PERENCANAAN DINDING PENAHAN TANAH KANTILEVER DENGAN MENGGUNAKAN PROGRAM PLAXIS

(Studi Kasus : Jalan Kumudasmoro Kelurahan Gisikdrono Kota Semarang)

Oleh :

Muhamad Ari Syafi'i [1)], Muhamad Muzaki Rohman [2)], Soedarsono [3)], Pratikso [4)]

Abstrak

Terjadi tanah longsor di jalan Kumudasmoro kelurahan Gisikdrono Kota Semarang. Pada tanggal 2 november 2019 sekitar pukul 07.00 wib sebuah dinding penahan tanah setinggi 10 m runtuh dikarenakan hujan mengkibatkan longsor sepanjang 20 m. Longsor tebing mengakibatkan 3 rumah warga rusak namun tidak ada korban jiwa, oleh karena itu penelitian ini bertujuan untuk perencanaan dinding penahan tanah dengan stabilitas yang aman.

Dalam penelitian ini, penulis melakukan pengujian sampel tanah dengan jenis pengujian *soil test, direct shear test* dan *sieve analysis*. Perencanaan dinding penahan tanah menggunakan tipe kantilever dilakukan dengan memperhitungkan faktor keamanan stabilitas terhadap gaya pergeseran, stabilitas terhadap gaya penggulingan, dan stabilitas terhadap daya dukung tanah menggunakan perhitungan manual dan program *Plaxis.*

Metode perhitungan menggunakan data tanah hasil pengujian laboratorium dengan sampel tanah pada kedalaman 0-1,7 m dida patkan data tanah γ_{sat} 16,06 kN/m^3; γ_{unsat} 15,282 kN/m^3; kohesi (c) 9 kN/m^2; sudut geser dalam (ø) 35°, kedalaman 1,7-4,2 m didapatkan data tanah γ_{sat} 14,812 kN/m^3; γ_{unsat} 13,381 kN/m^3; kohesi (c) 16 kN/m^2; sudut geser dalam (ø) 37°, kedalaman 4,2-5,5 m didapatkan data tanah γ_{sat} 12,714 kN/m^3; γ_{unsat} 10,319 kN/m^3; kohesi (c) 22 kN/m^2; sudut geser dalam (ø) 42°, kedalaman 5,5-10 m didapatkan data tanah γ_{sat} 13,026 kN/m^3; γ_{unsat} 10,314 kN/m^3; kohesi (c) 15 kN/m^2; sudut geser dalam (ø) 45°. Hasil stabilitas lereng existing menggunakan program *Plaxis* dengan cara meningkatkan muka air tanah secara bertahap dari kondisi kering hingga mencapai keruntuhan didapatkan SF(*safety factor*) sebesar 1,37<1,5(tidak aman) dan dalam kondisi muka air tanah semakin tinggi didapatkan SF(*safety factor*) yang semakin menurun mengidentifikasikan kodisi lereng tidak aman. Kemudian merencanakan dinding penahan tanah tipe kantilever yang mampu menahan kondisi muka air tanah setinggi 10 m dari dasar lereng. Perhitungan manual didapatkan hasil stabilitas terhadap gaya geser 1,56>1,5 (aman), stabilitas terhadap gaya penggulingan 1,65>1,5 (aman), stabilitas terhadap daya dukung tanah 3,04>3 (aman) dan nilai stabilitas dari program *Plaxis* didapatkan SF 1,63>1,5 (aman). Besi tulangan yang digunakan untuk tulangan vertical D25-100, tulangan horizontal D22-200, Tulangan montase D22-200.

Kata kunci : Dinding penahan tanah , kantilever, program *Plaxis*

DESIGN OF CANTILEVER RETAINING WALL BY USING PLAXIS PROGRAM

***(case study :** Kumudasmoro street Gisikdrono,Semarang City)*

By

Muhamad Ari Syafi'i [1)], Muhamad Muzaki Rohman [2)], Soedarsono [3)], Pratikso [4)]

Abstract

Landslide in Kumudasmoro street Gisikdrono,Semarang City On November 2 2019 at around 07.00 WIB a 10 m high retaining wall collapsed due to rain resulting in a 20m long landslide. The cliff landslide caused 3 houses to be damaged but no casualties. Therefore, this study aims to design a retaining wall with safe stability.

In this study, the authors tested soil samples with the type of soil test, direct shear test and sieve analysis. The planning of retaining walls using cantilever type is carried out by taking into account safety factors of stability against shear forces, stability to overturning forces, and stability to the bearing capacity of the soil using manual calculations and the Plaxis program.

The calculation method uses soil data from laboratory tests with soil samples at a depth of 0-1.7 m, and the soil data is γ_{sat} 16.06 kN / m^3; γ_{unsat} 15,282 kN / m^3; cohesion (c) 9 kN / m^2; inner shear angle (ø) 35 °, depth 1.7-4.2 m obtained soil data γ_{sat} 14.812 kN / m^3; γ_{unsat} 13,381 kN / m^3; cohesion (c) 16 kN / m^2; inner shear angle (ø) 37 °, depth 4.2-5.5 m obtained soil data γ_{sat} 12.714 kN / m^3; γ_{unsat} 10,319 kN / m^3; cohesion (c) 22 kN / m^2; inner shear angle (ø) 42 °, depth of 5.5-10 m obtained soil data γ_{sat} 13.026 kN / m^3; γ_{unsat} 10,314 kN / m^3; cohesion (c) 15 kN / m^2; inner sliding angle (ø) 45 °. The results of the stability of the existing slopes using the Plaxis program by increasing the ground water level gradually from dry conditions to collapse were obtained SF (safety factor) of 1.41 <1.5 (unsafe) and in the higher ground water level, SF (safety factor) which decreases further identifies unsafe slope conditions. Then plan a cantilever type retaining wall that is able to withstand the ground water level as high as 10 m from the bottom of the slope. The manual calculation shows that the stability to the shear force is 1.57> 1.5 (safe), the stability against the rolling force is 1.65> 1.5 (safe), the stability of the soil bearing capacity is 3.07> 3 (safe) and the stability value From the Plaxis program, SF 1.65> 1.5 (safe). Reinforcement used for vertical reinforcement D25-100, horizontal reinforcement D22-200, Montage reinforcement D22- 200.

***Keywords**: Retaining wall, cantilever, Plaxis program.*