

Building a Barrel Vault Ceiling

by Clay C. Johnson, AIBD

In modern wood frame construction, there are a variety of ways to treat the ceiling. Flat ceilings that are higher than the standard 8 feet are sometimes called “cathedral” ceilings east of the Mississippi. Ceilings that are flat in the center with edges sloping or stepping up to that center are referred to as “coffered” or “pan” ceilings. The so-called “vaulted” ceiling simply pushes the ceiling up to the underside of the rafters of a gable roof. Any of these ceiling types can highlight a room or make it appear larger, but none have quite the same effect as a properly proportioned barrel vault.

The barrel vault ceiling has its roots in early architecture, when arches in big public buildings like churches were

constructed of stone and masonry. The barrel vault was a simple way to span an opening before the dawn of modern materials.

Even though I design houses and not medieval churches, I’ve used barrel vaults in my projects a number of times to create a unique feeling of enclosure and inclusion (see photo), and my clients have always been delighted. Compared with a typical 9-foot flat ceiling, the gentle curves of a barrel vault can make for a powerful unifying feature for living rooms, playrooms, and even libraries and studies.

Proportion Is Everything

For a room to feel comfortable, the ceiling height must be in proportion to

the width of the room: The wider the room, the higher the ceiling needs to be. Ceiling heights in homes are most comfortable when they are about 60% as high as the narrow dimension of the room.

With a barrel vault, however, the perceived height is greater than the actual height, because the ceiling curves away from the room occupants. Consequently, it’s not necessary to push a barrel vault ceiling up very far to get a grand effect. In fact, where building codes or practical concerns limit building height, the barrel vault can be used to reduce the overall height of a room.

For example, the room shown in the photograph is located over a 20-foot-wide two-car garage. Applying the 60% rule would have made for a flat ceiling of 12 feet, creating a structure that was way too tall. The barrel vault allowed us to use normal 8-foot plate heights and still make the room feel spacious (see Figure 1, next page).

Note that the barrel ceiling meets the wall below the top plate. When laying out a barrel vault, don’t be tempted to chop this portion of the curve, even if it’s easier to build. The effect won’t be the same.

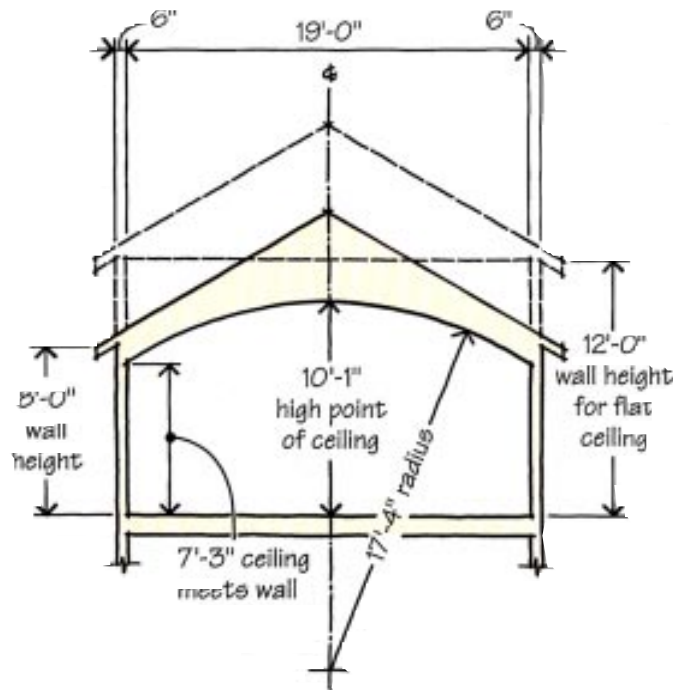
The Right Radius

The radius of a modern barrel vault ceiling needs to be between 80% and 120% of the width of the room. In Figure 1, the radius is 17 feet 4 inches, which is 84% of the room width. A radius tighter than 12 feet is difficult to build with drywall. Small barrel vaults



Barrel Vault Layout

Figure 1. A barrel vault appears to be higher than it actually is, so it can often be framed on standard 8-foot walls. A flat ceiling, which should be 60% as high as the room is wide, would have to be much higher (dotted lines) to create the same feeling of spaciousness. The barrel ceiling should meet the walls below the top plates, and the radius of the curve should be between 80% and 120% of the room width.



