Q What are the guidelines for letting rim joists act as headers in a wall system, and is there a way to insulate that header without sacrificing the bearing surface for the joists?

A Mike Guertin, contractor and presenter at JLC Live, responds: With any framing situation, first determine whether you even need a header. Windows and doors in non-bearing exterior walls generally don't require structural headers (other than 2x4s or 2x6s on the flat to frame the openings and cripples if the space between the flat header and the top or bottom plate is greater than 24 inches).

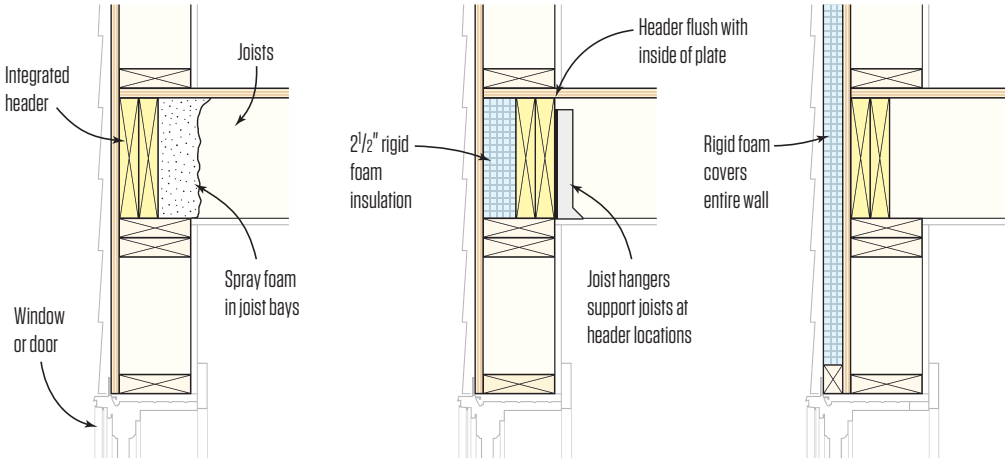
In many instances, you can also eliminate conventional structural headers in exterior bearing walls by using the rim joist to transfer loads around the window or door openings below. These floor-system-integrated headers minimize the amount of lumber needed to support an opening, and they allow for more insulation in the wall cavities.

Table R602.7.1 (Spans for Minimum No.2 Grade Single Header) in the 2012 IRC can be used to size floor-system-integrated headers. The IRC table lists single-header spans based on the snow load for your area, the load the header is supporting (roof, ceiling, floor), the width of the building, and the species of the header. For example: With a snow load of up to 20 pounds per square foot (psf), a single header for window and door openings can span 4 feet 2 inches on the first floor of a 28-foot-wide two-story house framed with SPF 2x10s and a center bearing wall (see excerpt from Table R602.7.1, next page).

If an opening is a wider span than Table R602.7.1 allows, go to Table R502.5(1) (Girder Spans and Header Spans for Exterior Bearing Walls). This table specifies the size of built-up headers, and you can use it to determine the header requirements based on the width of the span, along with the depth of your framing stock. Then you would create either a double- or triple-ply header using the rim joist as the outside layer. Keep in mind that you can use engineered rim-joist lumber instead of 2-by rim joists to achieve even wider spans for rough openings. When framing wide openings with a floor-system-integrated header, pay attention to the required bearing surface. You may need to double the studs at the sides of an opening rather than using a single stud.

If you're using floor-system-integrated headers to maximize insulation in the walls, you'll want to insulate the rim joists (and the headers) as well. I suggest

Insulating Integrated Headers



three different strategies depending on your specific situation. The first and easiest is keeping the rim joist and header even with the outside of the plate with the joists bearing on the plate, and then spraying foam insulation in each of the joist bays.

The next strategy is recessing the entire rim joist (and the header) up to 2 ½ inches and installing rigid foam on the outside of the rim before the wall sheathing is applied. The inside face of the header can be in plane with the inside of the 2x6 plate, and the joists that terminate at the headers would then be supported by joist hangers. This leaves 1 ½ inches of plate for the rest of the joists to bear, which is fine for conventional joist loading.

