

NOTEBOOK

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Deck Disasters Spotlight Faulty Connections

by Ted Cushman

This summer's celebrations have revealed an alarming lack of solidity in some of the country's residential decks. In June, a deck collapse at a Washington, D.C., townhouse injured about a dozen people, three of whom had to be airlifted to an area hospital. The following month, a party in Point Pleasant Beach, N.J., ended with 31 people being treated for injuries after an 8-by-24-foot deck ripped loose from a beachfront house and dropped 12 feet. Amateur video shot just before the collapse shows only about 15 people on the deck, town police chief Daniel DePolo told *JLC*. "Most of the people hurt were underneath the deck on a cement patio. That's how we got the mass casualties," DePolo explained. "We saw a lot of lacerations, nail

punctures, and fractures."

The New Jersey incident is only the most recent example of a type of structural failure associated with poorly built residential decks: a sudden rupture of the connection between the deck and the house.

"From what's been told to us," DePolo said, "it looks like the deck was only nailed to the house. We didn't see any lag bolts. The attachment to the house gave way first, and then the whole thing went down."

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FBI Sting Nails Philadelphia Plumbing Inspectors

In the wake of an FBI sting operation, a federal grand jury has indicted 13 Philadelphia plumbing inspectors for taking bribes from contractors to avoid inspections, obtain preference in scheduling inspections, or work without required permits.

According to investigators, some of the inspectors had been taking bribes at least since the early 1980s. Although the individual bribes were relatively small — typically from \$5 to \$20 — they added up to a substantial sum. The indictment mentions a figure of \$169,000, but Rich Manieri, a spokesperson for the U.S. district attorney's office, notes that the real figure could be far higher. "There's no way of knowing," he says. "It could be several times that figure."

The city's commissioner of licenses and inspections, Edward McLaughlin, notes that none of the contractors had complained about making payments. (One contractor, quoted in a Philadelphia newspaper after the indictments had been handed down, compared the bribes to tipping a barber.) The

district attorney's office would not provide details on the investigation, but published reports indicated that all 13 inspectors had been caught on film, after hidden cameras were installed in city vehicles under the pretext that they were part of a test of alcohol-fueled cars.

Two of those indicted had recently retired from the department, and the indictments named all but one of the plumbing inspectors currently active. Not surprisingly, the arrests have sharply limited the city's ability to perform plumbing inspections. The Department of Licenses and Inspections is said to be retraining 27 building inspectors to do plumbing inspections. In the meantime, licensed master plumbers working in the city will be allowed to self-certify their jobs under some conditions. A plumber who has obtained permission from an inspection supervisor to self-certify must photograph the job and attest that he has used approved materials and complied with the code. At that point, the job can be closed up without any direct involvement by an inspector.

Deck Disasters

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Inherently weak. Virginia Tech engineer Frank Woeste and his colleagues have been scrutinizing deck disasters as part of a project to create a deck and balcony inspection manual. The whole concept of attaching a ledger board to a wall or band joist, Woeste argues, is inherently weak; such a connection seldom has the strength to carry the standard code-mandated 50-psf combined live and dead load. Ideally, he believes, deck ledgers should be supported by exterior posts attached to the house. This provides wood-on-wood bearing and allows the joint to be inspected in service.

"When you attach that ledger to the band joist with fasteners alone, you create a bearing condition through mechanical fasteners subjected to shear," he says. "For decks or any other detail, that's a very inefficient connection."

Bolts vs. lags. Lag bolts are usually regarded as a much more reliable deck connector than nails, but Woeste has found that even lag bolt connections often fall far short of what's needed.

The published values for 1/2-inch-diameter lag connections, for example, assume that the screw is buried 4 inches into a beam. Woeste's team had to perform extra calculations to determine a screw's strength in just a 2x10 or 2x12 band joist. "Based on the best engineering available and the published, code-approved equations," Woeste says, "the allowable rating for a 1/2-inch lag in that skinny little material is just 180 pounds." For an 8-foot joist span, that would mean spacing 1/2-inch lag screws at about 10 inches on-center; a 12-foot span would require screws every 7 inches. Needless to say, few lag-fastened decks use that many.

