

Foundations

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for Success



Even for those with building or remodeling experience, getting a first new home out of the ground can be a challenge

BY PATRICK McCOMBE

In the mid '90s, I was working as a construction supervisor for Habitat for Humanity (HFH) in Pittsburgh. Like other Rust Belt cities, Pittsburgh and the surrounding area has a huge inventory of distressed properties left over from the city's industrial heyday. Our HFH affiliate would buy or be given these abandoned homes to rehabilitate for low-income homebuyers. It was rewarding work, but as you might imagine, there's usually a good reason—often many good reasons—why a house only costs a few hundred dollars, or is free.

Structural problems; squatters; extensive rot; rat, pigeon, and insect infestations—these were just some of the things we routinely had to deal with. For years, the other construction supervisors and I pleaded with our board of directors and executive director to acquire bare lots, so we could build new homes instead of doing full-gut remodels. All of us assumed that building new homes would be faster and easier than rehabbing the dilapidated old houses we had been working with. Like my friend and former *Fine Homebuilding* editor Andy Engel points out, “New construction is an order of magnitude simpler than remodeling. There's no demo, and you're not working in someone's house when they're trying to feed the kids breakfast.”

Building a clean new structure with straight and square walls, one assumes there should be few surprises. So I was jubilant when I was put in charge of one of our first new builds, a pair of single-family homes built on an infill lot with the masonry remains of a commercial building where stonecutters once cut granite headstones.

Anyone who's built in a city neighborhood on an infill lot with the remains of an existing structure can probably hear the alarm bells, but I was too inexperienced to know what I didn't know. It's true that building the house was easier, because everything was straight and level and the boxy structures were easy to build. But getting them out of the ground introduced new problems. A few decades later, I can now use this very



edifying experience of building these two 1200-sq.-ft. houses to help explain just a few of the things that can go wrong with a new-home build. I also asked my friends and *Fine Homebuilding's* social media followers for their help flattening the learning curve for anyone who is making the transition from experienced remodeler to first-time new-home builder.

Consider local architecture

It can be hard to see the beauty in a blighted inner-city neighborhood, but the existing architecture is often what makes a neighborhood special. Unique old buildings can transform an aging neighborhood into one that attracts newcomers. The same is true in rural areas. The local vernacular offers clues to an efficient and long-lasting structure that works with the local climate and landscape. There's a reason Southern homes traditionally had dog trots and those on the Gulf were raised well above sea level. Similarly, in northern New England houses and barns are connected, despite the risk of devastating fire, because subzero temperatures and feet of snow are bigger risks.

At the time I was working for HFH, the nonprofit was experiencing tremendous growth and had just become one of the 10 biggest home builders in the United States. Newly in-vogue high school and college service-learning requirements fueled an explosion in volunteer interest. And with HFH regularly getting media attention as an efficient home builder doing good work, money poured in from grants, private



donations, and corporate sponsors. The lid blew off in 1992, when it was reported that all of the 27 Habitat homes in Southern Dade County survived Hurricane Andrew largely unscathed, while more than 25,000 other houses in the county were completely destroyed and another 101,000 were severely damaged.

To keep up, Habitat affiliates around the country were trying to streamline their process by standardizing their homes and construction methods. Pittsburgh HFH decided it would build some new ranch homes with an efficient floor plan originally designed for Charlotte, North Carolina. Almost immediately, we started taking heat from local

preservationists and a few board members who correctly pointed out that these homes did not look right in the urban neighborhoods where we were building. But the majority of the board and construction staff, myself included, pushed the design forward because the single-story homes with low-slope roofs were much easier to build with volunteer labor.

Today I'd be on the side of the preservationists. When new homes are built in existing communities, they can either help or hurt the neighborhood. Designs respectful of local architectural traditions often help raise property values, while those that don't often hurt them.



Start with good plans, use material efficiently, and site it right

It should go without saying that in order to have a successful project, you need to have good plans with all of the important details and finishes spelled out. As real-estate agent Alex Saloutos says, “Build the home on paper first before you dig. This will help you iron out kinks before you start instead of in process, which is more expensive and time consuming.”

A significant amount of the feedback I received mentioned the importance of asking for input on the design from more-experienced folk, especially inspectors, other builders, and subcontractors. They can often help you save money or create a better house during the planning stage. Architect Robert Swineburne was quick to point out that simple forms are easier to build, more energy efficient, and less likely to have water-intrusion problems. “Keep it as simple as possible in shape and form. It’s uncanny how much time and head scratching a simple dormer can take.”

These little ranches had professionally drawn floor plans and elevations, but were developed for a place where slab-on-grade construction is the norm. Anyone who’s been to Pittsburgh knows it’s very hilly. To deal with sloping lots, nearly every home has a block or concrete foundation. A slab

/// *I was blessed to be able to build my own house first, and make mistakes on it, rather than a customer’s. It’s a steep learning curve compared to remodeling.*

Major takeaway? Try to always be the smartest person on the job. Learn like crazy. Ask questions; shadow all the subs you hire. Try to always make the next person’s job easier. Know the code. Some inspectors try to get you to do things that aren’t required—be respectful. Don’t argue, just ask for clarification from the code book. They’re people too.

