affordability schemes (based on tax breaks and government subsidies) instead of building truly affordable houses. Fortunately, during a trip to Grand Rapids, Michigan, I stumbled upon a workable model.

At the behest of that city's board of Realtors, the local Home Builders Association

Guiding principles

Real-estate markets and building requirements vary throughout the country, but the basic principles of building affordable homes apply everywhere. These principles include:

- **A careful design that focuses as much on quality and aesthetics as it does on affordability.**
- **A design team that includes representatives from all the affected trades.**
- **Optimum use of value engineering at every stage of construction (see sidebar p. 64).**
- **Efficient construction methods that employ as many factory-produced goods as possible.**

—F. P. R.

Photo this page: Tom O'Brien

VALUE ENGINEERING: A RECIPE FOR QUALITY AND SAVINGS

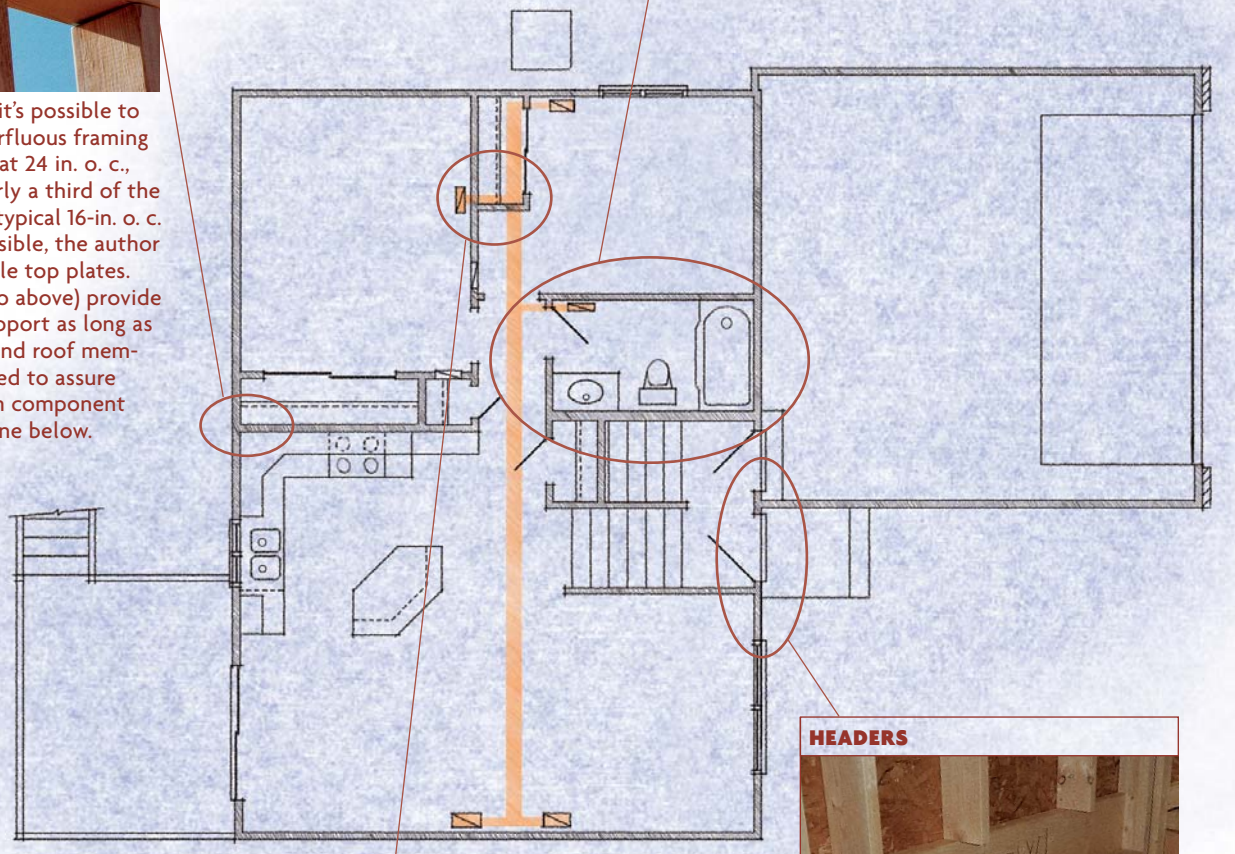
Building affordable houses that people want to live in requires constant re-examination of every aspect of the construction process, searching for ways to save money or to improve quality. For more information, see "Cost-effective Home Building: A Design and Construction Handbook," available from NAHB Research Center (800-638-8556).

