Site Amplification Factors Using 1D Seismic Site Response Analysis in Islamabad: An Application of Building Code of Pakistan 2021

Category: Infrastructure/Technologies

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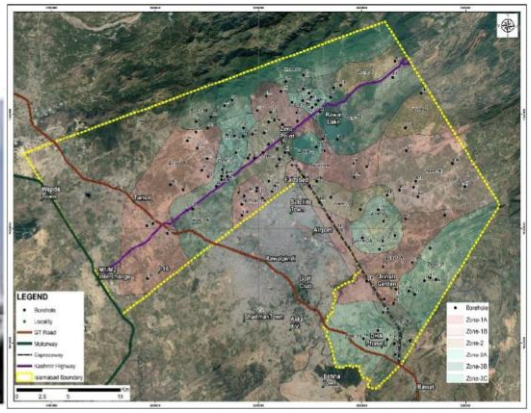
Summary: This project investigated the site amplification factors in Islamabad, Pakistan, as per seismic regulations of a newly enacted Building Code of Pakistan (BCP, 2021). Using a series of 1D non-linear site response analyses, the study evaluates these factors for the Islamabad region. Nineteen representative profiles were selected from a dataset of 125 site profiles, classified according to the Code. The representative profiles were subjected to a combination of thirteen ground motions that are compatible with site class B of the BCP, 2021, and 1D nonlinear seismic site response analyses were performed. Calculated response spectra and amplification factors are compared with design estimates provided by the code spectra. The study finds that while the Code-based design spectrum aligns with the current study's findings for periods greater than 0.5 seconds, it underpredicts the response for shorter periods for both SC and SD site classes. These findings highlight the need for a more refined approach in the seismic provisions for Islamabad to ensure accurate seismic hazard assessments and improved earthquake safety.



Objectives: The project aims to determine site amplification factors for different soil types and site conditions in the region. It also assesses the implications of the findings in relation to the Building Code of Pakistan 2021 and its seismic provisions.

Key Achievements: The project successfully developed the seismic site factors and evaluated the current Building Code of Pakistan for site-specific assessments.

Implementation Challenges: The project faced challenges such as data collection delays, coordination with stakeholders, and limited access to advanced tools.

Proposed Solutions: The project benefits the construction and engineering industry by providing data-driven recommendations for site-specific design and construction practices. It also assists private firms in developing earthquake-resistant infrastructure.

Impacts: The project has significantly impacted students by providing hands-on experience in the collection of site investigation data. Professors have expanded interdisciplinary teaching resources. The university has aligned the project with its sustainability goals and enhanced industry collaborations. Development of recommendations for seismic code refinement. Citizens gain safer buildings, reducing risks during earthquakes. The benefits from refined seismic codes, which align with international standards, improving disaster mitigation policies.