The final strategy is to install the rim joists and floor-system-integrated headers in the conventional way, flush with the outside of the plates. Then cover the entire wall with rigid foam, which is a growing practice being used to meet the increasing demands of the energy codes.

Excerpt From Table R602.7.1 Spans for Minimum No.2 Grade Single Header [a, b, c, f]

Single Headers Supporting	Size	Wood Species	Ground Snow Load (psf) ≤20[d] Building Width (feet)[e] 20	≤20[d] 28	≤20[d] 36	30 20	30 28	30 36	50 20	50 28	50 36
Roof, ceiling, and one center-bearing floor	2x8	Spruce-Pine-Fir	3-10	3-3	2-11	3-9	3-3	2-11	3-5	2-11	2-7
		Hem-Fir	4-0	3-5	3-1	3-11	3-5	3-0	3-7	3-0	2-8
		Douglas-Fir or Southern Pine	4-1	3-7	3-2	4-1	3-6	3-1	3-8	3-2	2-9
	2x10	Spruce-Pine-Fir	4-11	4-2	3-8	4-10	4-1	3-6	4-4	3-7	2-10
		Hem-Fir	5-1	4-5	3-11	5-0	4-4	3-10	4-6	3-11	3-4
		Douglas-Fir or Southern Pine	5-3	4-6	4-1	5-2	4-5	4-0	4-8	4-0	3-7
	2x12	Spruce-Pine-Fir	5-8	4-2	3-4	5-5	4-0	3-6	4-9	3-6	2-10
		Hem-Fir	5-11	4-11	3-11	5-10	4-9	4-2	5-5	4-2	3-4
		Douglas-Fir or Southern Pine	6-1	5-3	4-8	6-0	5-2	4-10	5-7	4-10	4-3

a. Spans are given in feet and inches. **b.** Table is based on a maximum roof-ceiling dead load of 15 psf. **c.** The header [may] be supported by an approved framing anchor attached to the full-height wall stud [...] in lieu of the required jack stud. **d.** The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater [...] **e.** Building width is measured perpendicular to the ridge. For widths between those shown, spans [may] be interpolated. **f.** The header shall bear on a min. of one jack stud at each end.

Q If the plywood subfloor is already in place, what makes a better setting bed for a floor tile installation: backerboard underlayment or plywood underlayment?

A Veteran tile installer and consultant Michael Byrne, who also moderates *JLC*'s ceramic-tile online forum, responds: In any comparison that pits ½-inch cement backerboard against ½-inch plywood underlayment—both properly installed over a ⅝-inch plywood subfloor—the double-layer plywood sandwich wins as the stronger of the two, even though both meet the tile industry's minimum standards. The reason is that backerboard products do not have any structural strength.

Adding strength to the floor system is only one factor, however, when looking at the integrity of a tile installation. Another major consideration is adhesion. If you compare the two configurations using identical thinset mortars, tiles installed over cement backerboard have greater shear-bond strength than those that are installed over plywood.

In dry-area installations, backerboard installed over a double-layer plywood floor provides approximately the same overall bonding strength as does a crack-isolation/waterproofing membrane over the same double layer of plywood. But for wet-area tile installations, the edge must be given to using a membrane because backerboard doesn't offer any waterproofing properties.

I've also seen membrane installed over a system of backerboard on top of the plywood layers, but at that point the backerboard becomes superfluous and just adds to the expense of both labor and materials, as well as contributing to the overall weight of the floor system.

Because there are so many variables involving the cost of plywood, backerboard, and membranes, it's difficult to pin down what might constitute the best configuration in every scenario. But as you determine what's best for your particular situation, consider the concept of minimum standards. The details described above—backerboard or ½-inch plywood underlayment properly installed over ⅝-inch plywood subflooring—both will give you a minimum passing grade, or a "D," from the tile industry.

But who is happy when their child comes home with a D on his report card?

When you're creating a setting bed for tile, better grades are easy to achieve. Whether you choose backerboard or membrane over the plywood layers, upsizing the underlayment to ⅝ inch will raise your grade to a C. If you also upsize the subflooring to ¾ inch, you will raise performance to a B. To score an A, use ¾-inch underlayment and ¾-inch subflooring.