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A Brief Note on Earthquake Engineering and Seismic Design

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Editorial Note

Earthquake engineering is an interdisciplinary discipline of engineering that considers earthquakes while designing and analysing structures such as buildings and bridges. The overarching objective is to make such structures more earthquake resistant. In a big earthquake, an earthquake (or seismic) engineer seeks to build structures that will not be affected by small shaking and will prevent significant damage or collapse. Earthquake engineering is a scientific area concerned with reducing seismic risk to socioeconomically acceptable levels in order to safeguard civilization, the natural environment, and the built environment from earthquakes.

This has typically being characterized as the study of the behaviour of structures and geo-structures due to seismic loading; it is a subset of structural engineering, geotechnical engineering, mechanical engineering, chemical engineering, applied physics, and other disciplines. However, recent earthquakes have resulted in a broadening of its scope to include areas from the larger area of civil engineering, mechanical engineering, nuclear engineering, and the social sciences, including sociology, political science, economics, and finance.

The primary objectives of earthquake engineering are to predict the effects of large earthquakes on metropolitan areas and civil infrastructure. Design, construct, and maintain structures so that they operate as expected and in accordance with building regulations while exposed to earthquakes. It is not necessary for a properly constructed structure to be exceedingly resistant or costly. It must be correctly engineered to resist seismic forces while sustaining a minimum amount of damage.

Seismic design

Appropriate engineering processes, concepts, and criteria are used to design or retrofit structures that are subject to earthquakes. Those criteria are only consistent with the current state of seismic engineering structural understanding. As a result, even if a building's design strictly adheres to seismic code rules, it is not guaranteed to be secure against collapse or catastrophic damage.

Poor seismic design might cost a lot of money. Regardless of whether it was based on physical rules or actual knowledge of the structural performance of various forms and materials, seismic design has always been a trial and error process.

An engineer must generally pass an examination in Seismic Principles to practise seismic design, seismic analysis, or seismic appraisal of new and existing civil engineering projects in the state of California.

- Seismic Design Criteria and Seismic Data
- Engineered Systems' Seismic Characteristics
- Forces of Seismic
- Procedures for Seismic Analysis
- Construction Quality Control and Seismic Detailing

Seismic design primarily uses the same modest number of fundamental structural elements as non-seismic design projects to construct sophisticated structural systems.

Structures are often intended to "withstand" the strongest earthquake of a given probability that is anticipated to occur at their site, according to building rules. This means that the number of people killed should be kept to a minimum by preventing structures from collapsing.

Understanding the various failure modes of a structure and providing the structure with the proper strength, stiffness, ductility, and layout to guarantee that such modes do not occur this is how seismic design is carried out.

The main goals of earthquake engineering are:

- Recognizing what happens between structures and the ground is one of the fundamental aims of earthquake engineering.
- Recognize the potential for large earthquakes or tsunamis to cause damage to structures.
- Design, construct, and maintain structures to withstand earthquakes while adhering to construction codes.