*Before you get too far into the project, make a list of all finishes and fixtures, and make sure the customers know what they want! Get things picked out before the framing even goes in—the color of every room, light fixtures, bathroom fixtures, sinks, color of granite ... the works. **///***

— Nathaniel Morse, NM Construction in Eugene, Ore.

can be made any size, but masons charge more when they have to cut block to accommodate a foundation size that doesn’t work with the 8-in. increments of their material. Fortunately, this oversight didn’t cost more—the mason’s union in Pittsburgh laid our crawlspace foundations for free—but a slight revision would have made their jobs easier.

You can make the same mistake with odd-shaped and odd-height buildings, which have more waste than those sized to take advantage of common material dimensions. Residential designer Michael Maines, who works in rural Maine, reminds first-time builders to consider the foundation elevation: “If you get the house too high, it looks perched above the landscape, with a lot of foundation wall showing. Too low, and you could end up with water-management issues. On flat lots this may not be a challenge, but I often work with challenging lots.”

Plan for utilities and access

In old neighborhoods, utility-service maps and municipal records are notoriously out of date. When I went to the city’s water department to ask what was involved in getting water service to the two homes, they couldn’t tell me, because the newest maps dated to the 1930s. They told me that they’d have to dig up the street, that the price for extending the main and adding service branches would be based on time and material, and that the cost would be our responsibility. Their estimate: “Thousands—probably not \$10,000.” I imagine that figure would be at least doubled now.

In some urban areas, closing streets and providing traffic control for utility hook-ups can cost tens of thousands. In rural and

suburban areas, the cost of extending power lines, installing a septic system, and drilling a well can take up a significant chunk of the budget. Maines reminds first-time builders to plan for large-delivery-truck access and muddy spring roads. “In rural, northern climates, you have to work around mud season when towns prohibit heavy truck traffic, like heavy equipment trailers and concrete trucks. It lasts about a month in early spring, right when everyone wants to start building.” He also says that 18-wheelers may not be able to make it down narrow roads or long driveways at any time of year.

Get inspectors on board early

By the time I first met with the local, newly hired building inspector, I had been a construction supervisor for about three years. I’d learned that if I came to the building department with good plans and a realistic construction schedule, the inspectors gave me greater respect and a little more latitude. I was in my mid-20s, but I looked to be in my teens. When I walked into the new inspector’s office, he sized me up, and I don’t think his impression was good. As I rolled out the plans, he asked me how long I had been doing this. While I explained my background, he scanned the floor plans and elevations and then focused on the detail drawings. While I was still talking, he pointed to the foundation detail, which showed a slab with a thickened edge. He asked, “Where are you building this?” It was a good question—the neighborhood where I was building had the steepest street I’ve ever seen, and there wasn’t a flat spot for blocks in any direction. A slab would have required a



massive cut-and-fill effort and huge retaining walls.

I explained that we planned to build them on a block crawlspace with a stepped footing, but our volunteer architect hadn't finished the revision. The response: "You'll need a complete set of plans before you get a permit."

I wasn't off to the best start. I asked if we could move forward with a demolition permit, so I could clear the remains of the masonry building. He handed me an application that explained the rules for getting a permit. "Fill this out and get me copies of the contractor's license and insurance information. And then I'll just need a check." I told him I could get him the application and a check in a day or two. "When the building is cleared, I want to see the lot," he said.

I asked him if he saw any other problems with the plans. "No, it's a simple box with a truss roof, but I want to see the truss design to check the loading before you order them." He asked what the floor system would be, and I explained that I planned to use I-joists without a center girder to speed construction. "I want to see that engineering too," he replied.

By this point, I'd worked with maybe six different municipal and third-party inspectors. None of them gave me a sinking feeling in my stomach like this one. I was glad I went early in the process so I could get the requested documents and hopefully look a little more put together at our next meeting.

There are more reasons to meet with inspectors early in the process than just dealing with the tough ones. Travis Brungardt of Catalyst Construction in Prairie Village, Kansas, says to meet with inspectors as soon as possible so you can learn what versions of the International Residential Code and energy code the municipality is following. He suggests asking what documents you'll need for a permit, what inspections are required, and if there are any local amendments that affect new builds. He also reminds new builders to check rules for setbacks, land clearing, and storm-water management.

Get architects and engineers on board even earlier

With my marching orders from the town inspector, I immediately called our project architect, a graduate student in Carnegie Mellon University's School of Architecture. I explained that I would need a foundation design and detail drawing before we could get a permit. The grad student said they would talk to one of their trusted professors about the best design. A week or two later, the demolition contractor was tearing down the old building and hauling the debris away.

