

Effects of near-surface geology on earthquake ground motions in Selfoss

A. Hallgrímsson* and S. Sveinbjörnsson

Earthquake Engineering Research Center, University of Iceland, Austurvegur 2a, 800 Selfoss, Iceland

R. Sigbjörnsson

Earthquake Engineering Research Center, University of Iceland, Austurvegur 2a, 800 Selfoss, Iceland

The geology of the upper tens of meters can have a large impact on the earthquake ground motions recorded at the surface (local site effects) and can cause significant variations in shaking even within a small town. Instrumental ground motion data recorded on a dense temporary network of sensors at Selfoss, in the South Iceland Seismic Zone (SISZ), coupled with an analysis of available geological profiles for this town evidence significant local site effects. These site effects are generally due to the presence of thin low-velocity sedimentary layers underlying surface lava. The thickness of this sedimentary layer ranges from 1 to 7 m which causes variation in the effects (Imsland, 2002). Five earthquake events were recorded at four stations and analyzed. The fundamental frequencies derived for the Selfoss area range from 4 to 9.5 Hz and a rough map (Figure 1 displaying isofrequency lines) was developed.

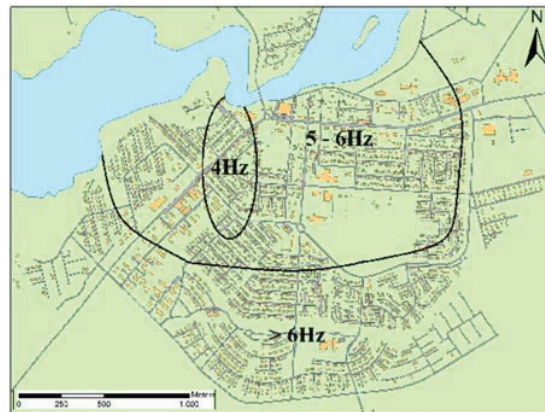


Figure 1: Contour map with respect to fundamental frequencies for sites scattered over Selfoss.

Based on the analysis the lower bound of amplification for ground motion ranges from 2 to just over 3. It is concluded that local site effects are measurable and vary greatly within Selfoss, even over short distances.

References

Imsland, P. 2002 (February). *Borun í bakka Ölfusár í janúar 2002: Stutt greinargerð*. Tech. rept. Árborg.

*e-mail: akh11@hi.is. url: <http://www.eerc.hi.is>