

A PLAN TOWARD SEISMIC MICROZONATION OF THE WESTERN COAST OF SAUDI ARABIA

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ABSTRACT

The study was mainly aimed at site-specific seismic zonation of selected cities located on the western coast of the Kingdom of Saudi Arabia (KSA). These cities are Haql, Yanbu, Jeddah, Jizan, and Al-Wajh. Thorough investigations were made toward the study: a) Collection of large geotechnical data of soil tests for the cities of Yanbu, Jeddah, and Jizan, b) Drilling 5 boreholes for soil investigations and standard penetration tests in each city of Haql and AlWajh, c) Vertical Electrical Sounding (VES) measurements at 5 sites in each city to define the groundwater and depth to the bedrock, and d) Shear wave velocity (SWV) profiling at 8-14 sites in each city.

The analytical part of the study involved systematic incorporation of earthquakes, geotechnical and geophysical data into development of the seismic site-specific parameters. These included, definition of the site-soil profiles and the corresponding seismic coefficients which are related with the seismic zone of the respective city and liquefaction potential. The prevalent soil profiles of the cities studied can be described as follows:

Majority of the tested sites in both Haql and Al-Wajh, and all tested sites in both Yanbu, and Jeddah, were classified as very dense and soft rock profiles with seismic site-soil category SC. The seismic coefficients which are associated with the seismic zone of the respective city were suggested accordingly. All sites tested in Sabkha terrains in Jizan, while one location each in Haql and AlWajh were found to be susceptible to liquefaction. Therefore, seismic coefficients recommended for these sites were based on site-soil category SE rather than soil category SD as determined solely based on SWV results. These coefficients were recommended for the standard buildings. However, the buildings which are classified as special or essential in the seismic design code, require geotechnical site-specific evaluation, to check for softer soil category (SF).

It is believed that the outcome of this study can be considered as an initiative step toward the seismic microzonation of the cities studied. Experts in many countries consider the seismic microzonation mapping based on site-specific soil conditions as the most essential element for their urban land use management plans and seismic risk reduction programs.