I was on another project when I got a call from the office (on my new folding cell phone) alerting me that the building inspector was trying to reach me. When I called

him back, he told me that he had stopped by the project to make sure the debris was being carted off and not buried on-site. "I was looking at the soil, and I think you need an engineer. I think this lot is un-buildable."

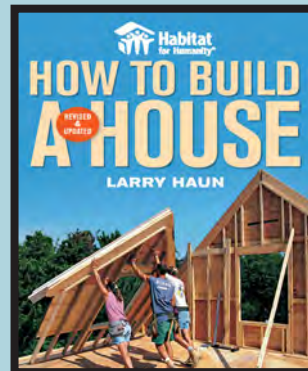
My heart sank. I was weeks away from hosting a group of volunteers to start the framing. One of my board members put me in touch with an understanding structural engineer, who promised to fast-track a foundation design suitable for the site—but he would have to make test bores, and that work was done by a busy subcontractor with a drilling rig and would take weeks. I wasn't against tugging at people's heartstrings when I needed a favor for Habitat builds, so I explained the important work and the volunteer effort, how HFH families paid for and helped build their own homes, etc. But there was nothing he could do. An hour later, my boss was making uncomfortable phone calls to disappointed sponsors.

Fortunately, the engineer concluded that the lot was buildable, but we'd have extra steel in an extrawide footing, and we'd have to reinforce and grout the block foundation walls. This single misstep—not planning to



BUILD AN HFH HOUSE

Longtime HFH volunteer Larry Haun's *How to Build a House* (first published in 2002) shows step by step how to construct a house nearly identical to my first new-home builds. I wish it had existed at the time. Its easy-to-understand text and visuals (some featured in this article) give invaluable instruction for building a simple, affordable, and energy-efficient home.



marked the foundation corners using strings and plumb bobs, but this house was a small rectangle. If a house has any complexity, it's a good idea to get a surveyor to site the building on the lot and mark the footing and foundation corners. Fixing a bad or out-of-square foundation or building too close to an easement or property line involves

very expensive fixes, sometimes a complete rebuild. Several other people also pointed out that underestimating the cost of grading, site work, and erosion control is really common even among experienced builders.

Keep a good thing going

Next, you need a good foundation crew and framers to keep the build plumb, level, and square. Framers often have to build on a slightly out-of-square foundation, but one that's out of level or severely out of square can complicate an entire build. Dale Warren, a custom home builder, says, "Pay attention to leveling and accurately measuring your footing and foundation. Every mistake you make at the beginning has the potential to cost you throughout the entire job. Pay attention to your underground utilities, so you don't have to rework anything during the build and for easy maintenance later."

A bad frame can also create problems and workarounds that slow and complicate the rest of the build. Like longtime builder and project manager Lavrans Mathiesen says, "A good framing crew will make everything after a breeze."

Once the frame is up, construction progresses much like an extensive remodel. Builder Phillip Lawrence reminded me of the importance of keeping subs in the loop on the build schedule: "Make sure you have all your subcontractor relationships in a good place. They can screw up your schedule/budget like you wouldn't believe."

Oh, and don't buy gas for a generator and compressor, or stock up on cordless-tool batteries, for the entire build—you can easily pay for the hookup to a temporary pole at the very beginning of construction and your life is easier and quieter. Don't ask me how I know.

Up and running

Once the foundation and underground utilities were in, building these two little houses was a lot like the rehabs we had been doing, only straighter and cleaner. We had to install new curbs and concrete sidewalks, which was a first for me, but I had some skilled and patient coworkers to help me along. The frames went together quickly, and installing exterior trim and siding was much faster than it was with the two-story rehabs. Plumbing, heating, and electrical was also faster and less expensive than with our typical rehab.

Admittedly, building these two houses involved a way steeper learning curve than I could have ever imagined, but subsequent new-home builds went smoother. By the time I left Pittsburgh to start a new life in Vermont selling building materials, Pittsburgh Habitat for Humanity had built or rehabbed six homes in that neighborhood, and my interactions with the building department gradually went from tense and stressful to almost friendly. □

Patrick McCombe is a senior editor.
Photos by Randy O'Rourke.

test soil conditions—added two months to the schedule, and cost thousands of dollars.

Get a good local excavator

An experienced local excavator often knows about troublesome soil conditions and where there's a high water table. Their experience can prevent expensive fixes later and is often invaluable in early discussions about septic systems, foundation depth, and siting the house.

Phoenix-area designer Jason Comer responded to my call for advice: "I did design work for a good-size remodeler that was doing easily dozens of jobs a year, but mostly kitchens, bathrooms, and small-room additions. We got into some new builds and what really cost them were mistakes estimating grading, site work, and not knowing how to supervise the concrete crews."

On my project, I found an excavation contractor who did a good job. He made the foundation holes the right depth without overdigging and he was able to work around existing utilities without damaging them. His flat holes made it easier to lay out and form the footings. A coworker and I