

# Post and Beam Construction

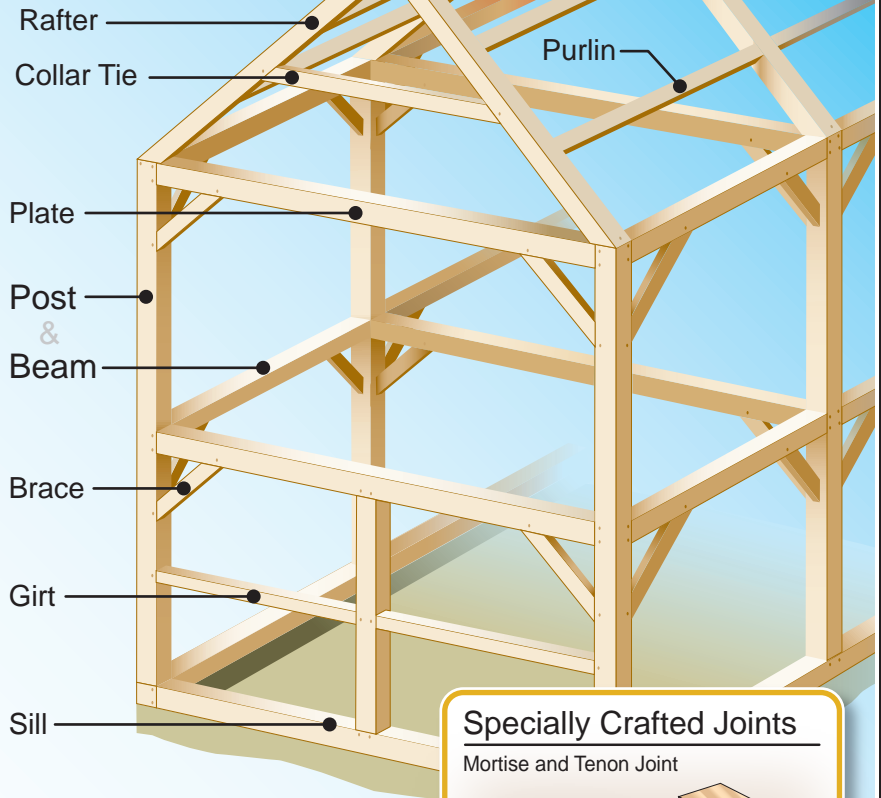
## Basic Description

Post and beam construction is characterized by having structural framing members spaced more than two feet apart, specially crafted joints, and exposed structural members inside the home.

The typical spacing of the main structural supports is eight feet. Instead of using 2x4 or 2x6 framing members on 16 or 24-inch centers, as in conventional stick framing, post and beam framing uses fewer and larger structural members. In addition, rather than nailing together the structural members, post and beam construction uses specially crafted joints (such as mortise and tenon, dovetail, or tongue and fork joints) to connect the posts and beams. Wooden pegs are used to secure the joint. Sometimes, when the structural loads are high, it may be necessary to use special metal brackets and bolts to connect the structural members, but generally the often hand-crafted wood joints with peg are sufficiently strong.

Post and beam construction is also characterized by having exposed structural members. The structural members, generally referred to as timbers, may be exposed only on the interior side of the building, or they may be exposed to both the interior and exterior. Timbers can be in log form, but are most often cut or hewn down to provide four flat surfaces. The timbers can have a rough hewn finish to give a rustic appearance, or a smooth finish for a more refined appearance. Timbers may be solid wood, or they can be glue laminated.

Post and beam construction can be used with almost any style of home. Due to the wide spacing between structural members, large window openings are easily and often incorporated into the design. In addition, the arrangement of the interior walls is very flexible because there are few, if any, structural members or load-bearing walls in the interior space.



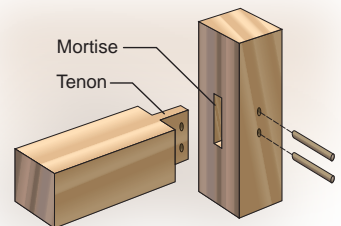
## General Construction

Post and beam homes are designed so that the timber framing provides the structural support and strength of the home. A true post and beam structure does not rely on exterior sheathing for support of the structure and other dead loads (e.g. house contents and snow) or resistance to live loads (e.g. occupants, wind, and seismic loads).

