# Site Effect and Expected Seismic Performance of Buildings in Palestine "Case study: Nablus and Ramallah cities"

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Local site effect: Landslides, liquefaction, amplification and faulting systems play very important roles on the intensity of earthquakes. Earthquake- resistant design of new structures and evaluation of the seismic vulnerability of existing buildings involves prediction of their response to site ground motions.

Historical references to the correlation between earthquake damage and local site condition extend back nearly 200 years. Provisions that specifically accounted for local site conditions didn't appear in building codes, however until the early 1970. The local site effect can be illustrated by the following: simple theoretical ground response analysis, measurements of actual surface, by subsurface motions at the same site, and by measurements of ground surface motions from sites with different subsurface conditions.

The effects of local geology on ground-motion amplification and building damage were studied in Palestine-West Bank. Nakamura's method of microtremor analysis was applied in this study. The measurements showed significantly higher amplification in the frequency range of building vulnerability in different parts of Nablus city. This finding is consistent with the distribution of the earthquake damage grades in the urban areas struck by the 11 February 2004 earthquake (ML= 5.2) with a focal depth of 17 km beneath the northeastern part of the Dead Sea Basin. Quite large differences in amplification between around 1 and 9 were computed between the eastern and western rims of the city. The downtown built in the central part of the city on soft clay, marl and valley deposits, whereas the northern and southern parts of urban areas in Nablus city lying on mountains consist of consolidated carbonates bedrock. In the central part of the city and at the rims, where the thickness of fluvial deposits and soft formations is about 15 m, amplifications between 6.74 and 8.67 for dominant natural period range of 0.8 - 1.1 sec were obtained. On the southern and northern mountains, which are located on limestone rocks covered with a thin layer of soil, the amplification in the same frequency range was low.

Calculating the natural period of the existing common buildings (Tb) in the studied area (buildings with 1012-stories), by using the dynamic analysis method. The values of Tb obtained were much closed to the site dominant natural period (Ts).

The findings of this study indicate that the expected differences in damage grades for urban areas in Nablus city could be attributed to variations in the thickness and physical properties of Tertiary-Ouaternary sediments, which appear to be rather heterogeneous. In addition to the

site effect amplification, the geology of Nablus was the main reason behind several quite large landslides happened during ten years ago in different part of the city (eg.White Mountain area). In Ramalalh City, on the other hand, the whole urban areas lying on mountains consist of consolidated carbonates bedrock, where the amplification was low