

**HUBUNGAN PARAMETER KUAT GESER DAN TEKAN BEBAS TANAH LEMPUNG VARIASI  
PENAMBAHAN LIMBAH *GYP SUM* DAN  
LIMBAH PLASTIK  
Studi Kasus Desa Banjarharjo, Kecamatan Kalibawang,  
Kabupaten Kulon Progo, Jawa Tengah**

Lidya Daryati Angeli Sagala<sup>[1]</sup> Adwiyah Asyifa<sup>[2]</sup>

[1] [2] Program Studi Teknik Sipil Fakultas Sains dan Teknologi  
Universitas Teknologi

<sup>[1]</sup>lidyasgl@gmail.com, <sup>[2]</sup>adwiyah.asyifa@staff.uty.ac.id

**ABSTRAK**

Pekerjaan infrastruktur konstruksi di bidang Teknik Sipil yang terjadi di lapangan berhubungan erat dengan struktur bangunan, salah satu aspek yang sangat penting yang merupakan tahap awal dalam memulai pembangunan adalah tanah pada yang berada di lokasi proyek konstruksi. Tujuan penelitian ini untuk menganalisis hubungan serta perbandingan variabel parameter kuat geser langsung terhadap kuat tekan bebas tanah lempung dari penggunaan serbuk limbah plastik dan limbah *gypsum* dalam bentuk serbuk dengan persentase 2%, 4% dan 6% terhadap peningkatan daya dukung tanah di desa Banjarharjo, kecamatan Kalibawang, kabupaten Kulon Progo, Jawa Tengah. Hasil penelitian didapatkan nilai daya dukung ultimate ( $q_u$ ) tertinggi diperoleh pada variasi penambahan limbah *gypsum* 10% ditambah dengan plastik 6% yaitu sebesar  $1,21 \text{ kg/cm}^2$  dari tanah asli sebesar  $0,63 \text{ kg/cm}^2$ . Terjadi penurunan pada variasi penambahan limbah *gypsum* 10% ditambah dengan plastik 2% sebesar  $0,60 \text{ kg/cm}^2$  dari tanah asli sebesar  $0,63 \text{ kg/cm}^2$ . Nilai sudut geser dalam pada tanah asli sebesar  $42,16^\circ$  dengan nilai kohesi ( $c$ ) sebesar  $0,18 \text{ kg/cm}^2$  serta mengalami penurunan akibat adanya penambahan pada variasi 2% dengan nilai sebesar  $25,585^\circ$  dan nilai kohesi ( $c$ )  $0,31 \text{ kg/cm}^2$ , pada variasi 6% terjadi penurunan kembali dengan nilai  $20,942^\circ$  dan kohesi  $0,35 \text{ kg/cm}^2$  Pada variasi 6% nilai sudut geser mengalami kenaikan sebesar  $34,070^\circ$  dengan nilai kohesi  $0,23 \text{ kg/cm}^2$ .

**Kata kunci:** *Limbah Gypsum, Limbah Plastik, Kuat Geser Langsung, Kuat Tekan Bebas; Tanah Lempung.*

**PARAMETER RELATIONSHIP OF SHEAR STRENGTH AND COMPRESSIVE FREE OF CLAY SOIL  
VARIATION OF ADDITION OF GYPSUM WASTE AND  
PLASTIC WASTE  
Case Study Of Banjarharjo Village, Kalibawang District,  
Kulon Progo Regency, Central Java**

Lidya Daryati Angeli Sagala<sup>[1]</sup> Adwiyah Asyifa<sup>[2]</sup>

[1] [2] Civil Engineering Study Program, Faculty of Science and  
Technology, University of Technology Yogyakarta

[1]lidyasgl@gmail.com, [2]adwiyah.asyifa@staff.uty.ac.id

**ABSTRACT**

*Construction infrastructure work in the field of Civil Engineering that occurs in the field is closely related to the structure of the building. One of the most important aspects which is the initial stage in starting construction is the land on the construction project site. The purpose of this study was to analyze the relationship and comparison of direct shear strength parameter variables to the free compressive strength of clay from the use of plastic waste powder and gypsum waste in powder form with a percentage of 2%, 4% and 6% of the increase in soil bearing capacity in Banjarharjo Village, District Kalibawang, Kulon Progo Regency, Central Java. The results showed that the highest qultimate bearing capacity ( $q_u$ ) was obtained in the addition of 10% gypsum waste plus 6% plastic, which was 1.21 kg/cm<sup>2</sup> from the original soil at 0.63 kg/cm<sup>2</sup>. There was a decrease in the variation of the addition of 10% gypsum waste plus 2% plastic of 0.60 kg/cm<sup>2</sup> from the original soil of 0.63 kg/cm<sup>2</sup>. The value of the internal shear angle in the original soil is 42.16 ° with a cohesion value (c) of 0.18 kg/cm<sup>2</sup> and has decreased due to the addition of a 2% variation with a value of 25.585° and a cohesion value (c) of 0.31 kg /cm<sup>2</sup>, at 6% variation there is a decrease again with a value of 20.942 ° and cohesion 0.35 kg/cm<sup>2</sup>. At 6% variation the value of shear angle increases by 34.070 ° with a cohesion value of 0.23 kg/cm<sup>2</sup>.*

**Keywords:** *Gypsum Waste, Plastic Waste, Direct Shear Strength, Free Compressive Strength; Clay.*