

# Impact of Soil Conditions on Earthquake Amplification: A Geotechnical and Seismic Study

Prabhash Kumar Yadav<sup>1</sup> and Dr Dharmendra Kumar Dubey<sup>2</sup>

Research Scholar, Bhagwant University, Ajmer, Rajasthan, India<sup>1</sup>

Professor, Shree Dhanvantary College of Engineering and Technology, Surat, Gujarat, India<sup>2</sup>

**Abstract:** *This study investigates the influence of soil conditions on earthquake amplification through a combined geotechnical and seismic analysis. Soil plays a critical role in modifying ground motion during earthquakes, with variations in soil properties leading to spatial variability in ground shaking. The research focuses on understanding how soil characteristics such as shear wave velocity, density, and composition affect seismic wave propagation and amplification. Geotechnical investigations involve soil sampling, laboratory testing, and geophysical surveys to characterize soil properties at the study site. Seismic data from historical events and simulated ground motions are analyzed to correlate amplification effects with soil types and geological features. Preliminary findings suggest that certain soil types, such as loose or soft soils, tend to amplify ground shaking more than stiffer soils. The study aims to quantify the extent of amplification and identify key factors contributing to soil-induced seismic hazards. By integrating geotechnical and seismic analyses, this research aims to improve our understanding of soil-structure interaction and its implications for earthquake resilience. The findings will contribute to more accurate seismic hazard assessments and informed infrastructure design in earthquake-prone regions.*

**Keywords:** Earthquakes, Seismic, Soil Conditions