WALL FRAMING

With careful planning, it's possible to eliminate a lot of superfluous framing material. Placing studs at 24 in. o. c., for example, saves nearly a third of the lumber consumed by a typical 16-in. o. c. layout. As much as possible, the author tries to eliminate double top plates. Single top plates (photo above) provide adequate structural support as long as the studs, floor joists and roof members are properly aligned to assure that the weight of each component bears directly on the one below.

PLUMBING

Cluster plumbing involves locating fixture groups, such as baths and kitchens, back to back or stacked over each other to save on drainage, vent and water lines. These houses have a full bath and a laundry room located back to back on the first level, with the main bath directly above. The only water lines that break this grouping supply the kitchen sink and exterior sillcock.



HEATING AND COOLING

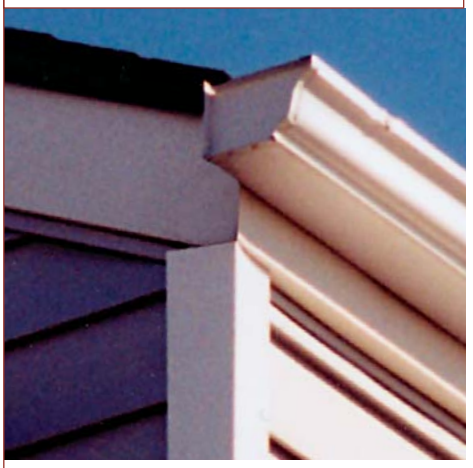
A 1½-ton, 10 SEER heat pump—sized to the minimum load calculations for heating and air conditioning as recommended by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Manual J—provides efficient heating and cooling. Conditioned air is distributed through a single air-supply plenum that runs along the center of the home (beneath the floor joists). Every room in the house is serviced through a sheet-metal boot that connects directly to the plenum, keeping ductwork to a minimum.

HEADERS

The standard practice of doubling up headers with a plywood sandwich in between wastes energy as well as material. A single 2x10 provides sufficient bearing capacity for most door and window openings. Adding a stud (on the flat) to the header's bottom edge creates a nailing surface and an insulation shelf.

Drawing this page: Paul Perreault

ROOFS



Even skilled framers get bogged down installing nailing blocks, lookouts and soffits on boxed eaves. These overhangs provide curb appeal, but a simple 2x6 fascia board with a gutter on it (photo above) provides an effective termination on less visible elevations. Scaling back the cornice work on these houses eliminated 60 sq. ft. of framing and cut down on roofing and painting, saving about $250 without noticeably affecting the appearance.

ELECTRICAL

Wherever the National Electrical Code (NEC) applies, cost-cutting flexibility is limited. However, reasonable savings can be achieved by carefully planning the layout of lights, switches and receptacles. Limiting mandatory receptacles often involves rethinking the location of certain doors, closets and cabinets to avoid creating wall lengths of 2 ft. or more, which usually require an outlet by code. It also entails placing outlets off center on walls to take advantage of access to the outlet from two directions. Ideally, each living area should not need more than three or four receptacles.

