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THE LIQUEFACTION POTENTIAL OF HARBOR ISLAND

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by
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ABSTRACT

A study was made of the liquefaction potential of a man-made island in San Diego, California, constructed primarily of hydraulic fill. The available data from soil borings on Harbor Island, as well as information regarding the construction of the island, were compiled and analyzed to determine the subsurface soil conditions. The blow count data were reduced to eliminate clayey soils, then corrected for effective overburden pressure, sampler type, drill rod length, and silt content. The data were further reduced to eliminate values beyond 2.5 standard deviations from the mean. Cumulative frequency distribution curves were then plotted for the remaining data points, from which the median N_1 (corrected) values were obtained for each of six soil groups.

An evaluation of seismic condition and seismic exposure analysis of Harbor Island were contributed to the study by Woodward-Clyde Consultants. The results of the seismic exposure analysis, which was performed using the SEEP computer program, provided a graph showing the probability in a period of 50 years of exceedance of peak ground acceleration for all the faults that were determined to affect the seismicity of the site, and a graph showing the mean annual number of events in which the peak ground acceleration exceeds a given critical peak acceleration value.

Using boundary curves developed by Seed for evaluating the liquefaction potential of any site in terms of modified standard

penetration resistance and cyclic stress ratio, site-specific curves for Harbor Island were developed by converting cyclic stress ratio to critical peak ground acceleration. Based on a method developed by Woodward-Clyde Consultants, the results of the seismic exposure analysis of the site were then combined with the liquefaction susceptibility of the soils at Harbor Island to develop an estimate of the probability of liquefaction in a period of 50 years.

The results of the study indicate that by the procedures used, the probability of some form of liquefaction occurring at the site in a period of 50 years appears to be higher for the Sheraton Hotel area (0.26 to 0.55) than for the rest of the island (0.13 to 0.26). This conclusion would be consistent with the fact that the Sheraton Hotel area was constructed in a different manner and with different material than the rest of Harbor Island. However, due to the fact that over 60 percent of the data for this study are from the Sheraton Hotel site, and the fact that the actual volume of data obtained from the rest of the island is relatively small, positive conclusions cannot be drawn regarding the similarity or dissimilarity of the Sheraton site conditions to the rest of the island from the data alone. Based on a review of construction photographs, the method of construction of the island, and discussions with the project engineer at the time of construction, it is the author's opinion that the data from the sites other than the Sheraton are representative of the

subsurface conditions for the entire island excluding the Sheraton Hotel area, but more data would be required to substantiate this position.

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