



## Performance Based Seismic Design of Structures by Considering Local Site Effects

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### Abstract

The magnitude of earthquakes occurring over the years have proven to be a major threat to the sustainability of new structures as well as preservation of old historic structures. Structures such as hospitals need to be in working conditions even after an earthquake. Due to this, developing countries are emphasizing the need for Earthquake Risk Assessment (ERA) in order to prepare a structure from the incoming forces of an earthquake. Past history has evidence of severe damage during earthquake due to amplification of ground motion to the places which has been far from the epicenter. In view of such events, the two components of ERA, namely, Ground response analysis (GRA) and Performance Based Seismic Design (PBSD), were developed. GRA is primarily concerned with predicting overall regional earthquake response without much highlighting the behaviour at specific locations while PBSD gives a realistic analysis of the structural response when subjected to a generalized earthquake ground motion. PBSD procedure confirms that the structure has obtained desired performance levels based on FEMA guidelines. This paper focuses on some of the research work of GRA and PBSD concepts. A procedure to include GRA effects in seismic assessment performance of structures is presented. In this study, GRA is carried out for a specific site in Vasco (latitudes of 15°3982'N and longitude of 74°8113'E), a central city in the state of Goa. Seismic Performance is conducted for (G+8) RC frame building. Structure is designed as per IS 456:2000 and IS 1893 (Part 1):2016 criteria. Response spectrum analysis is used for seismic investigation. Response spectrum curves are generated using DEEPSOIL V7 software. The structure is subjected to multiple design performance criteria like the maximum lateral displacement of the RC frame, storey drift, base shear, support reactions and moments. Analysis was carried out using ETABS 20 software. The RC frame building is found to exhibit fully operational level of performance for different ground motions. The proposed structural design is conservatively sufficient in satisfying the required performance levels.

**Keywords:** ETABS, DEEPSOIL, GRA, PBSD