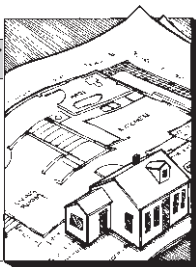


Energy-Detail Dilemmas

by Gordon F. Tully



The other day I found myself, my favorite builder and a friendly client talking about energy efficient construction:

Architect: I'm going off the deep end trying to decide how to detail the walls of a house I'm designing. Every time I do a house, it's different, nothing seems to work every time, and I'm scared stiff I will do something disastrous.

Builder: Got any ideas for this time?

Architect: I have ideas coming out of my ears, but I'm not sure of anything. First of all, if the occupant keeps the relative humidity down, and you seal up the building pretty well, it appears you don't need a vapor barrier, or retarder or whatever the heck you call it. At least in relatively mild climates, say less than 6500 heating degree days.

Client: You architects are all dreamers! Who says the next owner won't cook pasta all day and steam the place up? I think you should build under the assumption that some future owner will mistreat the house for a year or two. Why build fragile houses, especially custom designed ones?

Architect: Agreed, agreed! That's a properly conservative attitude. So I'll put in a good vapor barrier and spec the dickens out of it.

Builder: Good luck! Every time I use a new insulating contractor I have to run a continuing education course for the whole crew. They come to the job with all sorts of notions. When you build a house, you have to work

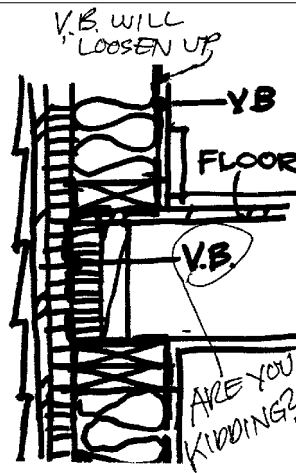
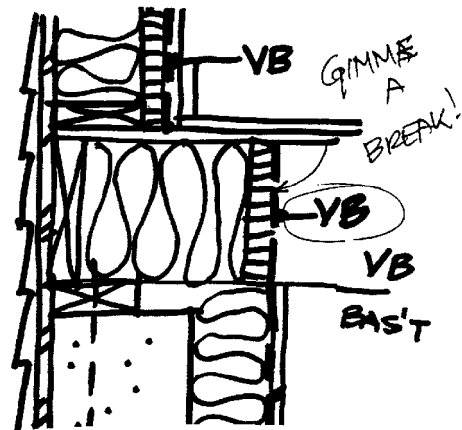
with the people, not just write stuff down on paper. Most subs don't read the specs anyway.

Architect: But what if I do all the right things, like use Tu-Tuf, double-lap the joints, and caulk around outlets and windows. Why can't I get a good barrier?

Builder: The drywall sub is going to butcher the vapor barrier when he cuts the board around the windows. But if you insist that he cut everything on the floor, maybe it might work.

Client: Hold on! The other day I read a research report which pointed out that some poly is inferior and falls apart after a few years. And I read another one that told how the film bellies into the soft fiberglass insulation and tears at the joints, because of differential wind pressure on the leeward side of the house. It seems that if the vapor barrier is the main barrier against wind, it will have a high pressure differential across it, and move a lot when the wind blows.

Architect: I always like well-read clients. I read the same reports, and that's why I started using rigid insulation board on the inside of the wall. Of course, if you use a board that doesn't have a low perm rating, you have to add 6-mil poly on the outside of the board, which means that it will get carved up by the gyp board people again. But if you put the poly on the inside, the wind may get at it. So I settled on Thermax, which has a very low perm rating. As far as I know, it's the only one that does.



get one at the joist boxes where an upper floor frames in, and it's God's own job to make the barrier continuous behind interior partitions framing into outside walls.

Builder: Yeah, I agree with that. It's a pain in the neck to have to put in a layer of poly or board between the wall and partitions, but I do it anyway. The joists are a horrible problem — no way will I stick little pieces of stuff in between each joist and caulk miles of joints. Forget it!

Architect: Apparently it doesn't make any difference anyway. I never heard of a case of rot caused by condensation at the joists, but I bet I hear of one as soon as this article is published. My theory is that there is so much wood at the joist box that any moisture is absorbed and then released later.

