Function of Lintel and Choice of Materials and its Effects

Assignment No.: 05.03

Assignment

What is the function of a lintel in a building, and how does its material choice affect its performance?

Answer

A lintel is a horizontal structural element placed above doors, windows, or other openings in a building to support the load from the structure above and transfer it to the surrounding walls or columns.



Figure 1: RCC lintel above the red door opening

Functions

1. Its main function is to distribute loads from above the opening to surrounding walls or columns.
2. Minimize deflection or bending of the supporting elements by distributing loads across a greater area.
3. Ensure that the opening does not compromise the integrity of the structure.
4. Contribute to the aesthetic appeal by providing a neat finish to openings.

Choice of materials

The choice of material affects the lintel's strength, durability, thermal properties, and resistance to environmental factors.

Timber

Crafted from hardwoods like oak or teak and used as a beam. They offer moderate load-bearing capacity and are suitable for small spans. However, usage is highly constrained due to – lower fire resistance, decay, rot, and insect infestation over time.

Stone

Durable natural stones – granite, limestone, or sandstone. They are durable and provide aesthetic appeal. However, they have low tensile resistance and could crack due to surface vibration when used for longer spans. Moreover, they are labor intensive and require skilled stonemasons.

Brick

Formed by arranging bricks in a specific pattern to cover the openings. Bricks are laid and coated with mortal to create a load bearing structure. They offer good compressive strength and are suitable for smaller to medium-sized openings less than 1m. However, their load-bearing capabilities might not suffice for structures with larger spans or heavy load requirements.

Reinforced brick

Additional reinforcements in the form of steel bars or rods are employed within the brickwork for enhanced strength and load-bearing capacities. This significantly increases brick’s ability to bear more loads, increasing structural integrity while maintaining aesthetic appeal.

Steel

They are made of steel and have an exceptional strength-to-weight ratio, offering higher load-bearing capacities. They are durable and can accommodate larger spans with minimal deflections compared to other materials. They are also lighter than RCC lintel. While they are resistant to cracking, they may require corrosion protection.

RCC

They are made using cement, aggregates, and reinforcements (steel bars or mesh). They offer excellent compressive and tensile strength, durability, and resistance to fire, weathering, and moisture. From smaller windows to larger structural openings, they are a very popular choice in construction design due to their load-bearing capacities. They can be either pre-casted (produced off-site) or cast-in-situ (produced on-site).