

INTISARI

Sulawesi Utara didominasi pola tektonik subduksi di lempeng Laut Sulawesi (subduksi Minahasa), Sangehe, dan Halmahera yang tergolong masih aktif. Likuefaksi merupakan fenomena terjadinya perubahan kondisi tanah pasir padat yang jenuh air kemudian berperilaku seperti cairan akibat meningkatnya tekanan air pori disebabkan adanya beban dinamik. Potensi likuefaksi lebih besar terjadi di wilayah kawasan pantai akibat jenis tanah berpasir dan elevasi muka air tanah yang dangkal. Likuefaksi dapat menimbulkan efek penurunan tanah (*settlement*) dan berkurangnya kemampuan fondasi untuk menopang beban konstruksi. Mendasari hal tersebut maka Kawasan Pantai Malalayang yang berada di Kota Manado, Sulawesi Utara dipilih sebagai objek penelitian untuk menganalisis kemungkinan likuefaksi yang dapat terjadi disana dan dampaknya.

Penelitian diawali dengan mengumpulkan data-data pengujian boring untuk mendapatkan nilai N-SPT, tipe lapisan tanah, data pengujian lab untuk mendapatkan data properties tanah, elevasi muka air tanah, serta data gempa seperti momen magnitudo dan percepatan gempa maksimum (*PGA*) sesuai lokasi penelitian. Analisis potensi likuefaksi menggunakan metode *Simplified Procedure* dan *Liquefaction Potential Index*. Untuk analisis penurunan tanah menggunakan metode analitik dibandingkan dengan metode komputasi. Selain itu dilakukan pula analisis penurunan daya dukung tiang pancang memanfaatkan metode Meyerhof.

Berdasarkan analisis likuefaksi yang dilakukan pada lima lokasi *borehole* didapatkan bahwa titik MLY-BH-01 berpotensi likuefaksi tinggi dan MLY-BH-05 berpotensi likuefaksi sangat tinggi. Hasil analitik dan komputasi menghasilkan nilai yang seragam yakni titik MLY-BH-01 mempunyai klasifikasi tingkat kerusakan sangat rendah sedangkan titik MLY-BH-05 menghasilkan klasifikasi tingkat kerusakan tinggi. Pada kondisi likuefaksi terjadi penurunan daya dukung tiang fondasi hingga sebesar 13,96% pada titik MLY-BH-05. Penurunan daya dukung ini terjadi akibat hilangnya tahanan selimut tiang di lapisan yang terlikuefaksi.

Kata Kunci: Likuefaksi, N-SPT, Penurunan Tanah, Daya Dukung Fondasi

ABSTRACT

North Sulawesi is dominated by the tectonic pattern of Sulawesi Sea plate subduction (Minahasa subduction), Sangihe and Halmahera which are still active. Liquefaction is a phenomenon of density transformation from dense sand soil which is saturated with water and then turned into a liquid due to increased pore water pressure caused by dynamic loads. The liquefaction potential is more significant in beach areas due to sandy soil types and shallow groundwater elevations. Liquefaction can cause settlement effects and reduce the foundation's ability to support construction loads. Based on this, the Malalayang Beach Area in Manado City, North Sulawesi was chosen as the object of research to analyze the possibility of liquefaction that can occur there and its impact.

The research begins by collecting boring test data to obtain N-SPT values, soil layer types, lab test data to obtain soil property data, groundwater level elevation, and earthquake data such as moment magnitude and peak ground acceleration (PGA) according to the research location. Analysis of liquefaction potential uses the Simplified Procedure method and the Liquefaction Potential Index. For the analysis of settlement using analytical methods compared to computational methods. In addition, Meyerhof method was using as analysis of the reduction in the bearing capacity of the piles.

Based on liquefaction analysis conducted at five borehole locations, it was found that MLY-BH-01 has high liquefaction potential and MLY-BH-05 has very high liquefaction potential. Analytical and computational results produce similar values. MLY-BH-01 has a very low level of damage classification, while point MLY-BH-05 produces a high level of damage classification. During liquefaction conditions, the largest decrease in the bearing capacity of the foundation piles is 13.96% at point MLY-BH-05. This decrease in bearing capacity occurs due to the loss of skin friction in the liquefiable layer of soil.

Keyword: Liquefaction, N-SPT, Settlement, Bearing Capacity