

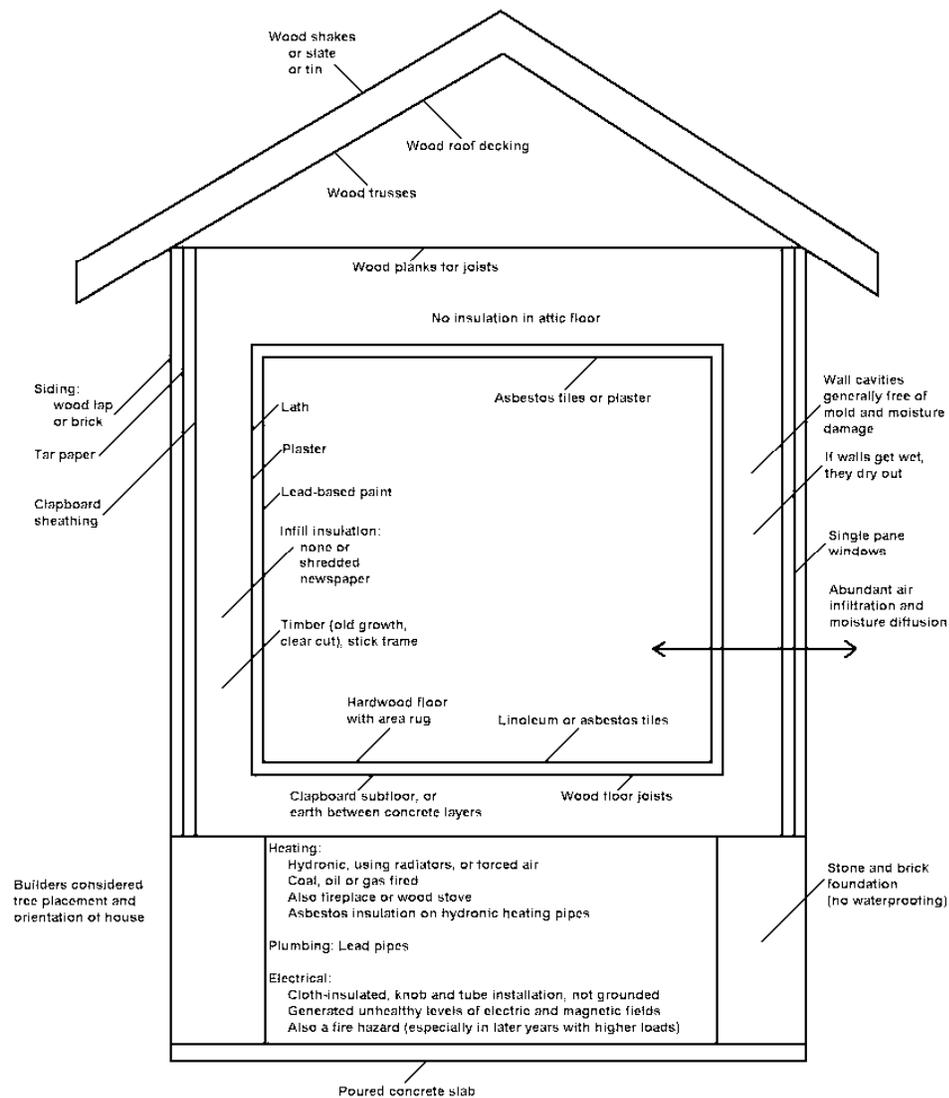
## Chapter 1. Historical Background

Hi folks, this is George to share a lesson from my formative years. It was 1961. My family was sitting around the kitchen table, reviewing our long-anticipated “modern renovation plans” for our not-so-vintage 1922 lath-and-plaster, asbestos “Bricktex” sided pre-WWI two-story bungalow. Already gone was the rumored original clap-board siding, the “fish-scale” cedar-shingled gable ends, the hand-carved eave brackets and the signature massive sloped front porch posts (replaced by circa 1950) spindly “wrought iron.” Also, about one third of the interior cracking lath and plaster had been replaced with (gasp) “DRYWALL.”

