

Balloon Frame Construction

Basic Description

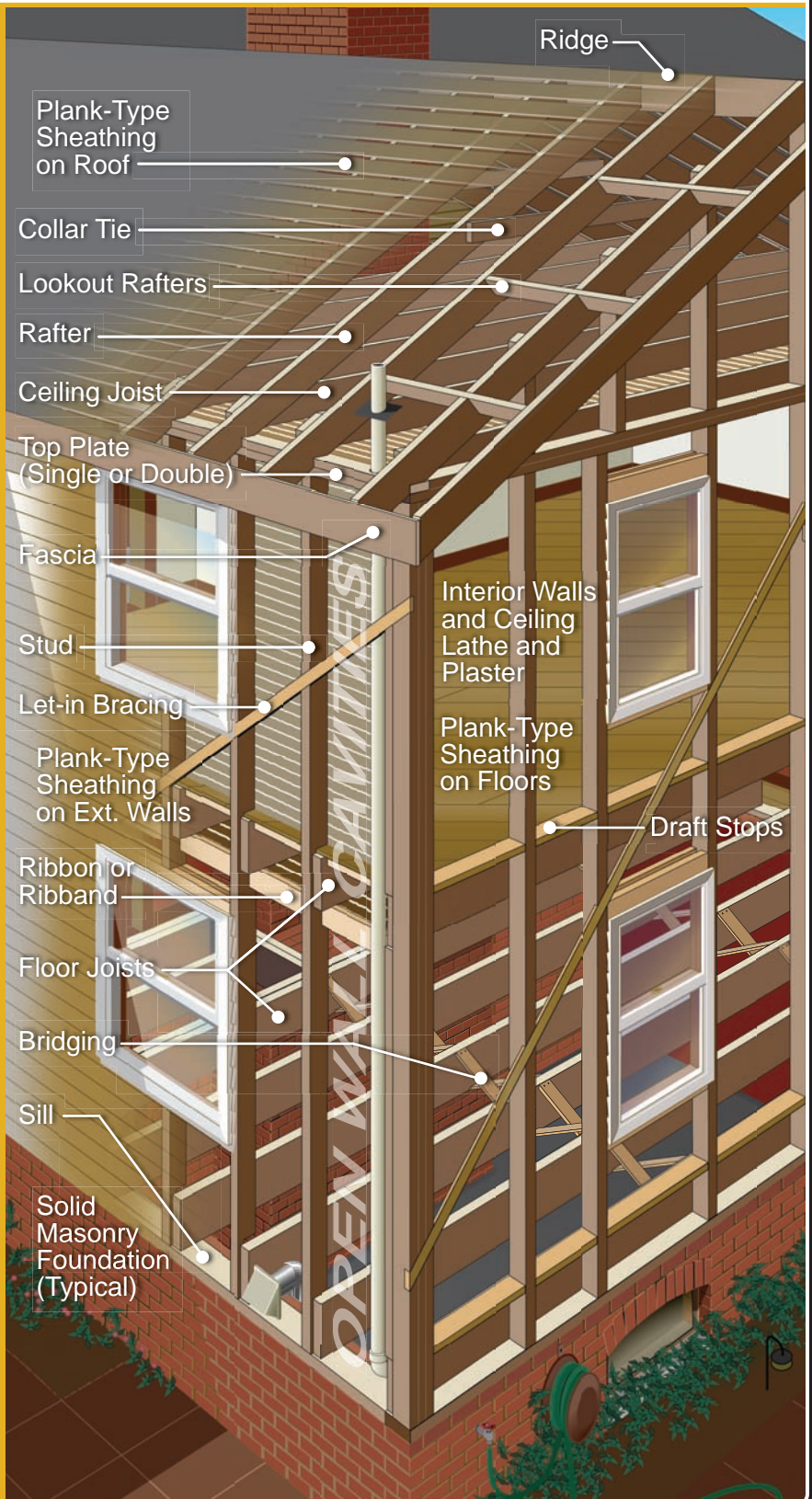
Balloon framing was the initial framing breakthrough during the mid-1800's that led the building industry away from the use of heavy timber construction. The advent of smaller dimensionally cut lumber at saw mills and the manufacturing of nails resulted in the development of these more affordable and lighter structures. The relative "lightness" of this framing method compared to the use of heavy framing members led to the term "balloon".

Early balloon framing is characterized by the tall open wall cavities it creates within the exterior wall assembly. These cavities generally extend the entire height of the home. The framing system relies on let-in bracing and/or floor and wall sheathing to provide lateral strength and resistance to wind. Balloon framed homes are generally designed so that dimensional lumber, extending from the sill plate to the top plate of the wall, provide support for all floors and the roof structure.

