Pakistan Building Code (Seismic Provisions 2007)

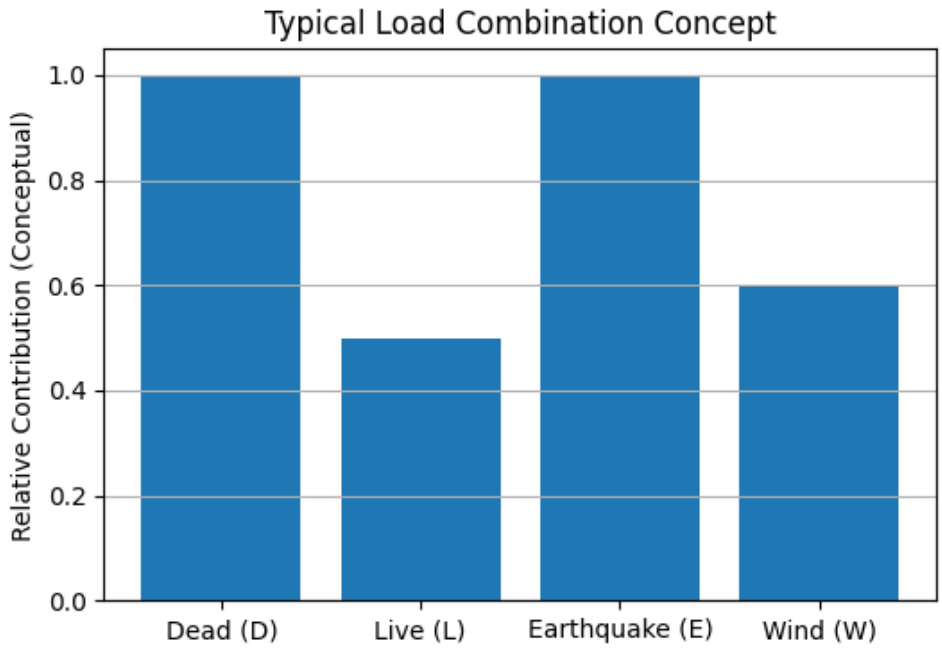
Chapter 5: Structural Design Requirements — Advanced Professional Interpretation

Purpose of Chapter 5

Chapter 5 is the core of seismic structural design in the Pakistan Building Code. It defines loads, load combinations, lateral force procedures, drift limits, and analysis requirements that govern the design of earthquake-resistant buildings.

1. Design Loads — Fundamental Framework

The code requires consideration of dead loads, live loads, wind loads, earthquake loads, and other environmental effects. Proper load estimation directly controls base shear and member design.