“DRYWALL!!! – the death of the building” was blurted out three times by the glassy-eyed, old Norwegian senior carpenter who was tearing out old insulation from my bedroom walls. “TRULY THE DEATH OF THE BUILDING” he authoritatively lamented as I watched the last of the old newsprint and horsehair insulation being removed from my room. At all of 11 years old, my only exposure to “DRYWALL” at that time was the stack of it that had landed on our front porch earlier that week, the stuff the old carpenter would call that “DAMN S...T” every time he would walk by. What I did know by the end of the same week was that I was certainly glad that my own room was being re-paneled in knotty pine planks, rather than DRYWALL!!!

What was the perennial, old-world wisdom the old carpenter was trying to communicate to his young, seemingly unappreciative, building associates? What hidden secret did the old-world carpenter have that seems to elude an entire generation of hastily (if at all) trained young apprentices? Was everyone under sixty in 1961 doomed to never know “The Secret”?

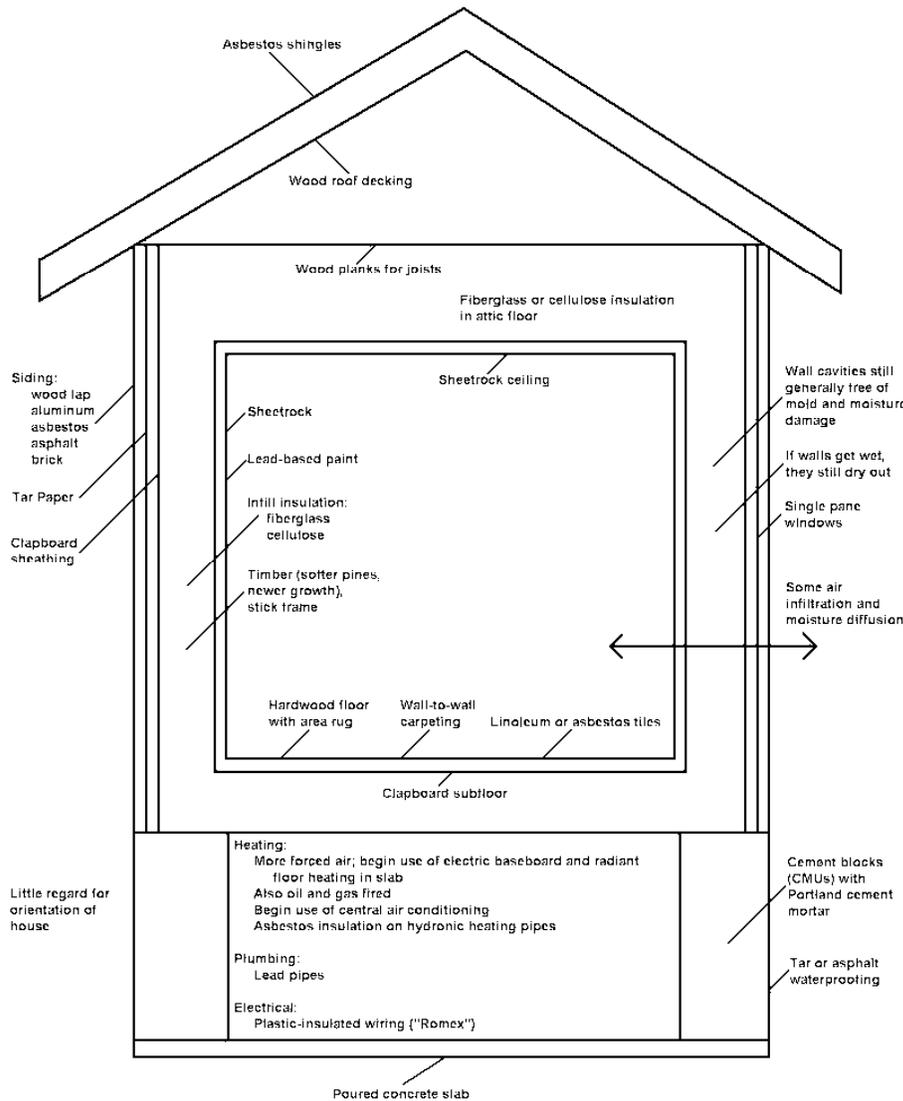
The occupants of a typical post-World War I “breathing wall” frame house (see [Figure 1](#)) have rarely suffered from modern “sick building syndrome.” An entire generation of European old world builders were still around, however by the time the post WWI building boom started, very few of the truly old, old-world construction techniques were in general practice in North America. Even though modern “stick frame” construction had fully replaced “timber frame” and straw-clay infill, a few old-timers still carried on the tradition of using materials that had natural hydration qualities. Board & batten, clapboard or lap wood siding, stone or brick exterior were common. Lath and plaster, with the 2-inch gap between the horizontal 1-2 inch wood strips heavily plastered, was the interior wall finish of choice. Hydronic (steam radiator) heating worked especially well in conjunction with lath & plaster walls’ ability to store, distribute and dehumidify itself. Roofs were commonly made of wood shakes, slate or tin. Foundations were typically stone or brick with no modern water-trapping plastic “waterproofing.” These combinations achieved a good balance of thermal mass and breathability. Insulation was optional.



