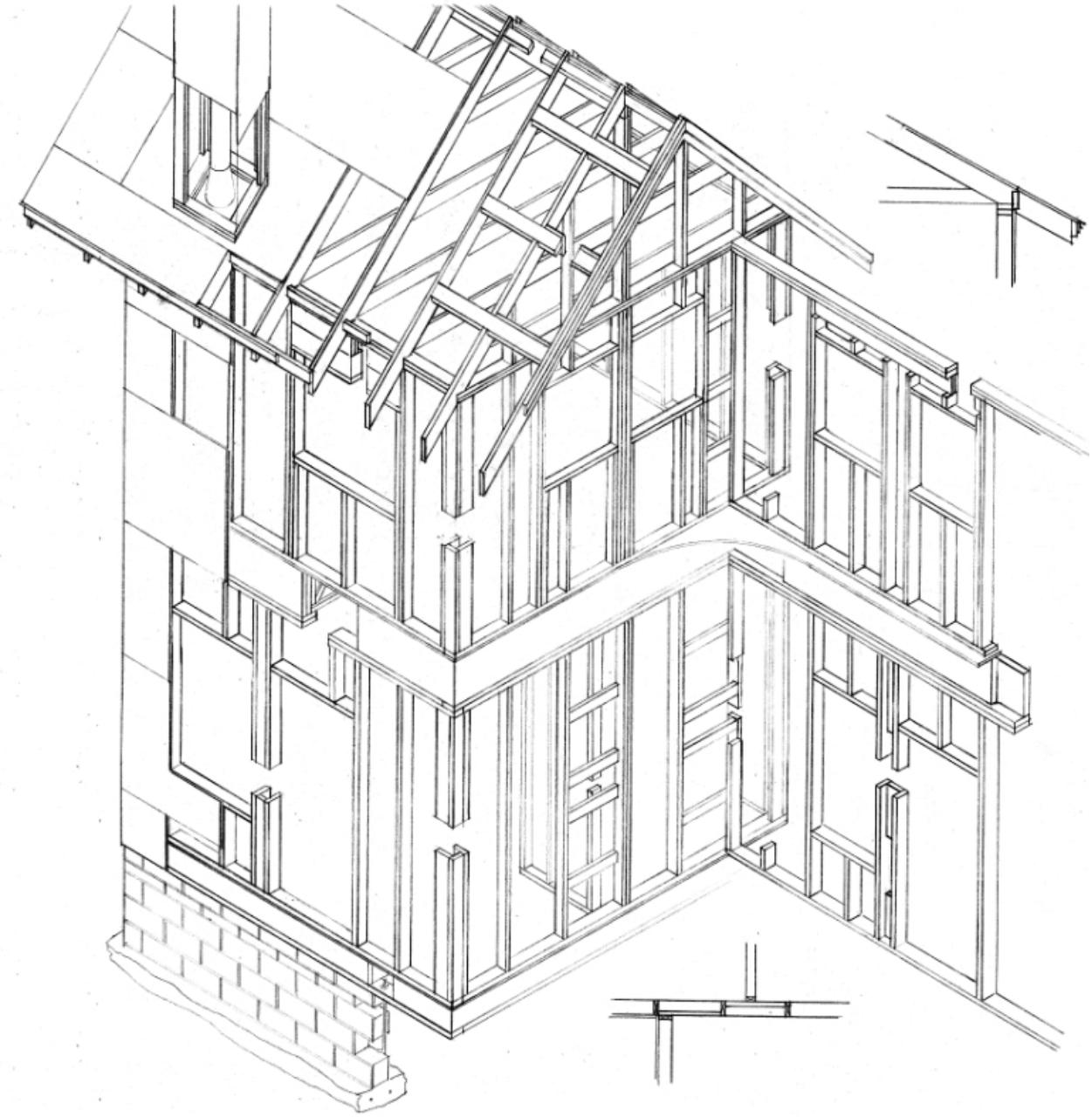
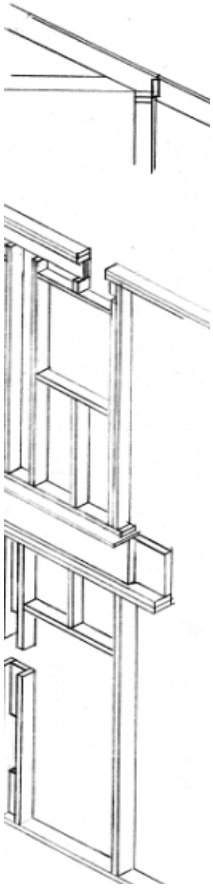
The article attached below, originally written for Fine Homebuilding, discusses some of the storm-resistant practices I had been incorporating since long before Hurricane Fran dropped seven trees on my house. I've updated it to add new practices incorporated since such as double PT subfascia & adhered synthetic roofing felt which we discussed last year at the Home Innovation Research Center in Washington DC during the creation of the new Residential Resiliency Guidelines for the US Department of Housing & Urban Development.

Energy-efficient framing practices for hurricane and tornado country



Drawn in pencil kids! Back in the <u>old</u> days!

