SEISMIC RESPONSES OF THE BASIN-FILL SEDIMENTS AND RC-BUILDINGS IN THE KATHMANDU VALLEY (NEPAL)

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Severe ground shaking, for about a minute relating to 25th April, 2015 Nepal-Gorkha earthquake was sufficient to cause heavy destruction in the Kathmandu valley. However, damages in the valley and adjacent areas were much less severe than was expected by an earthquake of this magnitude and rupture directivity. Kathmandu Valley being filled with fluvio-lacustrine sediments, the nature and thickness of which varies both laterally and vertically, these variations largely affects the soil fundamental frequencies. Still, the role of the valley infill and responses of the buildings are poorly understood. This study is intended toward a clear understanding between the subsurface geology and its interaction with the overlying building structure in the Kathmandu valley. Ambient noise measurements have been carried out at 39 soil sites and at the top of 28 RC-buildings along a N-S transect in the valley. Recordings were performed for 15 minutes at each site using a Lennartz LE-3D-5s seismometer connected to a City SharkII recorder. H/V spectral curves analyzed in 0.20 (Lennartz limit) – 25 Hz frequency band for the soil sites and in 1 – 25 Hz range for RC-buildings show no major possibilities of resonance effect in the valley. Few soil sites next to the river channels in the northern and southern part of the valley exhibit double resonance frequencies. A comparison has been made between experimental building fundamental frequency and theoretical frequency obtained from Nepal Building Code (NBC105). Height of the building is identified as a major factor governing the fundamental period (much more than the horizontal dimensions of the RC-building) and a linear relationship has been established between the height of the building and their fundamental period. Outcome of this research is a further step towards the understanding of the seismic behavior of valley sediments and the RC-buildings.