

Study of Shear Wave Velocity in Upper 100' of Sites in Greater Charleston Area

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Extended Abstract

The Charleston, South Carolina experienced the largest earthquake on the US East Coast, a Magnitude 7.0 event on August 31, 1886. This earthquake killed approximately 125 people¹, damaged thousands of buildings and caused several liquefaction. The greater Charleston region is home to approximately 700000 people and is the eight largest port in the US. When factors such as high population density and a large number of critical facilities are considered, it becomes apparent that accurate seismic assessment are desirable in the greater Charleston region. In addition, the sites in greater Charleston region have soil profiles that do not conform to the profile used to develop the National Earthquake Hazards Reduction Program (NEHRP) site factors. The NEHRP site factors are based upon the shear wave velocity over the top 30 meters (100 ft) of the site (V_{s30}).

Two Citadel undergraduate students have investigated the V_{s30} profiles of the sites in the greater Charleston region. The V_{s30} is a key parameter in predicting liquefaction and ground shaking². One goal of the study was to compile subsurface geotechnical data from local consulting firms and to estimate V_{s30} . Two different methods were employed to estimate V_{s30} at various sites in greater Charleston region. The results of the two methods were very comparable. The GIS software was used to develop maps illustrating the V_{s30} at the various sites in the study area. Another goal of the study was to investigate the effects of V_{s30} on seismic site response. The computer program SHAKE2000³ was employed to study the site response at the various locations. Results of the site response investigation suggest that the use of NEHRP site factors may not be appropriate for the sites in Charleston, South Carolina.

References

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3. Ordonez, G., User's Manual: SHAKE 2000, A Computer Program for the 1-D Analysis of Geotechnical Earthquake Engineering Problems. GeoMotions, LLC, Lacey, WA, 2007.