

# Pan Tips: Design Efficiencies

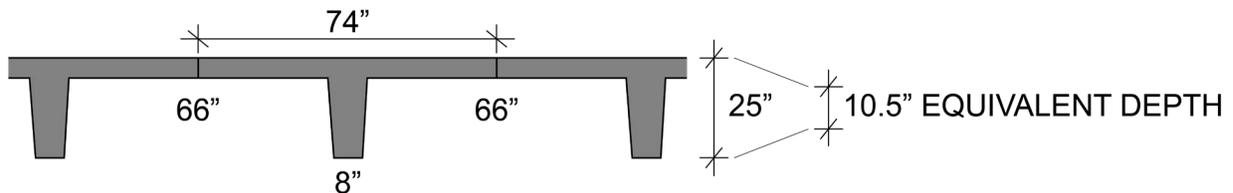
## Equivalent Depth as a Measure of Efficiency

Many factors go into determining the final cost of a structure with materials being the component that draws the attention of most designers. There are two metrics often used to evaluate design efficiency of cast-in-place structure:

- Tons of Reinforced Material - measured in pounds per square foot
- Cubic Yards of Concrete - often measured as equivalent depth

Experienced designers will not engineer each span or void configuration on a footprint. Rather, the reinforcing requirements for the typical joists will be used throughout the footprint. Economy comes from simplicity and having workers place the same reinforcing configuration in as many joists as possible.

The reinforcing is determined by many factors including live and dead loads, building codes, spans and contributing area of each member. Post tensioning may be used in conjunction with reinforcing. The contributing area, spans and loads determine the depth of pan chosen and the typical joist width. For an 8" joist with 66" pans on either side contributing area for the joist is 6.17 SF/LF of joist. Sometimes, wider joists with shallower pans can be more cost effective due to the height constraints. With pans, designers have a lot of flexibility.

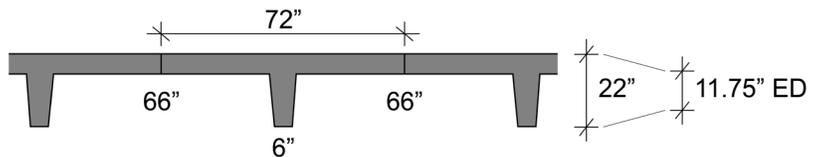


Pans void out concrete, so a project with 20" pans and 5" topping will have a system depth of 25" while the equivalent concrete depth may only be 10.5". Equivalent depth is the cubic yards of concrete for a given area, divided by the square footage. Pan construction can have equivalent depths ranging from 9" to 13". That's quite an accomplishment if you consider the topping slab may be 5". Said another way, for an equivalent depth of 10", the owner gets a structure that may span 35' in one direction and 30' in the other!

## CONSIDER THE FOLLOWING LAYOUTS AND THEIR EQUIVALENT DEPTHS AS MEASURED BY TOTAL CONCRETE IN A TYPICAL LEVEL:

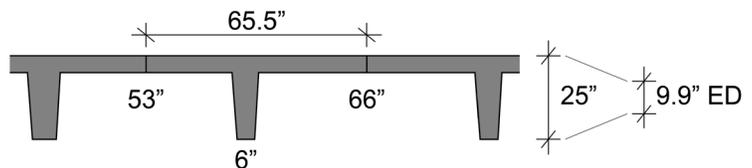
### 609 Main - Houston, TX:

- Typical Bay:** 30' x 42'
- Pan Depth:** 16"
- Topping Slab:** 6"
- Equivalent Depth:** 11.75"



### Banner Estrella Medical Center - Phoenix, AZ:

- Typical Bay:** 35' x 28'
- Pan Depth:** 20"
- Topping Slab:** 5"
- Equivalent Depth:** 9.9"



### Pennsylvania State Archives - Harrisburg, PA:

- Typical Bay:** 34' x 17' & 23'
- Pan Depth:** 24"
- Topping Slab:** 5"
- Equivalent Depth:** 14"