FOUNDATION

It costs less to build aboveground than under it. But Midwest ("tornado alley") residents demand the security of a basement. The wintry climate also requires deep footings. The author builds a daylight basement using 4-ft. tall cripple walls over 4-ft. deep concrete walls. The cost to build this foundation is not significantly higher than it would be for a 4-ft. deep crawlspace foundation. Fortunately, shallow foundation walls such as these don't retain much dirt, so their thickness can be reduced to 6 in. instead of the standard 8 in. This combination of a shallow basement and thin walls results in less digging, less concrete and less expense.

had assembled a panel of representatives from all the trades to develop a home that could be built for less than $60,000 (excluding land costs). Instead of hiring a designer to plot a house and then hoping bids would line up with an ideal budget, they went straight to the cost experts, the tradespeople, to come up with efficient-to-build designs. I was inspired by their blue-collar approach, which focused on practical construction methods instead of clever bookkeeping.

Subcontractor round table trims the fat

To get my local team of subcontractors hooked on the idea of building affordable houses, I sat them down for a round-table discussion. I explained that with their help, I hoped to design an affordable house that we could erect over and over again as a source of bread-and-butter income in good times and bad. I asked for help in designing each system for quality and efficiency as well as economy. Then I gave each subcontractor a preliminary floor plan on which to sketch his or her ideas (drawing p. 66). Their mission was simple: Look for savings. It didn't take long. Almost immediately, the electrician suggested that shortening the kitchen cabinets by 6 in. and moving a closet door 1 ft. would allow us to eliminate two electrical outlets, saving $110.

I was glad all the trades were together at the same time because their recommendations often overlapped. The plumber suggested that we could save $850 by using an electric water heater and heat pump to eliminate gas lines. The electrician said an all-electric home added $900 to his budget. But then the heating guy chimed in, noting he could drop $350 from his bid because the electric furnace and water heater required no flue. In the end, my plumber's suggestion shaved $300 from the budget.

Our biggest savings, however, came from improving construction procedures. During a break for lunch (I paid), I learned that my subs included a fudge factor in their bids to allow for mistakes. The electrician assumed his meter panel would not coincide with a clear stud bay, so his bid included time for blocking and framing. The framers, in turn, anticipated returning to make repairs after the electricians, plumbers and sheet-metal trades were through hacking up the walls. As my subcontractors discussed these problems, they collaborated on developing time-saving strategies that yielded substantial improvements in the construction process.

I kept track of my subs' suggestions and then hired a draftsman to incorporate them into the final plan. Like a paint-by-number picture, this plan included stud-by-stud framing, detailed mechanical drawings and critical dimensions noted in bold print to help the trades avoid mistakes. Once all the subcontractors felt confident that their work could be streamlined and materials pared to a minimum, they eliminated the fudge factor from their bids, which resulted in about a 5% overall cost reduction.

Without good design, an affordable home is just a cheap house

The design process was more complicated than just downsizing a standard floor plan and getting feedback from subs. Without careful planning, smaller homes can cost more per square foot than larger homes. In all, I spent more than six months developing and refining the basic plan before I was ready to break ground.

The structural shell (foundation, roof and exterior walls) has a greater effect on the cost of a home than any other factor. My strategy to control the cost of the shell began with minimizing the size of the roof and the foundation. The basic plan is a split-level raised ranch with 816 sq. ft. of space on the main floor (drawing facing page). This house includes a ready-to-finish basement with cripple walls framed over a 4-ft. concrete foundation to create an 8-ft. ceiling. Because the basement drops into the ground only 4 ft., I can install full-size windows, even on a level lot. By finishing this daylight basement, I can double the home's living area without increasing the roof and foundation costs.

