Liquefaction Vulnerability Assessment in Low-Seismic Regions: A Chiang Rai, Thailand Case Study

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ABSTRACT

The liquefaction concerns of the foundation ground in urban zones of Chiang Rai arises from a prior instance of liquefaction occurring in remote northern Thailand in 2011. Most areas are underlain by clayey sand deposits from paleochannels, which are highly susceptible to liquefaction. Therefore, this study aims to raise awareness regarding the risk of liquefaction in densely populated areas of Chiang Rai. To evaluate the likelihood of liquefaction, this research conducted Standard Penetration Tests on newly-installed boreholes and assessed the liquefaction potential through a simplified procedure analysis and finite element method. The study examines two earthquake scenarios associated with 10 percent and 2 percent probabilities of exceedance in a 50-year period. In summary, both analysis methods consistently indicate the possibility of liquefaction in Chiang Rai, specifically in the shallow layers of loose sand. Additionally, the variations in the type and sequence of soil deposits have a significant influence in the liquefaction risk. By incorporating geotechnical data obtained from the boreholes, this research substantially lessens the uncertainty around the liquefaction evaluation of these areas.

Keywords: Liquefaction potential, Site investigation, Chiang Rai

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