

[LEAN CONSTRUCTION]

WANTED:

MORE THAN A FEW GOOD ARCHITECTS AND ENGINEERS

The vast majority of architects aren't trained in the intricacies of efficient construction.

Engineers are trained, but most show little or no concern.

By Scott Sedam, Contributing Editor



On a mild winter afternoon in California's Central Valley, I walked a ranch house with an architect, engineer, and several builder personnel. The house had some cool features: The kitchen opened up via an entire wall of sliders to a patio with an optional outdoor kitchen, making homeowners feel like they live outdoors, and an inner courtyard admitted light into rooms in a surprising way. The entire house had a delightful feel to it and customers loved it. That's the good news.

The bad news: The house was selling, but the margins were terrible. After seeing the beautiful model, we drove farther back into the project to the same unit at the frame stage. As we moved through the house, the engineer—not the one who worked on the ranch house in question—kicked into high gear, offering his take on the engineering. "Every window and door opening has extra jacks and kings that contribute nothing to the strength of this house," he said. "Why are you paying for these?" The builder had no answer. "See those double lam beams over that opening?" the engineer asked. "No need whatsoever. Those could be done with dimensional lumber at less than half the cost."

The engineer went on to point out oversize headers built with both top and bottom plates, many of them completely unnecessary. He stopped at every excess cripple, wasted corner stud, extra framing member at the intersections of closets and walls, and window sill doubled for no good reason. Then he started in on all the excess tie-downs, bolts, and bracing beyond code.

This continued until the builder's staff succumbed to overload and went from informed to bewildered. A couple of days later, the engineer delivered his report. By eliminating unneeded framing, engineered wood, trusses, bracing, and

recovering just a fraction of the labor saved, the builder could recover a minimum of \$2,500—a good start toward solving the margin problem, and the builder didn't have to campaign and cajole for a single reduction in bid price from suppliers or trades. So why didn't the builder's regular engineer catch all this?

TEXAS TRAYS

In Texas we walked a house with that rare architect who boasts a slew of design awards yet puts a lot of thought into the cost, from elevations to floor plans to how to build them. He'd actually done a stint as head of purchasing with a production home builder. Among many other issues (read: opportunities), this large single-story ranch was festooned with ceiling trays, including the living room, dining room, kitchen, master bedroom, and one additional bedroom. Five in all, all standard, each built with double 2x12 framing members.

The architect made several observations: The builder could use a single 2x12 for the trays, and the trays could be built more efficiently with 2x4 material or even 2x2, with scrap OSB to box them out. Each method would save money and work just as well. Then he queried, "Have you ever asked your truss company to build the trays right into the trusses? That can save both material and a ton of labor." No one on the builder's team had considered that. Finally, the architect suggested, since they were already using 9-foot ceilings throughout, why not make the trays an extra-cost option?

The story ends with the builder going the integrated truss/tray route and making all but the master bedroom tray optional. The builder netted out more than \$900 per house for starters, found additional profit on tray options, and made its framers happy. The old "beat-down" approach was unnecessary. Why did they have to bring in an architect from 800 miles away to suggest this?

MOST BUILDERS ARE RELUCTANT TO PAY FOR EFFICIENT DESIGN AND ENGINEERING BECAUSE THEY DON'T UNDERSTAND TOTAL COST AND TOTAL VALUE. IF THEY KNEW THE NUMBERS, THERE WOULD BE NO HESITATION.

FEAR & LOATHING IN MEMPHIS

A few years ago, Memphis, Tenn., and surrounding cities adopted seismic standards and codes every bit as demanding as those in San Francisco, due to the New Madrid fault zone. The entire community of builders, architects, engineers, trades, and suppliers was on edge implementing the new requirements. When we walked those first houses supposedly built to the new code with a highly experienced West Coast-based engineer, what we found was every home built far beyond code requirements, at a cost of \$1,500 to \$3,000 extra for each in excess timber, sheer panel, engineered wood products, hold-downs, tie-downs, straps, and bolts. So just fix it, right? This engineer wasn't licensed in Tennessee, so he thoroughly marked up the plans and schedules, with full details and load calculations. Yet the builder's local engineer wanted nothing to do with the revised specs, even though they fulfilled code requirements. The builder had the same experience with several other engineering firms in the market. Finally, he was able to find one young guy to do the redesigns, who saw the opportunity to learn and thus grow his business.

WHO'S YOUR BOSS?

Out East, a builder contracted with a panel plant and was quite happy with the results. They saw reductions in cycle time, site waste, and—although it took a while for their framers to learn the process and time savings—they eventually dropped their labor price. During our site walk, I noticed a remarkable excess of timber throughout the entire structure. I fully understand that

panels must be built to both travel well and assemble efficiently. I spent one entire year of my career on a project that required visits to more than 25 panel plants and modular house manufacturers. The first house we entered revealed excess framing, headers, and connectors—all the usual suspects. At the next house—a large two-story—three representatives from the panel plant arrived to accompany us. My gentle prodding about the glut of timber was only met with claims that the excess was for transportation needs; something I knew to be false. I didn't think they were lying, they just needed to give me something on the fly and hoped I'd buy it.

