



Development of Soil Distribution and Liquefaction Potential Maps for Downtown Area in Yangon, Myanmar

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Abstract

The problem of soil against liquefaction during earthquakes is devastating geotechnical phenomenon. Soil against liquefaction is generally occurred in loose cohesionless saturated soil when pore water pressure increases suddenly due to earthquakes and shear strength of the soil decreases to zero. Yangon area has been chosen as the study area because it is the most populated and largest city in Myanmar and located in low to medium seismicity region. In this purpose, the liquefaction potential map have been prepared for site planners and decision makers to prevent loss of lives. Geographic Information System (GIS) is very useful in decision making about the area subjected to liquefaction. ArcGIS software is used to develop the liquefaction potential maps of the selected area in Yangon City. To perform in this study, the field borehole data for groundwater table, Standard penetration test (SPT), blow counts, dry density, wet density and fine content, etc. have been collected from the downtown area of this city. Firstly, the safety factor of soil liquefaction is computed by using NCEER (National Center of Earthquake Engineering Research, 1997) Method based on cyclic resistance ratio and cyclic stress ratio and then liquefaction Potential Index (LPI) values are determined using Luna and Frost Method, 1998. Finally, liquefaction potential maps are developed corresponding to the ground motions for annual probability of exceedance equal to 1%, 2% and 10% in 50 years.

Keywords: Liquefaction Potential Index; Geographic Information System (GIS); Yangon City; Liquefaction Potential Map; Earthquake; SPT Data.

1. Introduction

In the past decades, a huge amount of subsurface information has been incorporated in urban and rural area in many countries for various purposes such as disaster mitigation, infrastructure development and construction of high rise building. In the urban area, the underground condition below the Earth's surface operates the cost and feasibility of the construction projects from the aspects of physical properties of the foundation soil, depth of groundwater, and susceptibility of subsoil to liquefaction etc. Geotechnical database plays a significant role to investigate regional subsoil condition [4]. Sub-surface information is presented in various forms such as borehole logs, soil cross sections, soil test data sheets, geotechnical investigation reports, topographic maps, geological maps, and underground structure details. Seismic soil liquefaction continues to be a challenging problem, and attracts considerable attention from researchers all around the world. Liquefaction is one of the main effects of an earthquake that is responsibility to structural failure and damage to roads, pipelines and infrastructures [2]. It is one of the most serious geotechnical problems of public concern. For the study of subsurface geology, the generation of a geological database is important which can be done by the collection of borehole data.

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