Looking for a ledger. Woeste's calculations, moreover, assume a healthy ledger board attached directly to a healthy band joist. In the real world, that's not always the case. Do-it-yourself books, for example, almost invariably show sheathing or both sheathing and siding between the ledger and the band joist. Either condition results in a much weaker connection.

In extreme cases, the ledger may be fastened to little more than thin air. Woeste recalls a Virginia failure



in a house with a truss floor, where the band joist the contractor imagined he was tying into simply didn't exist. Robert Falk, a research engineer with the Forest Products Laboratory in Madison, Wisc., remembers a case in which the band joist itself pulled free of the house; an investigation revealed that it had been end-nailed into just the top and bottom flanges of the I-joist floor frame.

Information, please. If the typical details in the field are inadequate, it could be because there's not much guidance available for contractors. "The building codes aren't much help," Woeste says. "They all tell you

to use 40-pound gravity load plus dead weight of the structure, but they don't go into detail about lateral loads or connections to the house."

Standard reference books are also silent on decks. "The American Wood Council [www.awc.org] has a new edition of the *Wood Frame Construction Manual* for 2001," says Woeste. "It gives you every detail imaginable on how to build a house, down to the last nail. It's good — it focuses on high wind, which is a serious matter. But there is nothing in there about decks."

One source of information recommended by Woeste is a website maintained by the Fairfax, Va., building department; it can be found at www.fairfaxcounty.gov/gov/dpwes/publications/deckdet.htm.

Robert Falk and his colleagues at the Forest Products Laboratory also have published a comprehensive manual on deck construction. *Wood Decks: Materials, Construction, and Finishing* can be purchased from amazon.com for \$25, or from the Forest Products Society (608/231-1361) for \$19.95, plus \$5 shipping. "We came up with all new design calculations in cooperation with the wood industry, and all the major associations were involved in it," says Falk. "It's a lot more comprehensive than the home-center books."

Waiting for the codes. But given the absence of detailed code guidance and strict enforcement, both Falk and Woeste express grave doubts about the quality of current and recent deck construction.

"Unfortunately, I think things are going to get worse rather than better," Woeste says.

Robert Falk agrees. "Any yahoo can build a deck," he says. "A lot of times they're not even inspected, and I'm not sure that building officials know how to evaluate them. It's kind of scary."

Controversy Surrounds California Plumbing Code's Exclusion of PEX

A recent decision by the California Building Standards Commission to exclude PEX from the newest version of the state plumbing code has drawn manufacturers, trade associations, and state agencies into a bitter dispute that has been in the making for years.

The controversy dates back to June 1999, when IAPMO published the 2000 version of the *Uniform Plumbing Code (UPC)*. In March of 2001, the 2000 *UPC* — which approved the use of PEX for water distribution systems — was submitted to the California Building Standards Commission (CBSC) for inclusion in the pending *California Plumbing Code*. But in July of the same year, a lawyer for the California Pipe Trades Council — an organization that represents plumbers' unions in the state — sent a letter to the CBSC expressing the council's view that PEX should be excluded from the California code until an assessment of the material's environmental impacts could be performed.

According to CBSC executive director Stan Nishimura, it's not clear whether an environmental impact report — required for certain products under the state's Environmental Quality Act — is actually needed. "We're still investigating that," he said. That uncertainty, however, was enough: In May 2002, the CBSC adopted the 2001 *California Plumbing Code*, which had been amended to exclude the use of PEX.

Pipe Trades Council attorney Dan Cardozo, noting that California's union plumbers do little residential work, maintains that his organization has no vested interest in keeping PEX off the market. Dick

Church, executive director of the Plastic Pipe and Fittings Association (PPFA), scoffs at that claim. "I question the timing of their letter to the CBSC," he says. "They're afraid that approval for PEX could be the camel's nose under the tent."

