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Structural design categories and their processing

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DESCRIPTION

The entire process of structural planning and design requires not only for imagination and conceptual thinking, but also a thorough understanding of practical considerations like current design regulations and supported by a wealth of experience, institutional knowledge, and judgment. It is important to note that any construction that is being built must be durable for the length of time that is wanted and must the efficiency requirements for which is designed. As a result, every structure's design may be divided into the two categories

- Structural design
- Functional design

Functional Design

The structure that will be built should appear well and primarily perform the purpose for which it is intended. Both inside and outside of the building should be cheerful places. Because of this, the functional planning of a building must include the appropriate layout of rooms or halls to meet the needs of the client, sufficient ventilation, lighting, acoustics, and an unobstructed view in the case of community halls, movie theaters, etc.

Structural Design

The structural design process begins when the structure's shape is decided upon. Understanding the behavior of structural elements under stresses and constructing them with economy and elegance to produce a safe, useful, and long-lasting structure is the art and science of structural design.

Phases Structural Design

The following steps are part of the structural design process.

- Structural Planning
- Forces at work and loads calculated
- Analysis techniques
- Member selection
- Drawing, creating schedules, and detailing.

Structural Planning

The structural design of the building frame is completed after receiving an architectural plan of the buildings. The following must be determined in order to

- Column placement and orientation
- Placement of beams
- Spread of slabs
- Staircase layouts
- Choosing the appropriate sort of footing.

Column placement and orientation**:** Column placement and orientation are a few architectural concepts that may be used to assist determine where columns should be placed.

- Columns should ideally be placed at a building's corners and where beams and walls meet.
- Column placement should be chosen to minimize bending moments in beams. Avert beams with wider spans.
- Avoid having wider spaces between the centers of columns
- Columns property line
- Orientation of columns

Projecting columns: Avoid placing columns outside the wall of the room since they not only look terrible but also make it difficult to utilize the floor space and prevent furniture from fitting flat against the wall. To avoid the column from being skinny, the breadth must be maintained at 200 mm or more. In order to lower the weight on each floor's column and avoid the need for big sections for columns, the column spacing should be significantly reduced.

Position the column so that its depth is contained within the

the main bending plane or is perpendicular to the main bending axis. This is offered to raise moment of inertia and hence capacity to withstand moments. Additionally, it will lower the ratio, increasing the column's ability to support more weight.

Positioning of beams: In order to prevent enormous loads from falling directly on slabs, beams must often be installed behind walls or beneath a strong concentrated load. Prevent larger beam spacing from cracking and deflection criterion. The deflection changes inversely with the cube of the depth and directly with the cube of the span. Consequently, when span L increases.

Slab spanning: Supporting arrangements determine the slab functions as a one-way supported slab when the supports are only on the opposing edges or just in one direction. When a rectangular slab that is supported along its four corners behaves as a one-way slab. The aspect ratio of a slab as well as the ratio of reinforcement in each direction has a role in its two way activity. The primary steel is only given with a short span in a one way slab, and the weight is distributed between two opposing supports. The steel throughout the long span just serves as the distribution steel and is meant to distribute the load, prevent shrinkage, and withstand temperature stresses rather than to transmit the load. By supplying primary steel along the short span and just distribution steel along the long span, a slab is designed to serve as a one-way slab spanning.