Building a Barrel Vault with Scissors Trusses

There are many ways to frame barrel vaults, but standard scissors trusses make for a quick job. To assure a nice smooth curve, we typically use a series of straps and blocking (Figure 2). If we have enough floor space, we draw the truss and radius full scale; alternatively, we use our CAD system to print an accurate section, then lay out the radius to scale. We can then determine the location and thickness of the strapping material.

Where the curve touches the truss, use a line of flat 2x6 blocking. Elsewhere along the curve, use solid material of varying thickness placed approximately 2 feet on-center. Where the ceiling meets the wall, use a nailer with the bottom edge ripped to the proper angle. Keep all nailers flat to the curve, and don't be afraid to rip bevels or add support blocking as necessary. The more accurate the nailers, the smoother the final curve will be.

Blocking a Scissors Truss

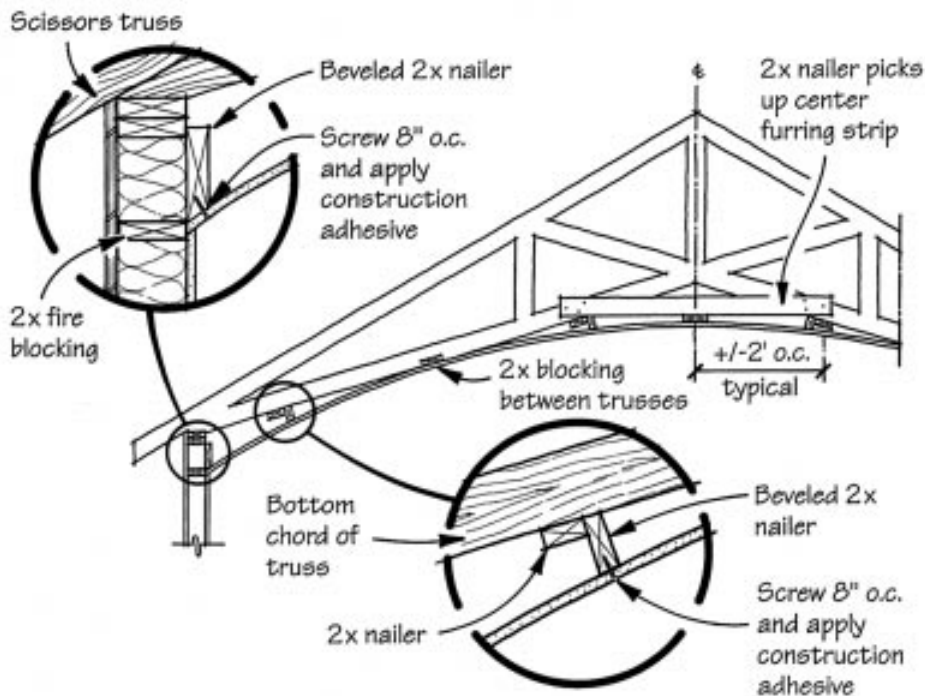


Figure 2. It's easiest to frame a barrel vault under a scissors truss. Space nailers 2 feet on-center, taking care to cut bevels accurately and adding blocking as necessary. To find the location of nailers, use a full-scale layout on the floor if space allows; otherwise, use a scale drawing.

Drywall Installation

We hang the drywall using the longest pieces possible along the arc of the curve. If we've done a careful job with the strapping, the drywall will form a smooth curve without a fight. (A radius tighter than 12 feet may require you to moisten the back of the drywall before bending.) Fasten the drywall using construction adhesive and screws, placed roughly 8 inches on-center in the field of the board. Once hung, the drywall is taped, finished, and textured as usual. By hanging the drywall along the curve instead of across it, the taping and finishing can be done with conventional straight mud knives or trowels.



Clay C. Johnson is a Certified Professional Building Designer and builder whose work in Davis, Calif., includes new homes, remodels, and additions.