Others in the industry believe that the decision to drop PEX from the new code was politically motivated. Wirsbo's website, for example, claims that the Pipe Trades

plumbing code within one year of the publication of a new version of the *UPC*. "They were required to come out with the new California code by October 2000," he says. "We maintain that the *UPC* automatically became the *California Plumbing Code* when that deadline passed."

While the court weighs the merits of the PPFA lawsuit and the CBSC considers the separate issue of



Although PEX is permitted for water-supply applications under the newest version of the *UPC*, the State of California recently opted to exclude it from the state plumbing code — a decision considered by many to be politically motivated.

Council has provided nearly \$1.4 million in campaign contributions to California governor Gray Davis, and that Davis himself appointed two new commissioners to the CBSC — both of whom reportedly had longtime union ties — one week before the final vote on the amendments barring PEX.

The PPFA has since filed a lawsuit that charges the CBSC and other state agencies with improperly excluding PEX by mishandling the code adoption process. According to Dick Church, state law requires the CBSC to adopt a new state

whether PEX should be subjected to a full-scale environmental review, the material's status in California remains in a sort of legal limbo. More than a hundred municipalities already approve the use of PEX, and builders and contractors can continue to use it within those jurisdictions despite its exclusion from the statewide code. But state approval, Dick Church believes, is not far off. "We wouldn't be suing unless we thought we had a good chance to win," he says. "We're hoping for a finding by the court by early November of this year."

BUSINESS TUNE-UP

Seagull Management by Melanie Hodgdon

While there are any number of successful management styles, at least as many more lead to failure. Among the latter is what I think of as “seagull management”: a system where the boss periodically swoops in, makes a mess of everything, and then takes off again.

Seagull managers tend to think in terms of the big picture. Once an idea has been formulated or a decision made, they prefer to leave the implementation to others. That’s not necessarily a bad thing — in fact, it’s a key trait of any effective leader — but the seagull manager can’t leave well enough

alone. He tends to come back and express his disappointment that things aren’t progressing as well or as rapidly as he’d expected. Because details aren’t his strong suit, he may not understand the time-consuming nature of his requests, which often leads to disappointment with his employees’ performance. The employees, on the other hand, may live in a state of constant anxiety waiting for the boss to swoop in with the next great idea.

The lesson here is that a successful company needs a balance of idea people and detail people. If you’re a global thinker, don’t

launch a new project without asking your employees how much added time it will take. If you’re a details person, remember that new ideas are the lifeblood of any company, and too much routine, no matter how perfectly carried out, can mean stagnation and decline. Seek input from people in the company who think differently from you, and keep an open mind about new ideas and innovations.

Melanie Hodgdon is a business systems consultant for builders in Bristol, Maine.

OFFCUTS

The online auction merchant eBay has added new homes to its offerings. The auctions, which began in June, featured homes from a number of major production builders, including KB Home, Beazer Homes, and others. The home-sale site (www.ebayrealestate.com) includes photos of model homes, architectural drawings, floor plans, and maps.

A nearly completed mansion on “Billionaire Row” in Dallas has been destroyed by fire. About 300 firefighters worked for eight hours to control the blaze at the 70,000-square-foot residence, which sprawled over ten acres. The spread of the fire was apparently facilitated by a lack of firewalls in the attic. It’s not clear whether a sprinkler system was operational at the time. The cause of the fire is under investigation.

Home Depot was the nation’s second largest retailer in 2001, according to the National Retail Federation’s annual ranking of the top 100 retailers by sales volume. Home Depot’s \$53.6 billion in sales was second only to Wal-Mart’s \$219.8 billion. Home Depot competitor Lowe’s was number 14 on the list.

The NAHB has developed a new home-building computer game. The game, aimed at middle school students,

has players work with a budget and deadlines to design and build a home and find a buyer.

The Department of Energy will provide funding to states to update and implement building energy codes. The agency will provide about \$2 million in grants to 22 states. The grants will be made by the end of this fiscal year and will be administered by state energy offices and code officials.

