

Pan Tips: Where to Start

Pan construction is simply Beam and Slab framing achieved using a series of steel pans to void concrete and form beam sides. Often referred to as joists, these beams are the same as any other structural member. In fact, joist construction utilizing wide module pans are designed as one-way slabs and beams. Modern joist systems should not be confused with traditional one-way joist systems defined by ACI 318, Section 9.8.

It can be difficult to know where to start. Generally, when doing preliminary design, there are three steps:

1. Determine the system depth to satisfy serviceability criteria - primarily deflection
2. Size the width of the joists (beams) to satisfy the strength criteria
3. Size the supporting beams for the joists

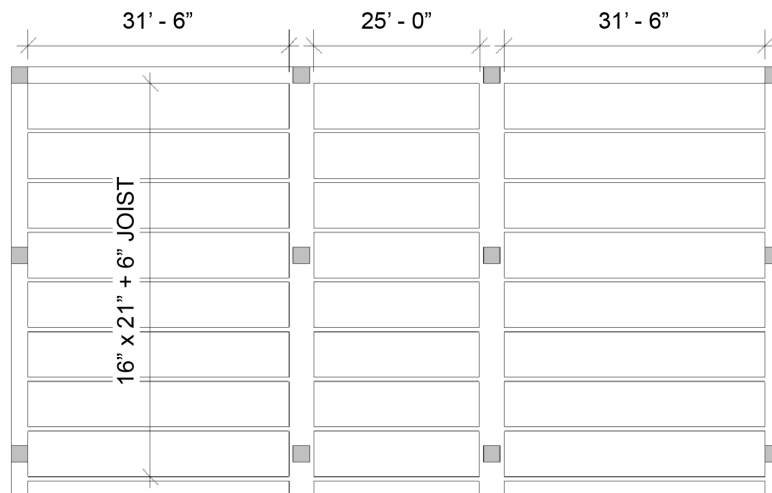
Depending on span lengths and superimposed loads, it is usually more cost effective to span the joists in the long direction. This helps to ensure a level soffit is achieved because the supporting beams span the short direction. Topping slab thicknesses are driven by fire codes with a minimum thickness of 4 5/8". Many designers simplify this to using 5" topping slabs throughout.

STEP 1: For projects with live and dead loads for typical occupancies, use the following rule of thumb: a joist can safely span in feet 1.5x its system depth in inches. Adding support beam dimensions to joist span yields a centerline to centerline dimension for design. If you have pan construction framing into 36" wide beams on both ends, for instance, you can start with the following expectations on centerline to centerline construction.

System Depth	Member Clear Span	Column CL with 36" Wide Beams
16 + 5	31.5'	34.5'
20 + 5	37.5'	40.5'
24 + 5	43.5'	46.5'

STEP 2: Try different joist widths starting with 6" and adding 1" increments until you get a solution that satisfies strength requirements. Remember that for economy, the job should use the same width joist throughout. The owner will benefit from the simplicity of repetition through reduced framing cost.

STEP 3: Make the depth of the supporting beams the same as the overall depth of the joist, and size the width based on strength requirements. Wide, flat beams result in lower costs even though narrower, deep beams may have larger moment and shear capacities. The savings lies in workers constructing the supporting formwork at the same elevation throughout the footprint.



Now that you have sized the system depth, joist width and supporting beams, apply the layout to the project's footprint. Lining up joists across bays provides for continuity and arraying voids from one end of the structure to the other also reduces costs. Diaphragm action is achieved through the topping slab: it isn't necessary to have wider joists on the column lines unless you are using those joists to resist lateral loads through frame action and the analysis indicates those joists need to be wider.