Client: Article? Are you putting this conversation in an article? I'm going to get my lawyer!

Architect: Relax, no one will know who you are. I'll get all the nasty letters.

Builder: One of the looniest ideas I think I ever heard was wrapping plastic out and around the joists, and then back up on the deck, to keep the vapor barrier continuous. Absolutely nuts. It puts the barrier way towards the outside, makes it dangerous to walk on the deck, and the stuff gets torn. I tried it once, and that was it.

Architect: One crazy idea that seems to be standard now is to caulk all the holes through the tops of partitions, and I have even put upside down roof boots on vent pipes going through into the attic. Works really well.

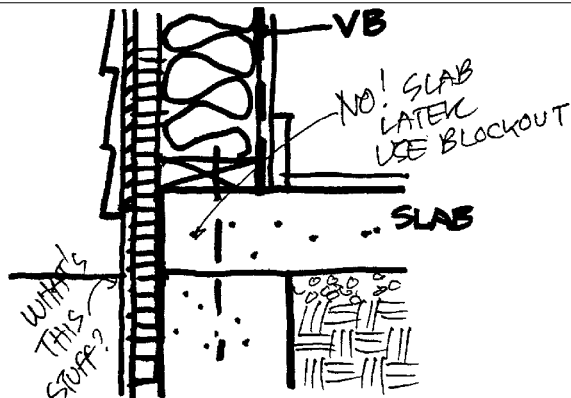
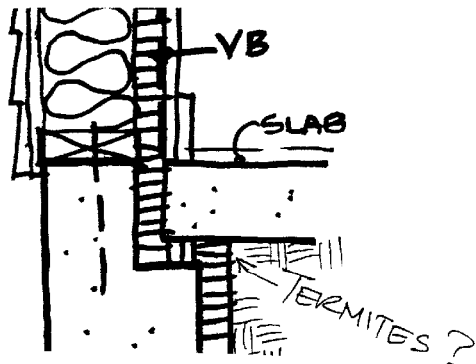
Builder: Well, have you worked out a system yet?

Architect: Not even close. For instance, what do you do on the ceiling below an attic? Installers hate foam board on the ceiling, for some reason, so I use poly. In theory you can put strips of poly in the middle of a double-partition top plate and then join the strips to the main sheets of poly and make a continuous barrier, but I am afraid to ask any builder I know to do this. So I rely on caulking holes and, at best, taping the barrier to the interior partitions. But I'm sure there are plenty of leaks this way.

Builder: Yeah. There have got to be thousands of holes in an attic ceiling.

Client: What do you geniuses do at the foundations?

Architect: Well, I usually insulate



Builder: That's terrific for you theorists, but did you ever try to buy Thermax in small quantities? No way, Jose. Besides, it's expensive. Good product, though.

Client: I'm ashamed of you, using urethane. Next thing you know we will all have to walk around with umbrellas, like the guy from the Department of the Interior or whoever it was suggested the other day, to keep off the UV when the ozone layer disappears. Can you believe it, that's what this goon actually said: "Carry an umbrella," or wear a hat, or something like that. Unbelievable!

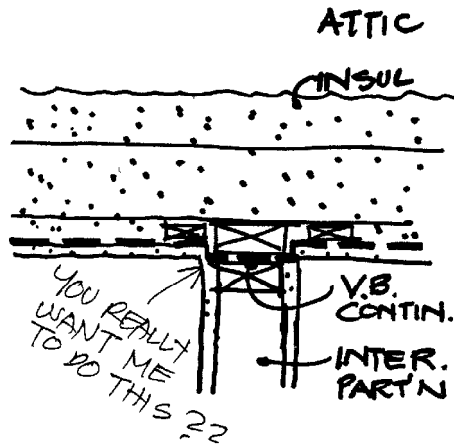
Architect: I feel bad all over when I use urethane, but I also have to get the building built. Thermax has thick skin and it should trap its Freon better than most, but you'll never find out from the company. I don't think any of the companies give you data on what the Freon retention "half-life" of their product is. They only tell you what they want to.

Builder: Free enterprise, man, don't knock it. What do you want, the government to go around rating different products? Product A is better than Product B? This isn't a dictatorship! Companies have a right to market products, and let people decide which one they want.