Unfortunately, when these homes catch fire, the fire spreads very rapidly throughout the wall cavity and into the attached floor systems. The tall, narrow space acts like a chimney, channeling air flow and fire from the crawl space or basement up to the attic space. The entire cavity, which is often not insulated, is "fuel-lined" with very dry and often rough-cut lumber. Rough-cut lumber ignites more readily than lumber that has been planed, due to the rough finish left by the saw mill blade.

Late balloon framing often uses fire stops (AKA: draft stops) at each floor level to prevent the rapid spread of fire, but they are not always present.

Balloon framing today generally only exists where greater wall strength is needed (e.g. exterior walls that surround a vaulted, two-story room), and should include the use of fire stops.



Foundation & Floor Assembly

Solid brick foundations are the norm in older homes that extensively utilize balloon framing. The sill plate may be made from rough-cut lumber or larger timbers with mortise and tenon joinery.

Floor joists are rough-cut, 2x lumber generally spaced between 16" and 24" on center with their ends face nailed to the wall studs and supported by the sill or a ledger board (AKA: ribbon or ribband) on upper floors. Floor sheathing is typically composed of 1x diagonal or perpendicular planking. On a home unprotected by fire stops, the joist space between floors is generally open to the wall cavities created by the exterior wall framing.

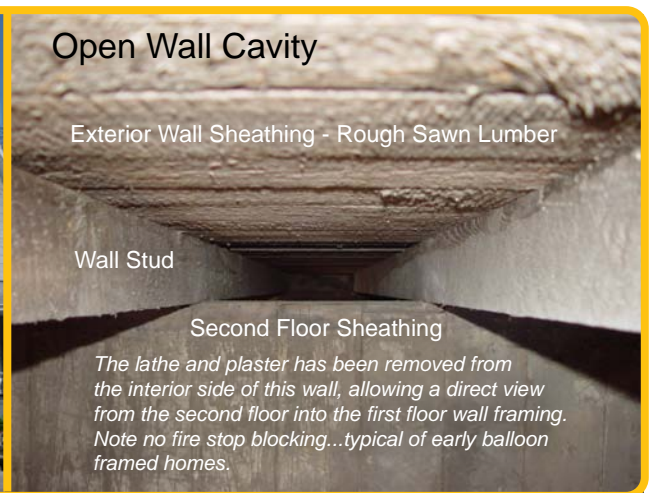
Wall Assembly

Rough-cut dimensional lumber is generally used for wall framing, and studs are typically spaced beyond the normal stud spacing (16" on center) used today. Fire stopping is required in any new balloon frame construction but may or may not be present in older construction. Let-in bracing may also be incorporated into the framing system to provide additional strength to the wall framing, especially prior to the installation of wall sheathing. Wall sheathing is typically composed of 1x boards attached either perpendicular or diagonal to the wall framing. Wall cavities are sometimes insulated either during the initial construction or more commonly during a future upgrade to the home.

Common 2x wood framing is used to frame the interior walls on these older homes and wood lathe strips and plaster is typically applied to the interior walls and ceilings as the finish material.

Roof Assembly

Typically, full dimension 2x rafters were used for framing the roof. Rafter-framed roofs typically have fewer vertical support members and rely on collar ties to provide additional strength for the rafter spans. Original roofs were sheathed using 1x board lumber installed perpendicular to the rafters, but roof replacements over the years may have introduced sheathing products like plywood to the roof.



Firefighter's Notes

1. Structure is often identifiable from outside the home. Balloon framed homes generally have some common traits. They were constructed in the late 1800's into the early 1900's. They are generally multi-story homes built on a solid brick or stone masonry foundation that extends a few feet above grade. See the photo above. These homes are often found in old established neighborhoods.

2. Structure Provides A Reasonably Low Surface to Mass Ratio...and That's a Good Thing. The solid sawn lumber in these homes is dimensionally larger than

today's solid sawn lumber. In addition, dimensional lumber is used throughout the home, even for the sheathing of the roof, walls, and floors. The original lathe and plaster finish that was applied to the interior walls and ceilings provided a non-combustible finish within the living space.

3. Fire Propagation Between Floors May Occur Quickly. There is no easy way to tell whether fire stop blocking is present. Without this blocking, the open wall cavities will catch and convey the fire very quickly. This is due to the "chimney effect" in the wall cavity during a fire and to

the fact the wall cavity is "fuel-lined" with very dry, rough sawn lumber. The joist spaces between floors that are also open to this wall cavity could easily ignite during the fire's ascent to the attic space.

4. Additions and Renovations To the Structure May Introduce Lightweight Materials. Keep in mind that additions and interior renovations to the existing structure will undoubtedly introduce more modern-day materials and methods into the home. This is simply something to look for and question when surveying neighborhoods in your area.

Be Safe Out There.