

RESPONSE SPECTRA FROM AFTERSHOCKS OF THE MANAGUA 1972 EARTHQUAKE

by

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Following the December 23, 1972, earthquake that destroyed Managua, a seismic array of L-7 velocity systems was deployed at 18 sites throughout the city to record aftershocks. The objective was to acquire broad-band data which could be used for studying soil amplification, structural response, soil-structure interaction, and for estimating the main event response spectra. This type of research is of importance in earthquake engineering (1, 2). The data used in this study were obtained at 6 locations in Managua and at a station located 13 km away. Pseudo relative velocity (cm/sec) spectra, Fig. 1a, were derived from 11 aftershocks, ranging in magnitude (M_s) from 0.9 to 2.3, recorded simultaneously at each location. Also, background spectral noise levels were determined. Analysis of these data showed that: 1) the ground motion level varied significantly within Managua and was probably greater at Banco Central than at the Esso Refinery (the site which recorded the main shock), 2) there is an amplification of 2 between the ratios at two stations 3 km apart, 3) the far-field to Banco Central spectral ratios show no significant amplification effects, Fig. 1b, on the vertical component, but exhibit an amplification of 2 on the horizontal components, 4) the spectral values at Banco Central are higher than at Banco America, 5) the ratios between the top floor to the basement recordings at Banco Central show a peak near 2 sec., Fig. 1c; and 6) simulation of the Banco Central response by means of a hybrid computer produced results which compare favorably with theory and observed data. Spectral evaluation such as these can be used (1, 2) for defining local variations in ground motion and possible ground amplification (1, 2) effects which correlate with damage and the lithological units under the recording stations.

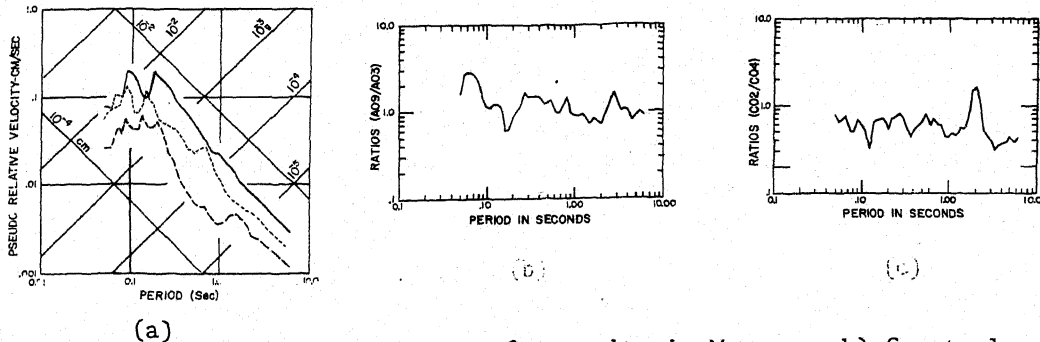


Fig. 1a) Aftershock response spectra for a site in Managua; b) Spectral ratios of far-field to Banco Central sta., and c) Banco Central upper floor to basement.

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