Black & Decker has announced that it will be cutting 2,400 U.S. jobs. According to *Woodshop News*, the tool and consumer product manufacturer — best known to builders as the parent company of DeWalt — will eliminate jobs at facilities in Maryland, Tennessee, Wisconsin, and California. About 1,900 new jobs will be created at plants in Mexico, China, and the Czech Republic.

American swimming pools are shrinking, according to the *Wall Street Journal*. The paper reports that the average American swimming pool has shrunk by 14% over the past decade, as larger houses, garages, and driveways eat up space once available for pools. Pool manufacturers are adapting, however: One company in Phoenix is reportedly selling a pool-hot tub hybrid it calls a spool.

Builder Callback Survey

Builders tend to keep their callback numbers to themselves, but a long-running survey conducted by the NAHB's Builders' Economic Council — and reported in the April 2002 issue of *Housing Economics* newsletter — provides a way for builders to see how they're doing compared to others in the industry.

Each year since 1995, the council has polled a panel of NAHB member builders about their callbacks, including cost, frequency, and response time. Among the survey's highlights:

- Fifty-eight percent of all builders responding reported callbacks related to drywall, making it the single most-mentioned source of problems. Paint and caulking were mentioned by 53%. Plumbing problems were a relatively distant third, with 31% of respondents mentioning them as frequent.

- In general, small firms seem to have fewer callbacks than large ones. Firms with fewer than 25 housing starts per year experienced an average of 2.86 callbacks per unit, compared to 3.16 callbacks for firms with 25 to 99 starts and 3.83 for those with 100 or more.

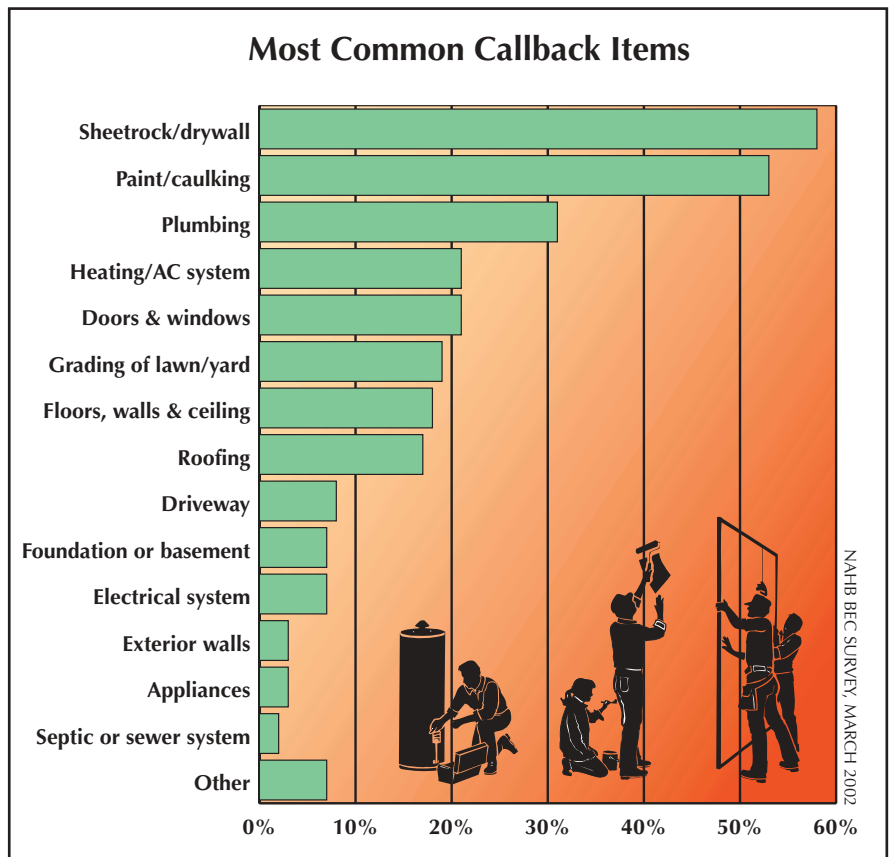
- The disparity in callback numbers between small and large firms was especially pronounced in the area of roofing, where only 12% of builders with 25 or fewer starts reported callbacks. Among builders with 25 to 99 starts, the figure rose to 21%, and to 22% for those with more than 100 starts.