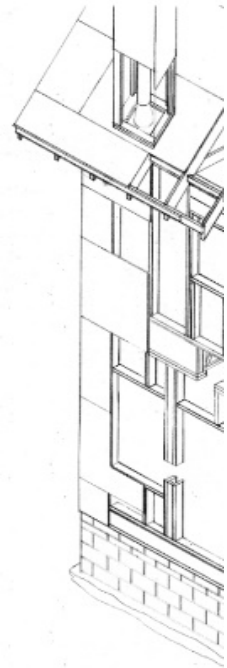


Strengthen the impact zone where the trees hit the top of the wall.

Nail the headers to the top plate with cripples as needed between the headers and the top of the windows and doors. Use double PT subfascia and double top plates with offset joints with 2x blocking on the outside of the upper top plate bearing on the top edge of the sheathing nailed to the plate directly below it so the impact of a tree on the overhang is transferred by the blocking to the shear nailing on the sheathing rather than just crushing the top edge of the sheathing and coming on into the room. Fully sheath the exterior walls with OSB and use better than code minimum hurricane clips to connect the wall sheathing to the rafters and "right-size the headers" to double 2×8's when less than 36" as allowed by the engineer.

Plan "break-aways" to minimize water damage.

If hurricanes and tornados didn't involve so much rain the recovery would be much easier. Trees on the roof can let in a lot of water and the structural damage is often much less expensive to repair than the water damage. Break the roof sheathing over the squash block on the outside of the wall so that when the trees land on the house the damage is largely held to the roof overhangs and the water is kept out of the attic. Use double 2x pt subfascia with offset joints and nail galvanized roof edging through the sheathing into the subfascia to help keep the wind from getting a grip on the roof sheathing at the edge. Likewise, flash the chimney pipe to the roof as if it didn't have a chase and then build a separately flashed chase above the roof that can break clear if hit by a tree without opening a huge hole in the attic. The reality is that a storm may blow over without inflicting structural damage but if it blows all the shingles off the roof and inundates the home with water it's likely to be a total write-off anyway so use the best synthetic roofing felt your budget can afford and seal the joints with acoustical caulk or tape. With the appearance of high-performance sealing products such as Liquid Zip (my new favorite) and Zip Tape, I think we are very close to being able to lose all the roofing and still be safe from water damage.

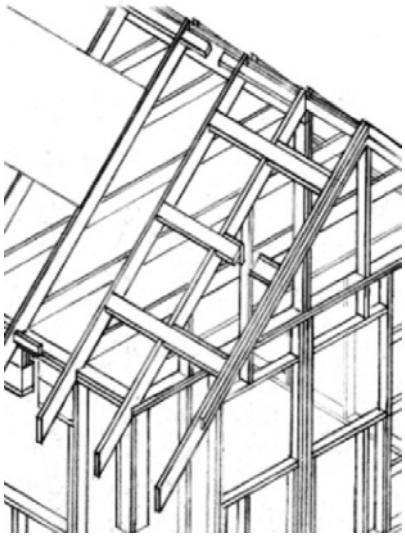


Don't assume that gravity is going to hold the bottom plate to the subfloor.

During recent storms in coastal NC, one house had four windows blown out by wind-borne debris. That was enough to pressurize the house and pop all the down-wind walls off the subfloor and into the yard totaling the home. Rather than simply nailing the bottom plate to the subfloor & floor framing with 16D nails, hold the sheathing up a foot or more off the bottom plate (i.e., 8' from the upper top plate) and add a horizontal strip of sheathing or treated plywood that spans from the mud sill to the studs. Code will allow us to skip the blocking if we run all the sheathing vertically, but I think it's worth blocking the top of this 'joining strip' and run 4x8 sheathing vertically to the top of the wall above this point.

Pay close attention to the location of the anchor bolts when the masons are wrapping up the foundation. If that's not practical at least mark the bolt locations on the foundation plan (use purple or green ink so the locations stand out). On the second floor, the sheathing can be run long so that when the wall is tilted up the bottom of the sheathing can be nailed to the rim joist and upper top plate below (with a ¼" gap for shrinkage at the rim joist.) Blow-outs (pushing the bottom plate off the floor and dropping the wall into the yard) are often caused by failed garage doors on attached garages so be sure to teach the clients to lock the garage door with the slide bolt locks on the inside and put a very rugged door & deadbolt lock between the garage and the house. Also teach them to pick up lawn furniture, trash cans and other random lawn decorations that can break windows when a storm is blowing.

Finally, stiffen the ridge and use real barge rafters.



Even if you use trusses and ridge vents it is still a good idea to stiffen the roof sheathing with blocking at the ridge and to use real old-fashioned barge rafters (2x4s let-in to the 1st rafter pair or truss over the gable wall and face nailed to the rake subfascia and to the 2nd rafter pair over the living space). It seems like barge rafters are becoming a lost art these days, but they really give a lot of solidity to the rakes by tying them in to the next to last rafter or truss. Nailing the roof sheathing off to 2×4's on the flat between the trusses is especially important on single story homes where the trees may hit the ridge first and it helps stiffen the roof by tying the two planes together. I had seven trees on my roof after a microburst touched down fifty feet from my home during Hurricane Fran (and a 100' hickory pushing three smaller maples onto my roof last winter) but no water damage and very little structural damage other than a few tin shingles in the days after the storm, a bit of shingle and gutter repair and some broken rafter tails. Nothing can make a home safe from a direct hit from a microburst or tornado, but we can do a lot to minimize damage from a close call.