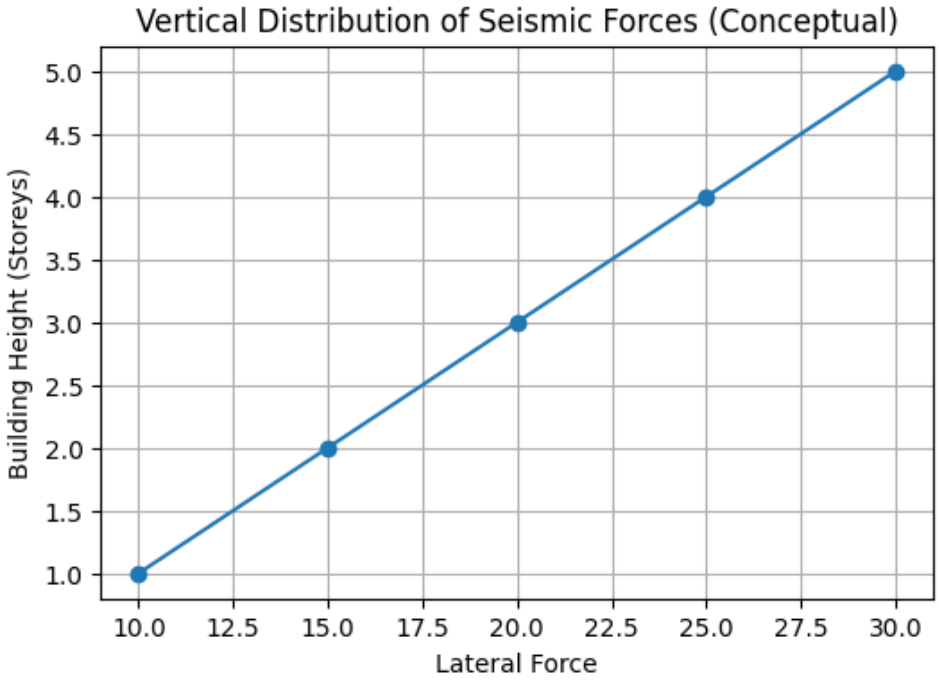


2. Earthquake Loads — Core Seismic Demand

Earthquake loads represent inertial forces generated by ground motion. The code provides equivalent static and dynamic procedures to estimate these forces depending on building height, configuration, and seismic zone.

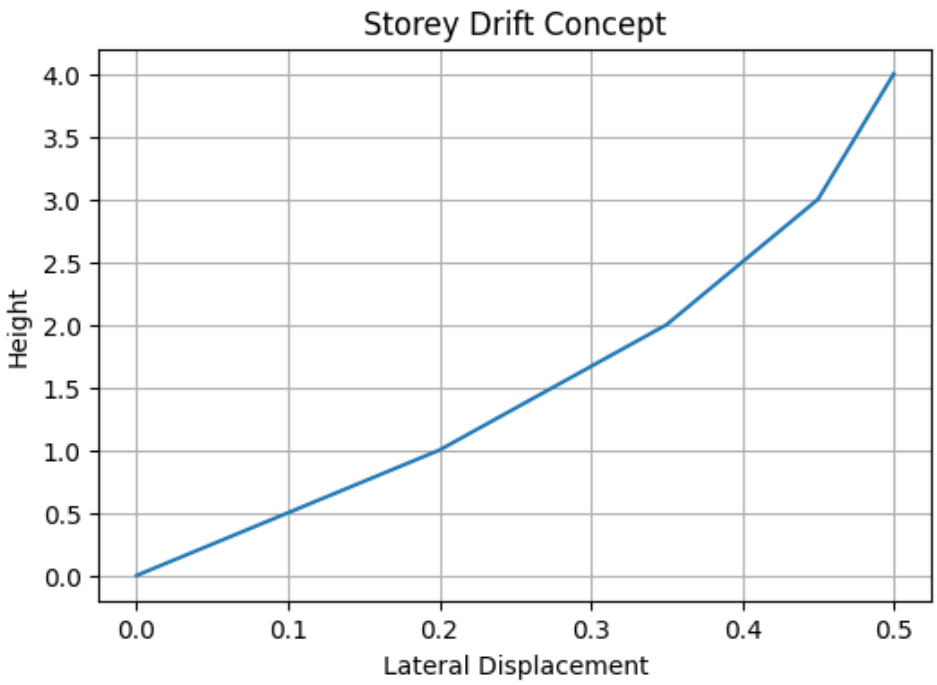
3. Vertical Distribution of Seismic Forces

The equivalent static method distributes base shear along the building height based on mass and elevation. Upper storeys typically attract larger lateral forces.



4. Storey Drift Control — Serviceability Requirement

The code limits inter-storey drift to control damage to structural and nonstructural components. Excessive drift is one of the most common causes of earthquake damage in buildings.



5. Dynamic Analysis Procedures

For taller or irregular buildings, dynamic analysis such as response spectrum or time-history analysis is required. These methods more accurately capture modal behavior and higher-mode effects.

6. Structural System Selection

The code places limits on structural systems, building height, and configuration to ensure adequate ductility and energy dissipation during strong earthquakes.

Professional Risk Notes

Common design mistakes include incorrect load combinations, ignoring accidental torsion, underestimating drift, and using equivalent static analysis for irregular tall buildings. Careful system selection and analysis method choice are critical.