**Figure 1. Typical post-World War I frame house (1920s, 1930s, 1940s)**

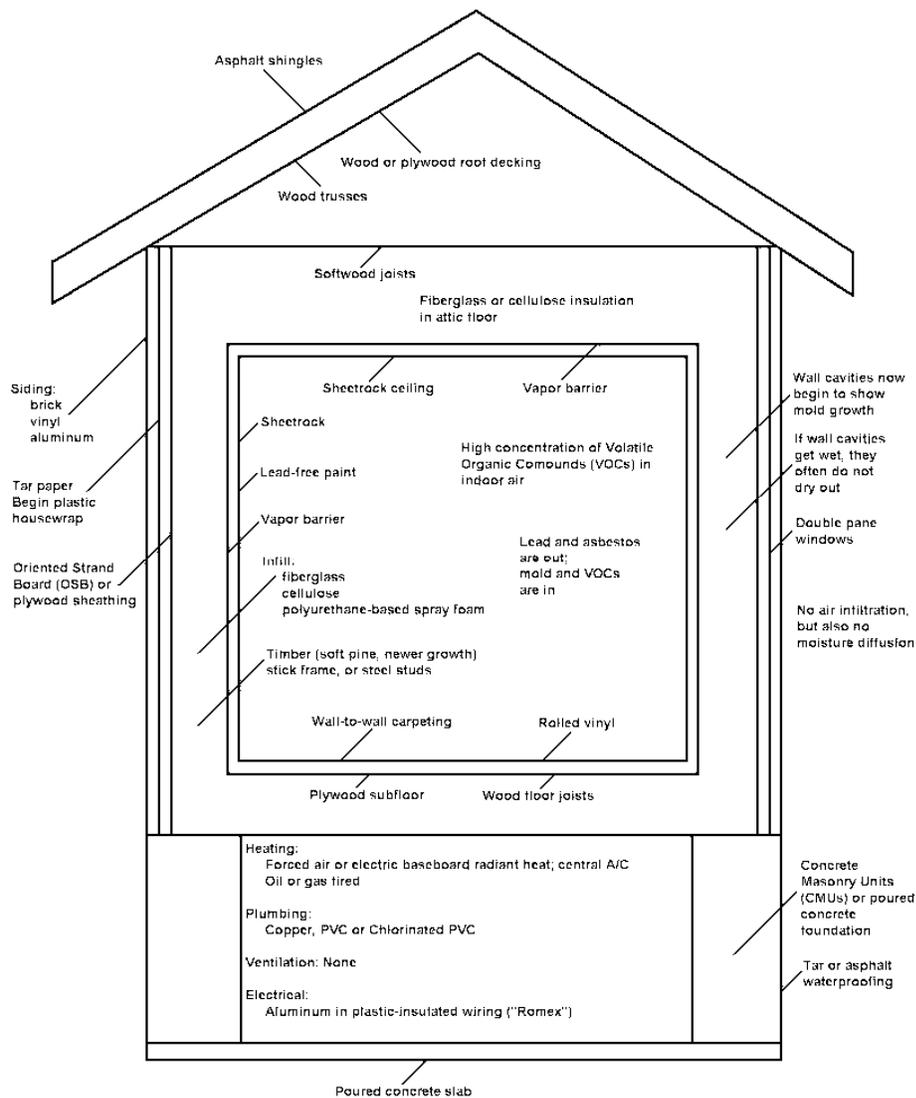
The largest boom in North American housing took place directly after WWII. With the return of the GI's from Europe, the demand for inexpensive, rapidly build "Starter" homes skyrocketed. The typical post-WWII frame house (see [Figure 2](#)) had to be built faster and more affordably than at any other time in modern history. Lath and plaster quickly got replaced with "Drywall." The earliest version of drywall, introduced in the late 1940's, emulated many of the characteristics of lath & plaster. Typically it was over an inch thick and had approximately one-inch diameter holes drilled in it at ~12"o/c (a clear remnant from when everyone knew a wall had to "breathe"). Composition asphalt roofing was introduced but luckily was still being installed over breathing wood planks and felt paper. Foundations were now often poured concrete or "CMU" concrete block with semi-permeable tar or asphalt waterproofing. Homes of this vintage still rarely trapped water or moisture behind the walls or roof, as at least the

