World Academy of Science, Engineering and Technology
International Journal of Structural and Construction Engineering
Vol:12, No:04, 2018

Finite Element-Based Stability Analysis of Roadside Settlements Slopes from Barpak to Yamagaun through Laprak Village of Gorkha, an Epicentral Location after the 7.8Mw 2015 Barpak, Gorkha, Nepal Earthquake

Authors : N. P. Bhandary, R. C. Tiwari, R. Yatabe

Abstract : The research employs finite element method to evaluate the stability of roadside settlements slopes from Barpak to Yamagaon through Laprak village of Gorkha, Nepal after the 7.8Mw 2015 Barpak, Gorkha, Nepal earthquake. It includes three major villages of Gorkha, i.e., Barpak, Laprak and Yamagaun that were devastated by 2015 Gorkhas' earthquake. The road head distance from the Barpak to Laprak and Laprak to Yamagaun are about 14 and 29km respectively. The epicentral distance of main shock of magnitude 7.8 and aftershock of magnitude 6.6 were respectively 7 and 11 kilometers (South-East) far from the Barpak village nearer to Laprak and Yamagaon. It is also believed that the epicenter of the main shock as said until now was not in the Barpak village, it was somewhere near to the Yamagaun village. The chaos that they had experienced during the earthquake in the Yamagaun was much more higher than the Barpak. In this context, we have carried out a detailed study to investigate the stability of Yamagaun settlements slope as a case study, where ground fissures, ground settlement, multiple cracks and toe failures are the most severe. In this regard, the stability issues of existing settlements and proposed road alignment, on the Yamagaon village slope are addressed, which is surrounded by many newly activated landslides. Looking at the importance of this issue, field survey is carried out to understand the behavior of ground fissures and multiple failure characteristics of the slopes. The results suggest that the Yamgaun slope in Profile 2-2, 3-3 and 4-4 are not safe enough for infrastructure development even in the normal soil slope conditions as per 2, 3 and 4 material models; however, the slope seems quite safe for at Profile 1-1 for all 4 material models. The result also indicates that the first three profiles are marginally safe for 2, 3 and 4 material models respectively. The Profile 4-4 is not safe enough for all 4 material models. Thus, Profile 4-4 needs a special care to make the slope stable.

Keywords : earthquake, finite element method, landslide, stability
Conference Title : ICCSEE 2018 : International Conference on Civil, Structural and Earthquake Engineering
Conference Location : London, United Kingdom
Conference Dates : April 24-25, 2018