- The 25-to-99 group led the way in speed of response to callbacks, with an average of six days. The under-25 group responded to callbacks in an average of seven days, while those builders with more than 100 starts per year took an average of nine days to respond.

- The survey lends support to the common-sense notion that callback frequency is directly related to the availability of qualified workers. In the March 2001 survey, for example, builders reported a sharp increase in callbacks from the previ-

ous survey period, from 3.43 to 4.1 per unit. In a separate survey, performed in December 2000, 61% of builders surveyed reported that labor was in critically short supply. By March 2002, only 39% of builders were reporting labor shortages, and the average number of callbacks had fallen to 3.15 per unit.

- According to the 2002 survey, mid-size builders had the lowest callback-per-unit cost, with an average of \$296. Small builders averaged \$332 per callback, while large builders averaged \$383.



Save the Pieces

Everybody likes a house party. But how about a “tear down the house” party? San Francisco Bay area contractor Paul Gardner throws a couple every weekend. Gardner owns and runs Whole House Building Supply, a salvage business that specializes in “deconstructing” homes instead of demolishing them. When a house in the area is up for

dened California landfills.

In the unusual bay area market, salvage is a plentiful resource. “It’s a whole different culture out here,” says Gardner. “The land is so scarce and valuable that people buy the house just for the land. And even though the house is in perfectly good shape, they tear it down to put up a bigger house. There are

in sizes up to 16 inches wide. People come to our sales and say, ‘Wow, you have mortise locksets with glass doorknobs? This is gorgeous!’ People go nuts over that stuff.”

It’s not all antiques. Often the buildings are almost new or were recently remodeled. “Architects and contractors will come out and buy a whole kitchen and just recreate it on their own project,” says Gardner. “We did a house owned by one of the founders of Yahoo, and we sold \$24,000 worth of stuff. The kitchen had just been remodeled five years earlier, with cherry cabinets and granite countertops.” Gardner’s crew kept the cabinets mostly intact. “We moved them in huge sections. It took 20 guys to move this great big island — we put it on a trailer and dropped it off at the lady’s place.”

With just a weekend to work in, most sales net only a few thousand dollars. Customers do a lot of the work themselves: “We let them use hand tools to remove the easy stuff. If they need a power tool, we have our guys available to cut for them, and then they have to pay for the labor. We only let licensed and insured contractors remove structure or use power tools.” Everyone who attends a sale has to sign a liability release. “We monitor the process, too, to make sure it’s as safe as possible,” says Gardner. “We don’t want anybody getting hurt. But we have a seven-year safe track record, and that helps convince new clients that we’ll do a safe job.”

“As a contractor, I’ve always hated waste,” says Gardner. “It’s gotten too easy just to go to a home center and buy stuff. Home centers are always going to get their crowd of people. But more and more people are finding out about us, and our stuff is very popular too.”



WHOLE HOUSE BUILDING SUPPLY

Customers do much of the demo work at Paul Gardner’s bay area whole-house salvage sales. Here a member of Gardner’s crew helps a customer tear out a skylight frame.

demolition, Gardner sets up a weekend sale and invites the public to come and remove woodwork, doors, cabinets, sinks, flooring — anything that still has value.

Everybody benefits, says Gardner: The building owners avoid some demolition costs and get a tax deduction (Gardner partners with a local nonprofit). The customers get quality materials at a bargain price. Gardner earns his fees for providing the service, and the community diverts material from the overbur-

streets here in Palo Alto where every other house has been torn down.” The dot-com crash hasn’t stopped it, he observes: “The economy isn’t as hot as it was, but we’re still going gangbusters.”