outside wall construction was still “breathable.” Also, in this era the insulation generally used was still hygroscopic. Buildings literally started deteriorating en masse with the widespread use of thin drywall (with polymeric additives) combined with non-breathable insulation (fiberglass) and non-breathable exterior sheathing (plywood or OSB). Of course, the final death blow was the ubiquitous “VAPOR BARRIER.”



**Figure 2. Typical World War II frame house (1950s, 1960s, early 1970s)**

The late 1970's saw North America's first “Energy Crisis,” that is, the infamous Middle Eastern Oil Embargo. With this late-dawning awareness of the utter finite nature of oil and oil-related energy products came the onslaught of “energy-efficient” building band-aids and conservation technology. (See [Figure 3.](#)) Centuries of building wisdom were literally thrown out the door in the pursuit of saving the last BTU of energy – with dire consequences!!! Sealing the building became synonymous with “SICK BUILDING SYNDROME.”



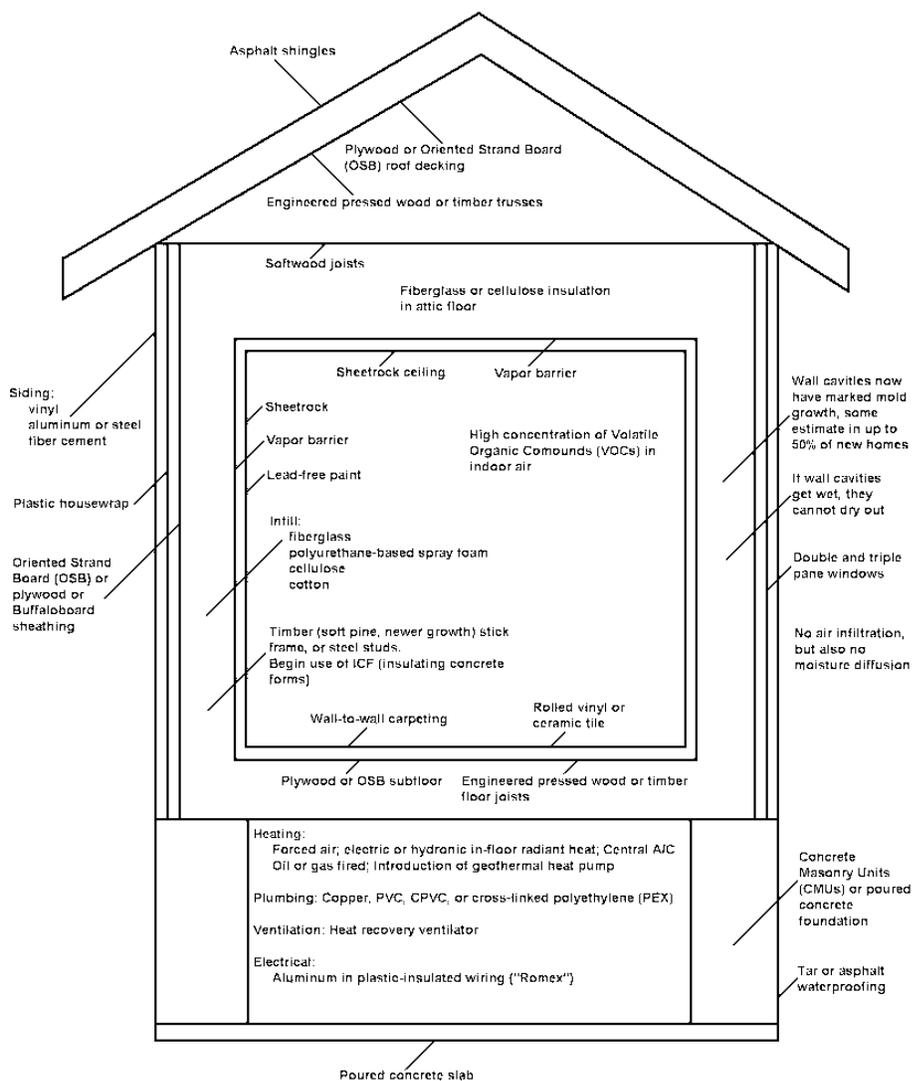
**Figure 3. Typical post-oil-embargo frame house (late 1970s, 1980s, early 1990s)**

Over the years, as we in the construction industry continued to tighten our building shells, we sealed in more and more of the estimated over 70,000 new chemical formulations introduced since WWII. (It is also estimated that less than one tenth of one percent of these chemicals were ever tested for human safety before being introduced into the American marketplace). Poorly breathing plywood or OSB wall sheathing were now often wrapped in non-breathing polyethylene "vapor barriers" to