Client: Caveat emptor! I thought we gave that up in the 19th Century! What happened to third-party lawsuits?

Architect: Calm down, calm down. Look, let's just say we don't know, but have a hunch it would work better. Anyway, it doesn't matter, because even if you have a perfect vapor barrier on the walls you can't

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foundations on the inside. If there is a basement, the owner will probably put in studs and wall finish anyway, so you might as well insulate between the studs. At slabs, I make a notch in the top of the frostwall, and insulate between the slab and the frostwall with two inches of Styrofoam or equal. But it occurred to me the other day that it would be better to insulate outside, because you could set the slab directly on the frostwall and avoid the blockout.

Builder: Ah, but you forget our weather problems, pal. I never pour the slab until the house is closed in because it's always too hot or too cold or too wet or too sunny. Inside, I can get it right, and do it later. So I need the blockout anyway so the joint at the edge of the slab is back under the outside wall. And I always put something soft between the slab and the frostwall to prevent the slab from cracking. Might as well be insulation.

Architect: Another problem is that I still haven't found anything good to cover the outside insulation. Some builders solve the problem by cutting away the insulation above grade, which leaves a huge cold bridge through the foundation, can you believe it? And they use beadboard, which absorbs water like crazy.

Client: I was reading a pamphlet from the State Extension Service that talked about carpenter ants and termites, and I think putting plastic foam into the ground is just inviting trouble from insects.

Architect: You're dead right, that's another problem to worry about! We always spec poison of some kind around the foundation, but the only thing I know of which works is chlordane, and that's a no-no. I am looking into some options.

Builder: You can use termite shields if the insulation is outside. The shield forces the termites to build their tunnels out and around the shield where you can see them. But carpenter ants will eat right through the foam and live in it. I've seen their nests, and one friend reported crumbs all around the outside of his house, under the exterior foam insulation.

Architect: Yeah, but carpenter ants have to live where it is wet. It seems to me that if the frame is dry, you won't have problems, and if it gets wet, the ants will get in somehow.

Client: My friends all say you should put the insulation on the outside of the studs, because that wraps the whole house and reduces heat loss through the studs and joists and things. Why don't you do that instead of putting it inside?

Architect: Well, we do put foam on the outside of some of our buildings. In fact, the state agency that builds housing for the elderly down here insists on it. An engineer friend worries that when you put the plywood sheathing outside the foam — and you have to with wood siding or it will warp — the nails will bend and the building will loosen up if there is a heavy load. For example, that might occur in a wall full of windows and doors.

Builder: But what about houses that use aluminum-coated cardboard for sheathing? Even if it's outside the foam, plywood has got to be better than that! You can use nailed-on bracing, but that doesn't work as well as the plywood, I bet.

Architect: We never talked about roof ventilation. I personally don't see why anyone vents roofs and

cathedral ceilings. If you have a good vapor barrier, the vent may make things worse by pulling air through from the house. And if you don't have a good vapor barrier there will be ice and condensation up there anyway.

Builder: Just like crawl-space ventilation, trying to use outside air to solve problems that shouldn't exist. I never ventilate crawl spaces, because humid outside air condenses like crazy in a cold crawlspace in the spring and fall. But you have to keep it dry!

Client: You know, if the aircraft industry knew as little about their products as you guys do about yours, it would still take three days to get across the country. Isn't there any research data that could answer your questions?

Builder: What do you want, a police state? Government agencies telling us how to build our buildings? This is a free country, and it's only when builders and architects like us try out new things that anything gets solved.

Client: And when smart clients like me hire smart architects and builders like you! Well, you may have a point. What do you think, architect?

Architect: I think I'm back where I started. Have you got any ideas?

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Suggested spec for new, energy-efficient house:



1. GC to provide continuous Vapor Retarding Barrier Membrane Film (VRBMF) throughout the house, on the warm side. Upon completion, and at ten year intervals throughout the life of the house, GC or his successor firm will perform a blower door test. If the test is not per spec, GC or successor firm will replace the VRBMF and restore the house to its original condition free of charge.

2. The architect guarantees that every detail conforms to all applicable published opinions with regard to energy.

3. The Owner is prohibited from occupying the house if the inside relative humidity exceeds 40 percent for more than ten successive minutes.