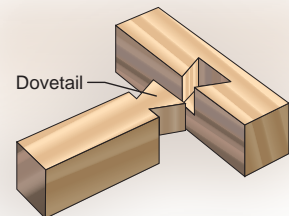
Unless the house is from a standard design (i.e. already engineered and pre-fabricated), the construction process begins with the development of design drawings for the house involving a structural engineer. Once designed, the timbers for the frame are usually fabricated and test-assembled in the manufacturer's shop. Frame pieces are marked to aid assembly at the jobsite. Once all the frame pieces have been fabricated and test assembled, they are shipped to the jobsite for assembly, typically by an experienced contractor.

## Specially Crafted Joints

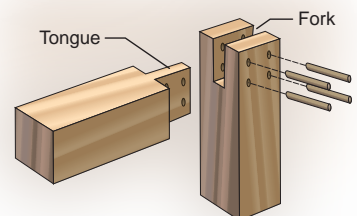
### Mortise and Tenon Joint



### Dovetail Joint



### Tongue and Fork Joint



## Foundation & Floor Assembly

The post and beam framing can be erected on a standard foundation, or it can be erected on separate piers for each post.

A conventional stick framed floor can be used, but it is also common to use widely spaced beams and a plank floor. A plank floor can be made with either tongue and groove planks or laminated planking. With tongue and groove planking, the planks are from 1-1/2" to 3-1/2" thick, depending on the load and the span, and the edges of the planks lock together to stiffen the floor. With laminated planking, 2x4s are laid on edge and nailed together to form a solid floor that is 3-1/2" thick.

## Wall Assembly

Once the frame has been completed, the builder has several different options on how to "fill in" the walls between posts. Since these "in-fill" walls are not load-bearing, a wide variety of conventional and non-conventional materials can be used. Two common choices today are conventional wood framing or structural insulated panels (SIPs), which consist of rigid foam insulation sandwiched between wood panels. Regardless what method is used, the post and beam framing system is often concealed from the exterior side by the wall finish materials, but can remain exposed, if properly sealed. On the interior side, the majority of the post and beam framework usually remains visible.

## Roof Assembly

Generally cathedral ceilings are used so that the beauty and craftsmanship of the structure above can remain exposed. Several different options are available for the construction of the roof. One common choice is SIPs. If SIPs are used, the roofing material is generally applied directly to the panels. If plank decking is used, which is another common option, then rigid foam insulation is often installed over the planks, and plywood and roofing materials are installed over the insulation. If wood planking is not used as a finish material for the interior side of the roof, drywall (ie. gypsum wallboard) may be installed and painted as the finish material on the interior side of the roofing system.



## Firefighter's Notes

**1. Structure is often hidden to outside.** As with most construction methods, today's post and beam structure is often hidden by the home's exterior finish materials. As with the home above, one may have no idea that this is a post and beam home unless they see it during construction or have a step inside. This emphasizes the importance of surveying and being aware of the homes you protect.

**2. Structure Provides Low Surface to Mass Ratio...and That's a Good Thing.**

Even though the structural members are often exposed to fire inside the home, their thickness and mass requires more burn time than construction materials that have a high surface to mass ratio.

**3. Know the Floor Construction.** Don't assume the floor structure is made of heavy materials too. Some are made of heavy beams and planking, but others may incorporate lightweight materials to help offset the cost of the structure and to help accommodate a design for large open

rooms that the structure above it allows.

**4. Know the Roof Construction.** Again, don't assume the roof structure is made of heavy materials. The structure itself may be stout, but remember these members are further apart than on a conventionally framed home. Know the materials you are standing on and whether they are protected on the bottom side with finished drywall. And keep in mind the orientation of the purlins (see detail on reverse side) when making roof cuts for venting.

Be Safe Out There.