be finally choked in vinyl or aluminum siding!! (However, as often as not this suffocating polyethylene film was put on the inside of the wall). Slow-diffusing fiberglass insulation became the most common insulation type. Interior walls of this era were now almost exclusively polymer-laden, oxygen-challenged, modified gypsum wallboard (Sheetrock). Roofs were now nearly all poorly breathing plywood or OSB covered with slow-diffusing "composition" shingles. Add to this the widespread use of force-grown (large open cell), fast-growth lumber and a perfect recipe for mold growth was in the

making. Even our basements took a hit in the beginnings of the widespread use of unproven, often water-trapping, plastic “waterproofing.”

The present day “super-tight” homes (see [Figure 4](#)) add significant additional dangers to occupants by often plugging up the last opportunity for natural hydration. In addition to the suffocating features added to many of the 1970's, 1980's and 1990's homes, we've added an onslaught of questionable new ones, including Styrofoam® “out”sulation (covered with plastic stucco that may not be breathable), all plastic ICF's (Insulative Concrete Forms) and Styrofoam®- based SIP's (Structural Insulated Panels).

In retrospect, in reviewing my family's 1961 “modern renovation plans,” I can now appreciate how fortunate our family was that we renovated when we did, to be spared the ravages of the whirlwind of trapped toxins, mold cultures and the formidable health risks that have become commonplace in modern construction.



**Figure 4. Typical present-day super-tight frame house (since mid-1990s)**