Then we saw the back wall of the house, which ran from a large family room through an open dining area on into the kitchen—36 feet in total. The structure used to accomplish this left me staring in disbelief. Along the entire length ran tripled-up lam beams with about 30 fat TJIs supporting the second floor, attached with joist hangers, and there were several 3-0/5-0 windows and one 48-inch sliding door. Huge support posts at 12 feet and 24 feet created a 12-foot opening, filled in by panels, plus the windows and slider. For the life of me, I couldn't fathom the thinking behind the design. Then someone explained: "The customer wanted an 18-inch bump-out on the back wall."

The panel plant was owned by a large lumber dealer, and together they worked up the specs and design for the panels plus the necessary engineered wood, connectors, etc. The rep talked a good game about how efficient the panels were, when all I could see was blatant waste. I asked the panel rep if his company had an engineer and he replied,

"Absolutely! We have two! They're involved in the design of everything." Yet there were at least two or three far more efficient, cost-effective ways to design this option that I could see, so I asked about who the engineers work for. The rep looked confused, so I added, "Who pays them for their work?" He tried to explain that the engineers work for the panel plant, just like he does, and it is owned by the lumber company, and ... he was confused again. I feigned surprise and explained that from what I could see, I assumed the engineers work for Georgia-Pacific, Weyerhaeuser, Simpson Strong-Tie, and a few other big suppliers. The rep laughed, but soon realized no one else was amused.

I explained that although the panel company builds nice, sturdy panels, it hadn't understood who the customer is for this job. The customer is not the component manufacturer, lumber supplier, or lumber dealer; the customer is the builder—who had no desire to buy and bury excess timber and metal behind the walls. Part of the panel company's job should have been to make damn sure the builder didn't waste money, but I suggested that that had been forgotten. It was a tense moment, but over the next few months, everyone woke up—including the builder. Changes were made, adding several thousand dollars of margin for the builder.

EDMONTON EXCESS

Walking homes in Edmonton, Alberta, in February isn't what many would consider a good time, but finding big savings helps to ease the chill. On this day I noticed grade beams and thickened footers that appeared way beyond the

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call of the code. We measured about 10 of them, and that was all the evidence we needed. Turns out the house architect had developed a habit of simply dotting in the interior footers and grade beams with the universal, "as required." Then forming crews built them as they found expedient, and the concrete company reaped the benefits. Once this spec deficiency was remedied and the architect began calculating the correct sizes, the builder realized an additional average savings of \$375 per house.

If you think—or perhaps just hope—these incidents are simply cherry-picking four or five out of a few hundred product tours, you're wrong. My TrueNorth colleagues and I find similar examples in the homes of every builder we visit—more than 200 over the past 19 years across the U.S. and in four other countries. No exceptions. Thus we know, not anecdotally but by the facts, that the problems with architects and engineers are not the exception, they're the rule.

Here are the cold, hard facts. The vast majority of architects are not trained in the intricacies of efficient construction. Engineers are trained, but most show little or no concern. We can be a bit more forgiving of the architects, although not so much so their universities. If I ran a school of architecture, each student, each summer, would be required to work in the field in construction. Same for engineers learning about the process of how things are built and the costs, both obvious and hidden. That would benefit them far more than a summer internship at a design firm. And any architect should be highly motivated as soon as he or she actually begins designing, to get up to speed on cost factors. Yet I had an outside architect in Nashville actually

look me in the eye and say he hadn't visited a field site in the 24 years since graduating. That was one of the few times I've been totally speechless.

I find it harder to give a break to engineers, who just know better. They know when they're over-specifying; they know when they have designed at two or three or five times the code requirements. They know that it costs their builder—who writes the checks—a fortune. I propose this as the job definition for a residential structural engineer, "Meet every building code—including the customer code—at the lowest cost to the builder." Yes, the customer code is important. If you build a second-floor master bedroom to code, yet each time the homeowner crosses it it bounces, you just lost the game.

DIRTY SHOES

Some years ago at an NAHB presentation, I was doing my rant about these issues, and during the Q&A a woman asked how you go about finding architects and engineers who "get it" when it comes to cost and value. "Simple," I proclaimed, "just go from office to office seeking one pair of dirty shoes."

Not long after I wrote a column citing my frustration with architects, a high-level official from the American Institute of Architects sent a letter to my editor-in-chief complaining that I was being unfair to architects and demanding that I cease and desist from further criticism. That made my day because it was proof that I'd touched a nerve well in need of tweaking. I challenged him to submit an article refuting my points, which the editor assured would be published. I also challenged him to point-counterpoint debates at

any venue of his choosing. He never replied. But I did hear from quite a few architects and engineers thanking me for laying the problem on the table.

I am a huge fan of architecture, and that only adds to my frustration. It's true that some of the greatest designs ever produced would likely never have happened had the designer been constrained by cost. The reality, however, is that 99 percent of us will never live in a home designed by a famous architect. And although I agree that architects should be artists first, we can't build beautiful residences without understanding cost and value, with the full support of every structural engineer, at a price homebuyers can afford.

This is an industrywide problem, and builders' reluctance to pay for great design that actually increases building efficiency and reduces cost is a huge contributing factor. Purchasing will work mercilessly to bid and rebid, desperately seeking a \$500 price reduction. Yet senior management will balk at spending the money to design a house that will generate a multiple of that \$500 in margin, net of the fees. I couldn't claim this if I hadn't seen it repeatedly done by the small percentage of architects and engineers who truly get it. They amaze me and have taught me so much, but they make me impatient with the status quo in their professions. I'm tired of the waste we find in every house. Are you? Isn't it time we all lost patience with the current state of affairs? **PB**

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