Reinforced Concrete - Mechanics and Design 9th edition Wight Solutions Manual

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Chapter 2

2.1 What is the difference between dead loads and live loads?

Dead loads, or permanent loads, remain constant over time, and they always act at the same location. For example, the self-weight of concrete.

Live loads, also known as variable loads, change over time. Their magnitude varies, and their location also varies. For example, the load from the furniture in an apartment, temporary storage, and loads from a party.

2.2 In which cases is a reduction of the live load not permissible?

a. The live-load reduction applies only to live loads due to use and occupancy (not for snow, etc.).
b. No reduction is made for areas used as places of public assembly, including garages or roofs.
c. Structural members supporting one floor. According to ASCE/SEI 7-22, the reduced live load for structural members supporting one floor shall be at least 50 percent of the unreduced live load.
d. Structural members supporting more than one floor. The unreduced live load cannot be less than 40% of the unreduced live load. This applies mainly to columns of multistory buildings.
e. For live loads exceeding 100 psf, no reduction is allowed by ASCE/SEI 7-22, except that the design live load on columns supporting more than one floor can be reduced by 20 percent.

2.3 What are the different risk categories in building design?

Risk categories range from I to IV. The greater the potential for loss of life or loss of service to a community in the event of a structural failure, the higher the Risk Category, and the more stringent the design requirements are in terms of safety.

Risk Category	Building description
I	Buildings and other structures that pose a low risk to human life if they fail, such as agricultural facilities
II	Buildings and other structures that do not fall into categories I, III, or IV
III	Buildings or other structures that represent a substantial hazard to human life in the event of failure, such as assembly occupancies, schools, and detention facilities. Also, buildings and other structures not included in risk category IV that contain a sufficient quantity of highly toxic or explosive substances that pose a significant threat to the general public if released.

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IV	Buildings and other structures designated as essential facilities, such as hospitals, fire and police stations, communication centers, and power-generating stations and facilities. Also, buildings and other structures that contain a sufficient quantity of highly toxic or explosive substances that pose a significant threat to the general public if released.

2.4 Why is it generally uneconomical to try to save concrete and steel by meticulously calculating the size of every beam and column to fit the loads exactly?

In construction, formwork costs can account for a significant portion of the overall structure's cost. Reusing the forms is often more cost-effective than reducing the size of structural elements by a few inches in beams, slabs, or columns. As a result, the rule of thumb is to reuse the forms as much as possible while minimizing the changes in the dimensions of structural members.

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