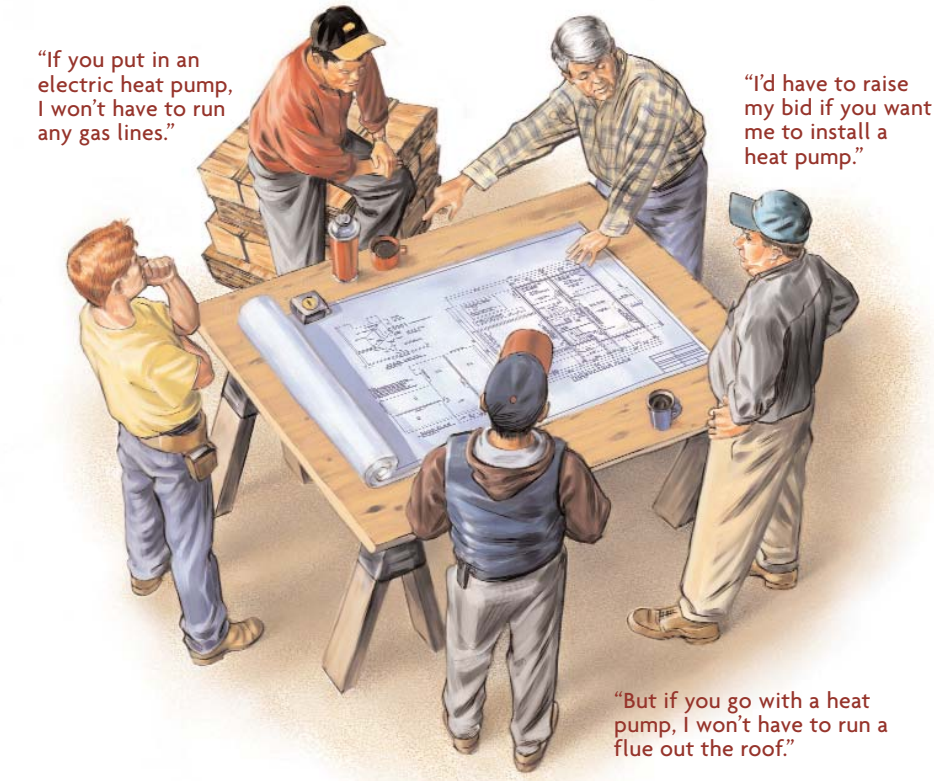
After the roof and foundation, exterior walls (with their costly insulation, sheathing and siding) make up the third expensive component in a structural shell. Here, I try to economize by limiting the total length of the walls in proportion to the area they enclose. A square would represent the most cost-effective footprint of all; but a square box is not appealing to the average homebuyer. I've found that a rectangle—better yet, a combination of rectangles—represents the best compromise between savings and aesthetics.

My standard plan incorporates two rectangles, the house and the garage (drawing facing page). This arrangement provides for an eye-pleasing break in rooflines as well as a change in elevation. This arrangement is economical because the garage adds curb appeal without requiring much insulation, drywall or wiring.

The use of two independent rectangular modules also allows me to reconfigure the floor plan lengthwise or widthwise. While the house can turn 180°, the garage can at-

BLUEPRINT DEMOCRACY

Having worked up a preliminary design for an affordable house, the author invites his subcontractors to find more savings.



tach in front or on the side. This building-block flexibility not only gives buyers a choice, it also allows me to use lots that other builders reject.

Once I'd refined the shell and the floor plan, I scrutinized every phase of construction, from excavating through painting, looking for ways to trim costs without detracting from the quality and desirability of the house. Value engineering is what sets the affordable homebuilder apart from the builder who's merely cheap. As we practice it, value engineering is kind of like a treasure hunt. Most of it is done in the planning, but as construction progresses, my team of subcontractors, material suppliers and I continue refining the search for economy and improvement. Every so often, we find a gold nugget (sidebar p. 64).

Panelized framing makes best use of labor and materials

Conventional 16-in. o. c. stick-framing is incredibly wasteful. My walls are framed 24 in. o. c., without unnecessary plates, cripples, trimmer studs and nonbearing headers. To reduce waste, I try to eliminate all structural redundancies (top photo, p. 64). But the quality and reliability of a building's frame become critical when you eliminate structural redundancies. That's why all my walls are built in a panel factory, where computer-controlled precision assures consistency.

With panelized walls, I know that the rough-opening dimensions are always correct; and I don't have to worry that specified details such as blocking for cabinets and towel bars might be forgotten. I also have fewer labor problems. One carpenter with two unskilled helpers can assemble a panelized house in less than half the time it would take the same crew to stick-frame the house.

