

INTISARI

Candi Prambanan terletak di Daerah Istimewa Yogyakarta merupakan salah satu candi terindah di dunia dan telah ditetapkan sebagai salah satu warisan budaya dunia (*World Heritage*) oleh UNESCO pada tahun 1991. Salah satu potensi *geohazard* yang ada di wilayah Candi Prambanan adalah gempa bumi. Hal ini karena secara geologis Candi Prambanan berada di atas sesar aktif yang sering disebut dengan patahan Opak. Secara geoteknik, kondisi lapisan tanah di Candi Prambanan adalah pasir halus dan seragam, sehingga ada kemungkinan ditemukan potensi likuifaksi, apabila menerima beban gempa. Penelitian ini bertujuan untuk mengetahui kondisi tanah dasar fondasi Candi Prambanan terhadap potensi likuifaksi.

Analisis potensi likuifaksi di Kawasan Candi Prambanan menggunakan metode semi empiris yaitu perbandingan *cyclic stress ratio* dan *cyclic resistance ratio* dengan data dari hasil uji lapangan yaitu *Standard Penetration Test*. Perhitungan nilai *peak ground acceleration* dilakukan dengan menggunakan berbagai macam formula empiris. Parameter ancaman likuifaksi yang digunakan berdasarkan *Liquefaction Potential Index*, *Liquefaction Risk Index* dan *Liquefaction Severity Index*.

Dari hasil analisis tampak bahwa nilai *peak ground acceleration* berdasar gempa Yogyakarta 2006 dengan magnitude 6,3 SR adalah 0,216g. Atas dasar tersebut kondisi eksisting Candi Prambanan dengan muka air tanah pada kedalaman -12 meter aman terhadap ancaman likuifaksi. Bilamana terjadi gempa dengan kekuatan lebih besar dari gempa Yogyakarta 2006, dengan PGA sebesar 0,3 – 0,4g dan muka air dangkal (-1 meter), maka dapat berpotensi terjadi likuifaksi.

Kata Kunci : Likuifaksi, *Cyclic Stress Ratio* (CSR), *Cyclic Resistance Ratio* (CRR), *peak ground acceleration*, Candi Prambanan

ABSTRACT

Prambanan Temple situated on Special District of Yogyakarta is one of the beautiful temples in the world and stated by UNESCO as one of the world heritages in 1991. One geohazard potential in this temple area is earthquake. It is because the temple is located geologically on the active fault often called as Opak fault. Geotechnically, the condition of soil layers in the temple are fine grained and uniform sand, thus it may be found any liquefaction potential if it receives quake load. This study aimed to determine the condition of Prambanan Temple subgrade against liquefaction potential.

The analysis of the study used semi-empirical methods namely cyclic stress ratio (CSR) and cyclic resistance ratio (CRR) with result data of the field test that is Standard Penetration Test (SPT). Calculation of the peak ground acceleration (PGA) value was conducted by using various empirical formulas. Liquefaction risk parameters applied were based on Liquefaction Potential Index (LPI), Liquefaction Risk Index (LRI), and Liquefaction Severity Index (LSI).

From the analysis result, we can see that the PGA value according to the earthquake happened in Yogyakarta in 2006 with magnitude 6,3 Richter Scale (RS) was 0.216 g. Based on this fact, the existing condition of the temple with water table -12 m deep was safe from liquefaction risk. When there was any earthquake might exist with the greater power than the Yogyakarta earthquake in 2006, with PGA 0.3 – 0.4 g and phreatic head (-1 meter), it could occur liquefaction potential.

Key Words : Liquefaction, Cyclic Stress Ratio, Cyclic Resistance Ratio, Peak Ground Acceleration, Prambanan Temple