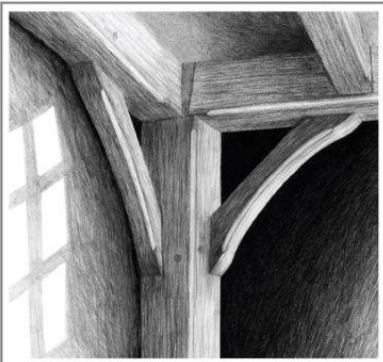


DESIGNING A BARN

Ridgway F. Shinn, III

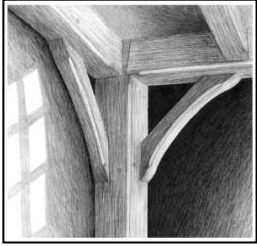
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Designing your timber frame barn

Illustrations showing a variety of barns

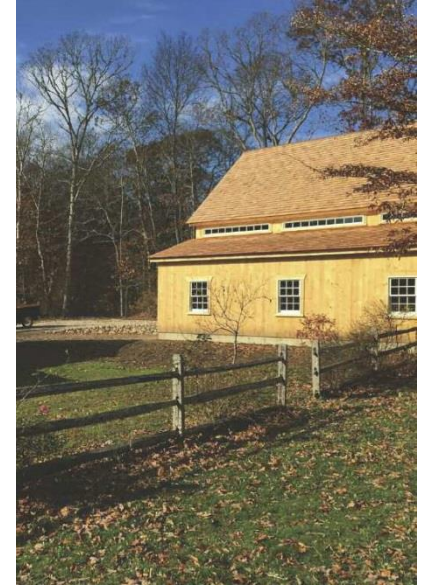
Design steps

Step 1: Define the barn's purpose.

A barn can be used for many things, and the design will vary depending on how you intend to use the building. Whether you want it for horses, hay, vehicles, a workshop, a collection, or barn dances, you will want certain features. Define those needs first.

Step 2: Decide on the barn's overall size and internal arrangement.

- **Stalls:** Horse barns are typically based on stall size, with the standard in the industry being a 12' by 12' stall.
- **Aisle:** Most people designing for horses also want an aisle to provide access for vehicles to deliver hay and grain, and to provide a space where they can groom and tack horses. As a result, horse barns are typically 24' wide with stalls down one side, or 36' wide with stalls on both sides.
- **Storage:** Other needs to consider are grain storage, tack storage, a wash stall, and access to the second floor if a second floor is desired.
- **Second floor:** Generally, a 36' wide barn with a fairly steep pitch (anywhere from 8/12 to 12/12 pitch) generates a large amount of useable space on the second floor. Consider possible uses for the space: hay, horse drawn vehicle storage, an apartment (which depends on your specific local codes), workshop—or do you want to leave it open to above?
Because all of the weight of the structure is carried on the points (point loading) or posts, you can configure the second floor in a variety of ways; it can be the same area as the first floor, or a loft, or just an area around the sides—whatever you want.
- **Access:** Whatever you choose for the space, remember to consider access from both the inside and outside.



Barn with workshop.

Step 3: Consider roofing and sheathing.

We generally frame barns with a ridgepole and common rafter system. This means there is a rafter every four feet (four foot on center). The sheathing that you apply to the rafters depends on the roofing materials that you choose. We recommend a 2 x 6 tongue-and-groove planking, particularly if you are using asphalt shingles. This provides adequate structural support, plus you don't see nails protruding through the sheathing. If you are using a metal roof you can sheath with 1" boards since the metal is relatively light. It can also be applied to 2 x 4s nailed onto the rafters at 2' on center. (See the roof manufacturer's specifications.) Wood shingles can be attached to furring strips nailed onto the rafters with spaces between them, again depending on the type of shingles being used.

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Building basics

The barn's foundation

We recommend digging a foundation for your barn. We typically use a 4' frost wall. We then apply a 4" x 8" sill to the foundation and then frame our posts into that sill. See photo at right.

Bents and bays

Most barns are framed in "bents," and the area between the bents is referred to as a "bay." Each bent is constructed of posts and girts that are on each gable end of the barn and at parallel intervals down the length of the barn. For instance, a barn that is 36' x 48' would generally have 4 bents that are 36' wide at 12' on center totaling 48' in length. Bents are preassembled on the site and the each is raised as a unit with a crane. See photos below and at right.



Bents ready to be raised.



Post on sill on frost wall.



Bents go up one at a time.

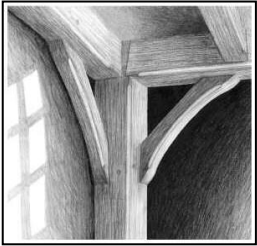
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Building basics continued (a variety of barns)

Plates and cupola

Once the bents are raised, we connect the plates (horizontal members at the eaves that the rafters sit on) to the bents, with traditional wooden mortise and tenon joints. We then install the rafters. If there is a cupola, at this point it has been preassembled and is raised to the roof.



Plates are connected to the bents.

Sidewall purlins and sheathing

Next the horizontal sidewall purlins are installed. These provide the nailing surface for the vertical sheathing. Many people use shiplap pine boards for the sheathing and these are nailed directly to the sidewall purlins. The sidewall purlins, plus the studs, frame the windows and doors, top and bottom, and therefore are placed to accommodate your choice of door and window placement.



Rafters are installed.



Cupola has curved rafters.

Partitions

Stall partitions can be fastened to posts with cleats or channels (c-shaped iron fasteners).

Custom Height and Pitch

We can adjust wall height, ceiling height and roof pitch to your needs.

Within these general guidelines, we can design the perfect barn for you.



Cupola Installed.



Purlins Installed.

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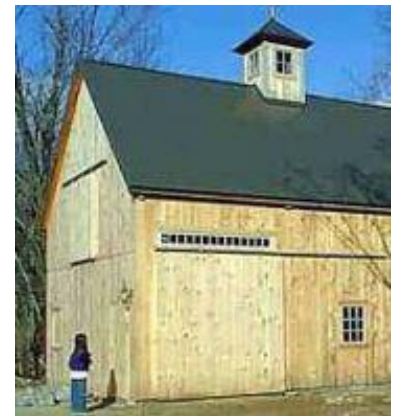
Our barn at Plimoth Plantation living history museum in MA.



Interior of Plimoth barn at left.



Above and right: a small farm barn.



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