Open floor plans and prefinished trim optimize resources

In addition to pinching pennies, I've worked hard to design a house that feels spacious and comfortable. Every room has high ceilings and large windows. Particularly important are the public spaces: The kitchen, dining room and living room are combined into one large, vaulted space, instead of three meager rooms (top photo, facing page). This combination of rooms makes the house feel larger than it really is, and it saves money by eliminating a bunch of interior walls.

I also save money by reducing painting costs. After the drywall hanger is finished and before the trim carpenter arrives, the walls and ceilings are sprayed with a bright, off-white latex paint. Once that job is done, the painter has only a half-day's worth of exterior work before he moves to the next job.

The cabinets, doors and millwork are prefinished. The carpenter just installs them, fills the nail holes and—presto!—the trim is finished. To streamline the finish process even more, the closets get wire shelving, and the windows get drywall returns.

Vinyl windows, vinyl siding, aluminum-clad soffits and fascia boards, and factory-finished garage doors eliminate the need for most outside painting.

Limited options simplify choices

I was still patting myself on the back for having designed the most cost-effective houses in the county when I noticed that they weren't selling. That's when I realized that even buyers of affordable homes want choices. My solution was to offer a limited range of options to accommodate the most popular upgrades. Some of the most common requests include adding a skylight, upgrading bedroom lights to ceiling fans, enlarging the family room and adding a fireplace. For upgrades such as these, I've developed package prices and adjusted our construction practices to make these changes as easy to accomplish as possible.

To handle changes without driving subs crazy, I use the same strategy that worked so well in crafting the basic design: Get my subcontractors' advice. I can't please everyone, however, so when I encounter a buyer whose demands create serious work-flow problems, I make an exception to my quest for affordability: I charge a premium for the change and reimburse the affected subcontractors generously. My subs don't complain.

Color choices can drive any contractor crazy, so I keep those things firmly under control. On the exterior, I allow customers to choose from a limited variety of vinyl-siding colors, but not much else. The roof shingles are always gray; and the wood-trim surfaces are always painted white. Any leftover material (a gallon of paint, a bundle of shingles) goes to the next job without being wasted.

Penny wisdom or pound foolishness?

Construction costs run up like cash-register tape at the supermarket. Little purchases add up. To keep this inflation in check, I watch every penny. That's why I applaud a subcontractor who suggests a $10 reduction, though it represents less than one-hundredth of a percent savings overall. Building economy requires this kind of frugality.

Drawing this page: Matt Collins

EFFICIENCY MAKES ROOM FOR COMFORT

Leaving out the walls between kitchen, dining area and living area saves on framing and makes small spaces feel much larger (top photo). Using panelized walls enables a small, semiexperienced crew to assemble a quality house quickly (photo left). Savings on production costs make it possible to include luxuries such as skylights and vaulted ceilings.

But frugality does not override quality. If I'm not careful, my hard-won construction savings can easily be eaten away in warranty calls. I keep track of warranty calls in a dedicated job-cost file. Every six months, I review this file to see where callback dollars were spent. When I see recurring problems, I make changes, even if they initially mean spending more money. For example, I now install 5/8-in. drywall over 24-in. o. c. trusses because people complained of wavy ceilings. Because customers complained about squeaky floors, I now use 3/4-in. subflooring (instead of the 5/8-in. variety), and I make sure my crews inspect and spot-screw subfloors before carpeting. I use FlexWrap (Dupont Tyvek; 800-448-9835) window flashing to avoid window leaks. I sheathe exterior walls with 1/2-in. oriented strand board (instead of less expensive sheathing) so that the siding won't appear wavy. I've twice upgraded windows. Changes such as these have added $1,200 to my building costs but have saved thousands in warranty claims.

Much of my approach to affordable housing goes against the advice of real-estate experts. I've found, however, that economy-minded buyers would rather have a fourth bedroom and storage space than granite countertops and a whirlpool tub. Two small bathrooms and a simple kitchen might seem inadequate for today's market, but arranged tastefully, this house works fine. □

Fernando Pagés Ruiz builds homes in Lincoln, NE. Photos by the author, except where noted.

Top photo: Tom O'Brien