

STABILITY OF HIGH-RISE BUILDINGS

High-rise buildings are structures that have a significant height and span more than 12 floors, or 35 meters. They are designed to accommodate various functions, such as residential, commercial, office, hotel, etc. High rise buildings are exposed to various loads and conditions, such as wind, earthquake, fire, blast, etc., that can affect their stability and performance. Stability is the resistance of a structure to undesirable movements, such as sliding, collapsing, or overturning [1,2]. Performance is the ability of a structure to fulfill its intended functions, such as safety, serviceability, and durability. Therefore, it is important to analyze and optimize the factors and methods that influence the stability and performance of high-rise buildings.

Some of the main factors that affect the stability and performance of high-rise buildings are: Structural system is the arrangement and connection of the structural elements, such as columns, beams, slabs, walls, etc., that support the loads and transfer them to the foundation. The structural system can be classified into different types, such as frame, shear wall, core, outrigger, tube, etc., depending on the distribution and orientation of the elements[3,4]. The structural system should provide adequate stiffness and strength to resist the lateral and vertical loads, as well as the P-Delta effects, which are the additional forces and moments that arise from the interaction between the axial loads and the lateral displacements of the structure. The structural system should also prevent or delay the buckling phenomena, which are the sudden loss of stability and strength of a structure or a member due to the action of compressive forces.

Material is the substance that constitutes the structural elements, such as concrete, steel, timber, etc. The material should have suitable properties, such as density, modulus of elasticity, yield strength, ultimate strength, ductility, etc., that affect the behavior and response of the structure under the loads and conditions. The material should also have adequate durability, fire resistance, corrosion resistance, etc., that affect the longevity and maintenance of the structure.

Design strategy is the approach and methodology that are used to conceive and develop the structure, such as the architectural concept, the structural form, the load path, the analysis method, the design criteria, the optimization technique, etc. The design strategy should consider the functional, aesthetic, economic, and environmental aspects of the structure, as well as the relevant codes and standards that govern the design [5]. The design strategy should also incorporate innovative and advanced techniques and technologies, such as smart materials, sensors, monitoring systems, control devices, etc., that can enhance the resilience and robustness of the structure.

By exploring these factors and methods, one can gain a deeper understanding and appreciation of the stability and performance of high-rise buildings, as well as the challenges and opportunities for improving them. High rise buildings are not only engineering marvels, but also symbols of human achievement and aspiration.

REFERENCES

1. Al-Kodmany, K. Sustainable High-Rise Buildings: Toward Resilient Built Environment, University of Illinois (Chicago), April 18, 2022. pp. 1-2. *Frontiers in Sustainable Cities*, 4, 782007
2. Council on Tall Buildings and Urban Habitat, 10th world Congress (Chicago), 28 Oct-02 Nov 2019. pp. 3-4. *The 50 Most Influential Tall Buildings of the Last 50 Years*
3. High-rise building. May 2, 2021. p.1. In Simple English Wikipedia
4. Jan, T.S., Liu, M.W., & Kao, Y.C. An upper-bound pushover analysis procedure for estimating the seismic demands of high-rise buildings, University of Illinois (Chicago), April 18, 2022. pp.3-4. *Engineering Structures*, 26(1), 117-128