Light Weight Concrete

Presentation

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Outline

- What is Lightweight Concrete
- Principal of LWC
- Advantage
- Disadvantage
- Application
- Methodology
- Conclusion and Future Scope
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Why are we using lightweight concrete?

(a)

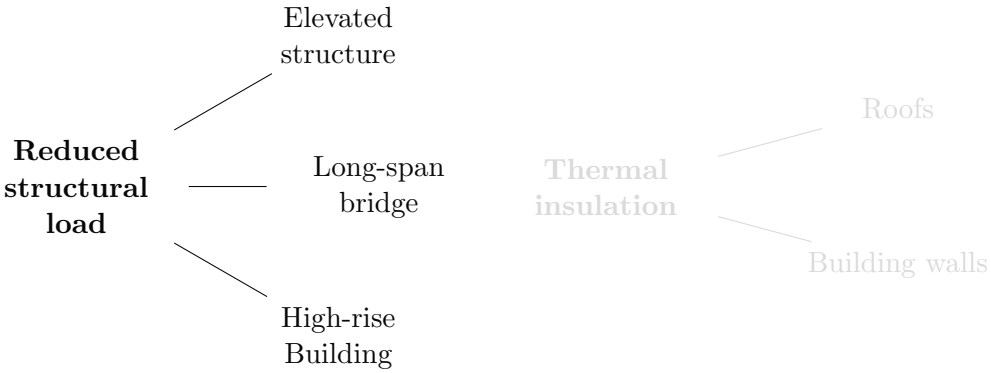
(b)

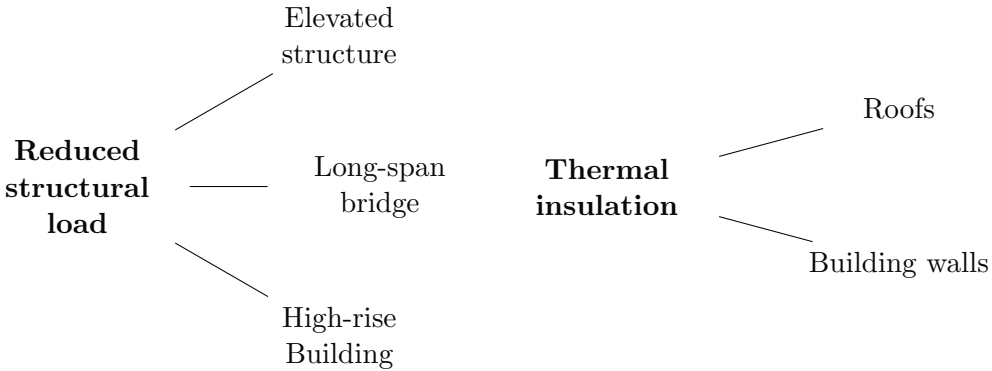
Images of different types of design and structure.

(a)

(b)

Images of uses of lightweight concrete.


Elevated structure
Reduced structural load
Long-span bridge
High-rise Building
Thermal insulation
Roofs
Building walls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Reduced shrinkage and cracking

- Humidity variations
- Temperature fluctuations

Architectural Flexibility — Decorative elements and creative designs

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What is Light Weight Concrete

- Lighter than conventional concrete.
- Formulated — replacing conventional aggregate materials.
- Derived from natural or artificial materials that have inherently lower densities.
- Density — 300kg/m3 to 1850kg/m3
  Normal concrete — 2200kg/m3 to 2600kg/m3.

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(a)

(b)

Lightweight concrete image

Types of lightweight concrete

- Three type of **Lightweight concrete (LWC)**..
  1. Lightweight aggregate concrete.
  2. Aerated concrete.
  3. No-fines concrete.

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Principle Behind LWC

- The basic principle behind the making of lightweight concrete is to include the air in concrete.
- To achieve the above principle practically, there are 3 different ways.
- By replacing the conventional aggregates with cellular porous aggregates (Lightweight aggregate concrete).
- By incorporating the air or gas bubbles in concrete (Aerated concrete).
- By omitting the sand fraction from the aggregate (No-fines concrete).

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Advantages

- Reduces the dead load of the building.
- Easy to handle and hence reduce the cost of transportation and handling.
- Improves the workability,and improved seismic performance.
- Relatively low thermal conductivity.
- Good resistance to freezing and thawing action when compared to conventional concrete.
- Better insulating properties and superior fire resistance.

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Disadvantages

- Very sensitive to water content in the mixture.
- Volume per unit mass is more.
- Mixing time is longer than conventional concrete to ensure proper mixing.
- Lightweight concrete is porous and shows poor resistance.
- Slower drying time [2].

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Applications

- It is used in the construction of roof slabs, houses with load-bearing walls, etc.
- It is also used in the construction of stairs, windows, garden walls, etc.
- In large buildings also, this is used in the construction of partition walls.
- These are molded in the form of slabs and used as thermal insulators inside the building [1].

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Methodology

- Batching
- Weight batching
- Measurement of water
- Preparation of concrete cubes
- Compacting
- Curing
- Testing

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Conclusion and Future Scope

- It is an eco-friendly alternative that can help reduce carbon emissions and promote sustainable development.
- It has a lower thermal conductivity, which makes it an excellent insulator.Higher fire resistance and sound absorption capacity
- Use of ultra-high-performance concrete panels made from lightweight aggregates have been showcased in several projects.
- More durable requires less maintenance than normal concrete.
- More sustainable and efficient. For example, the use of fly ash, and paper sludge[3].

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- Limitations- including lower compressive strength and potential durability concerns in certain environments.

References

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Thank You!