The fine old lumber and vintage hardware found in graceful homes from the ’20s and ’30s can be a high-value inventory. “We find old moldings in shapes you can’t buy at Home Depot,” says Gardner. “We pull off drywall and find clear virgin-growth vertical-grain redwood,

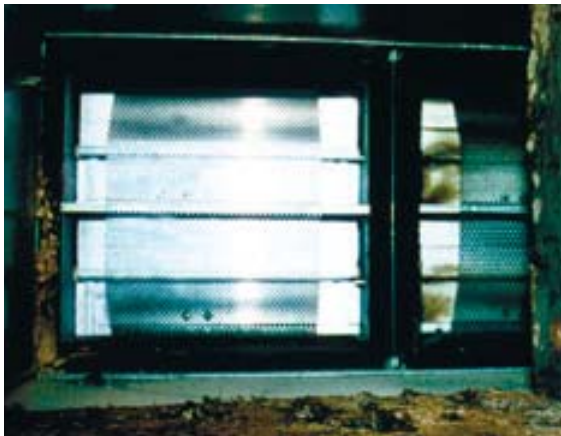
DOE Rolls Back Air-Conditioning Efficiency Standards

After nearly two years of controversy, the Department of Energy (DOE) has published its revised Final Rule on air-conditioner and heat-pump efficiency minimums. The new standard calls for a minimum Seasonal Energy Efficiency Rating (SEER) of 12 for all units, beginning in 2006. This rolls back the SEER 13 requirement published by the DOE in the waning days of Bill Clinton's presidency but is still 20% above the current SEER 10 requirement.

Paybacks will also vary by region. An Indiana contractor comments, "There are many areas of the country where going above 10 SEER is a lousy investment. Here in Indy we have low electric bills. Breakeven can be 15 or 20 years. Invest your money at even a few percent interest, and you do better. Put it into insulation or towards new windows, and you really save." But a Southern California contractor says, "Ten SEER is rarely installed around here. We're already doing 13

exchanger) is probably a good thing everywhere, but higher SEER gained by increasing evaporator surface area (the indoor heat exchanger) is a huge problem in high-humidity areas, unless fan speed is greatly reduced to drop the evaporator temperature, which drops the SEER."

"DOE recognizes the humidity control problems in the southern region," the agency wrote in publishing its new rule. "In the South, the equipment may very likely not provide adequate



U.S. ENVIRONMENTAL PROTECTION AGENCY

The warmer coils of high-SEER air-conditioning units sometimes boost energy efficiency at the expense of "latent capacity" (dehumidification). In some climates the result can be mold in air handler cabinets (left) or within walls (right).

Several states are fighting the DOE move in court, but Congress will likely preempt those suits: The Senate has already written the SEER 12 level into its version of this year's energy bill.

On average, DOE says the cost of upgrading to the new standard will be recovered through lower electric bills. But on a case-by-case basis, the new rule could create budget problems for many homeowners and technical problems for many contractors. Unlike new-home installations, replacing SEER 10 with SEER 12 or SEER 13 coils in an existing furnace sometimes requires expensive modifications of the air handler or even the mechanical room.

SEER as a minimum, 14 and upwards to 18 SEER often."

Humidity issues complicate the picture. Houston, Texas, contractor David Debien says, "The problem is that all ratings are based on 'averages' — climates that few of us live in. We focus on higher efficiencies, and the result in Texas has been mold."

Companies improve SEER ratings in part by using larger indoor coils, which cool more efficiently but run warmer and extract less humidity from the air. Michigan service tech Gary Lloyd explains, "Higher SEER gained by increasing condenser surface area (the outdoor heat

dehumidification.... [But] any problem with dehumidification can be dealt with in a variety of ways."

In practice, solutions will require a range of field modifications and special designs. Texas contractor Debien installs systems whose indoor coil is smaller than the outdoor coil, causing the indoor coil to run colder and extract more humidity. Others recommend using coils matched according to manufacturer specs but with a slow airflow setting to keep the coil running cold. Either way will improve dehumidification, but the increase in "latent cooling" requires an energy input, however it is achieved.

