Different Types of Slabs

Assignment No.: 05.01

Assignment

What are the different types of slabs used in construction, and how do they differ in terms of design and load-bearing capacity?

Answer

Slabs are flat horizontal structural elements of buildings made of concrete. They form floors, ceilings, and roofs, providing a surface for occupants, and equipment to rest. They transfer loads to beams and thereafter columns (or walls in the case of load bearing structures). They are of different types depending on their span, the loads they'll be subjected to, and materials.

Conventional slab

This type of slab is connected by beams and columns. While the slab's thickness is small, the depth of the beam is large. Loads are transmitted from the slab to the beam and then to columns. They are of two subtypes:

One-way slab

- **Design:** They are rectangular in shape and supported by beams on two of their four sides. The longer span is more than twice the length of the shorter one.
- **Load-bearing capacity:** They carry loads primarily in one direction.
- **Application:** They are applicable in roofed, open-air hallways and on a porch.



Figure 1: One-way slab used at MIST garage

Two-way slab

- **Design:** They are also rectangular shape but are supported by beams on all four sides. Their longer span is less than twice the length of the shorter span.
- **Load-bearing capacity:** Distributes loads in two perpendicular directions, making it stronger than one-way slabs.
- **Applications:** They are used in most apartment buildings, offices, and general-purpose floors.



Figure 2: Two-way slab used in MIST salt fridge

Flat plate

- **Design:** In this type of slabs, loads are transferred directly to the column instead of beams. It may also be one-way or two-way subtypes.
- **Load-bearing capacity:** Suitable for light to moderate loads, with a limited span to avoid punching shear.
- **Applications:** Underground parking, hotels, and residential buildings with simple layouts.



Figure 3: Flat plate slab structure

Flat slab

- **Design:** This type of slab is similar to a flat plate but incorporates drop panels or column capitals (thickened portions near columns) to enhance load capacity and resist punching shear. The drop panels can be square or rectangular in shape.
- **Load-bearing capacity:** Supports heavier loads and spans larger areas compared to flat plates due to the added strength of drop panels.
- **Applications:** Unsymmetrical warehouses, industrial buildings, and parking garages.



Figure 4: Flat slab structure at MIST Old Library

Grid slab

- **Design:** These are lightweight slabs with hollow grid-like systems on their soffit. The hollow grid system reduces the self-weight of the slab without compromising its structural stability. The grids are spaced at equal intervals and can be of any shape — square, rectangular, or triangular. They transfer the loads to the beams from above.
- **Load-bearing capacity:** They can span long distances with ease due to their reduced weight and high structural efficiency.
- **Applications:** Public buildings, museums, and auditoriums.



Figure 5: Grid slab structure between MIST Tower 3 & 4

Ribbed slab

- **Design:** These are very similar to grid slab but have wide grids of beams on their soffit.
- **Load-bearing capacity:** They offer the same load distribution and weight reduction as grid slabs.
- **Applications:** They are also applicable in public buildings, museums, or auditoriums.



Figure 6: Ribbed slab structure at MIST Admin Tower

Cantilever slab

- **Design:** These are fixed at one end and free at the other.
- **Load-bearing capacity:** They have higher deflection than other types of slabs due to the support conditions and should not exceed 4 feet in span length.
- **Applications:** They are applicable mostly on balconies and decorative overhangs.



Figure 7: Cantilever slab structure at MIST Old Library