

Designing Concrete Structures:

Design a Concrete Floor System using the Pan and Joist System



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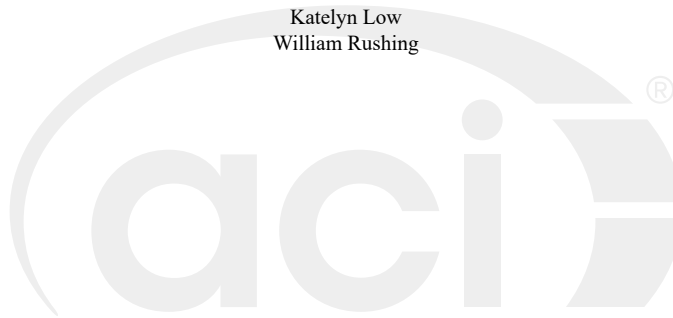
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ACI E702.6-22 Designing Concrete Structures: Design a Concrete Floor System using the Pan and Joist System.

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Example: Design a Concrete Floor System using the Pan and Joist System

Using the 2014 ACI 318 building code Strength Design Method, design the following reinforced concrete pan and joist floor system. Floor design loads used in the following design example would normally be determined by the appropriate provisions of the legally adopted building code. For this design, typical floor dead and live loads are used.

Pan and joist floor system

Design a typical interior span of a concrete floor system using 30 in. prefabricated forms (2 ft 6 in. joist spacing) with a center-to-center span of 24 ft and a clear span of 22 ft 6 in., as shown in Fig. 1. Joists are assumed to be 5 in. wide at the bottom, 7 in. at the underside of the slab, and 14 in. deep, as shown in Fig. 2. The slab is assumed to be 3 in. thick. Floor design loads are to be office type and corridor type loadings with a live load of 80 psf, and an additional superimposed dead load of 20 psf plus material self weights. The concrete compressive strength to be used in the design is $f'_c = 4000$ psi and steel reinforcement, welded wire reinforcement, yield strength is $f_y = 80,000$ psi for wire reinforcement and $f_y = 65,000$ for welded wire reinforcement. Consider normal weight concrete is used and has a density of 150 pcf.

The code to be used for design is ACI 318-14, using the strength method and shear and moment coefficients in Section 6.5.

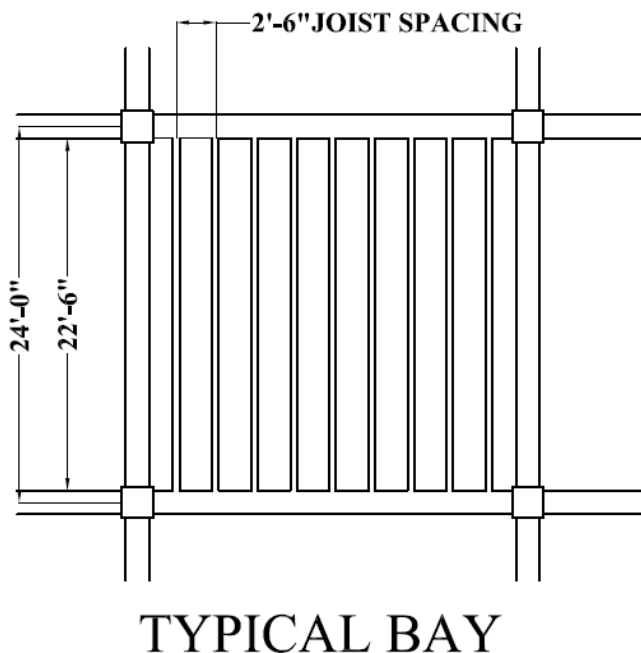


Fig. 1—Typical bay framing. Note: top of slab view is not shown for clarity.