

LAMPIRAN

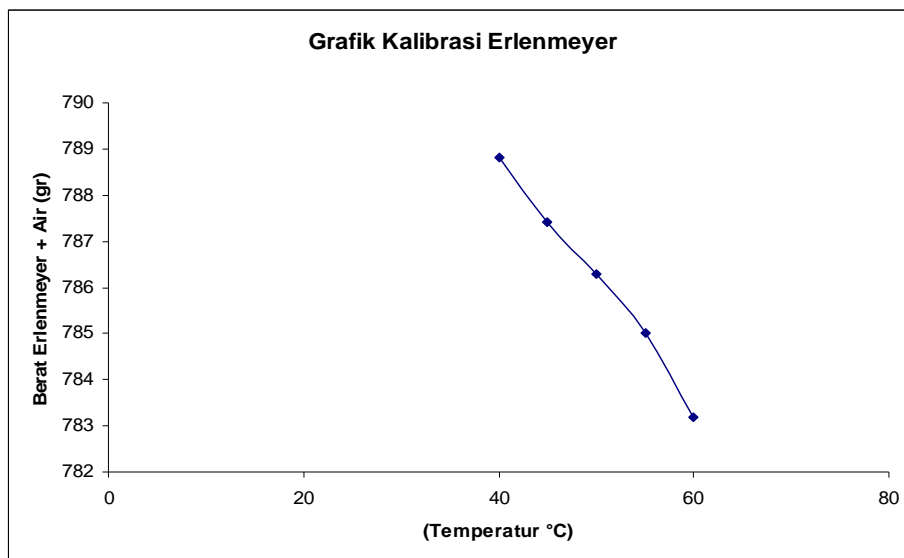
LAMPIRAN I

KALIBRASI ERLLENMEYER

Nama Instansi : Universitas Kristen Maranatha
Nama Proyek : Praktikum Tugas Akhir
Deskripsi Tanah : Pasir
Nama Operator : David Sulastro

Tabel L1.1 Kalibrasi Erlenmeyer

| No | Temperatur (°C) | Berat Erlenmeyer + Air ;W ₂ (gr) |
|----|-----------------|---|
| 1 | 60 | 783,2 |
| 2 | 55 | 785 |
| 3 | 50 | 786,3 |
| 4 | 45 | 787,4 |
| 5 | 40 | 788,8 |



Gambar L1.1 Grafik Kalibrasi Erlenmeyer

LAMPIRAN II SPESIFIC GRAFITY TEST

Nama Instansi : Universitas Kristen Maranatha
 Nama Proyek : Praktikum Tugas Akhir
 Deskripsi Tanah : Pasir
 Nama Operator : David Sulastro

Tabel L2.1 Data Spesific Grafity Test

| No | 1 | 2 | 3 | 4 | 5 |
|---|--------|--------|--------|--------|--------|
| Berat Erlenmeyer + Air + Tanah ; W_1 (gr) | 841,4 | 843,2 | 844,5 | 845,9 | 847,1 |
| Temperatur ; T (°C) | 60 | 55 | 50 | 45 | 40 |
| Berat Erlenmeyer + Air ; W_2 (gr) | 783,2 | 785 | 786,3 | 787,4 | 788,8 |
| G_t | 0,9832 | 0,9857 | 0,9881 | 0,9902 | 0,9922 |
| G_s | 2,68 | 2,65 | 2,66 | 2,69 | 2,68 |

| | |
|---------------------------------|-------|
| Berat Wadah + Tanah Kering (gr) | 296,8 |
| Berat Wadah (gr) | 204,6 |
| Berat Tanah Kering ; W_s (gr) | 92,6 |

$$G_s = \frac{G_t \times W_s}{W_2 - W_1 + W_s}$$

$$G_s \text{ rata-rata} = 2,67$$

LAMPIRAN III
ILUSTRASI KALIBRASI ERLLENMEYER



Gambar L3.1 Alat Uji Kalibrasi Erlenmeyer

LAMPIRAN IV

DIRECT SHEAR TEST

PENGUKURAN AWAL

Soil Sample

Pasir Lolos #20

Berat = 100 gr

Shear Box

Diameter ,d = 63 mm Luas = 31,17 mm²

Tinggi, h = 10 mm Volume = 62,35 mm³

Tebal = 1,295 mm

Berat = 795,6 gr

Data Hasil Uji Direct Shear

Tabel L4.1 Data Direct Shear Untuk Normal Stress 0,1 kg/cm²
 NORMAL STRESS : 0,1 kg/cm² RING CONSTANT : 0,13 kg/div

| Horizontal Dial (div) | Strain % | Prov.Ring Dial (div) | Shear Force (kg) | Shear Stress (kg/cm ²) |
|-----------------------|----------|----------------------|------------------|------------------------------------|
| 10 | 0,4031 | 4 | 0,520 | 0,016683 |
| 20 | 0,8063 | 7 | 0,910 | 0,029195 |
| 30 | 1,2095 | 9 | 1,170 | 0,037536 |
| 40 | 1,6126 | 12 | 1,560 | 0,050048 |
| 50 | 2,0158 | 15 | 1,950 | 0,062560 |
| 60 | 2,4190 | 16,4 | 2,132 | 0,068399 |
| 70 | 2,8222 | 16,4 | 2,132 | 0,068399 |
| 80 | 3,2254 | 16 | 2,080 | 0,066731 |
| 90 | 3,6285 | 15,5 | 2,015 | 0,064645 |
| 100 | 4,0317 | 15,2 | 1,976 | 0,063394 |
| 110 | 4,4349 | 14 | 1,820 | 0,058389 |
| 120 | 4,8381 | 13 | 1,690 | 0,054219 |

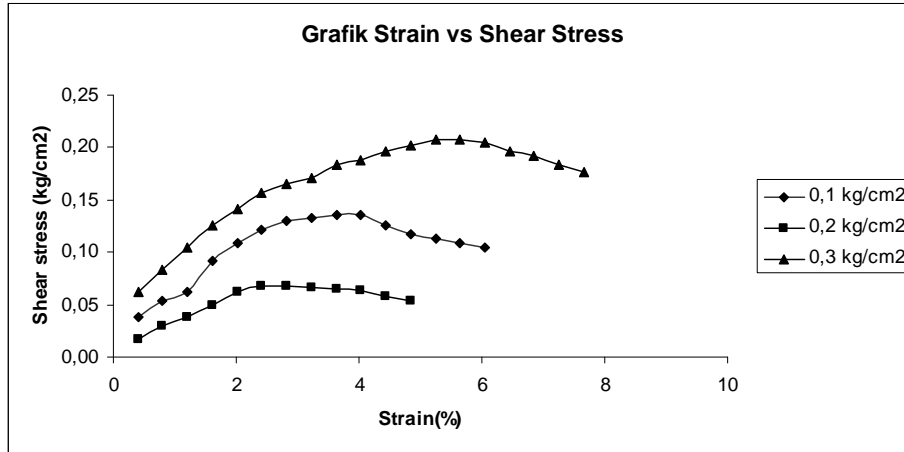
Tabel L4.2 Data Direct Shear Untuk Normal Stress 0,2 kg/cm²
 NORMAL STRESS : 0,2 kg/cm² RING CONSTANT : 0,13 kg/div

| Horizontal Dial (div) | Strain % | Prov.Ring Dial (div) | Shear Force (kg) | Shear Stress (kg/cm ²) |
|-----------------------|----------|----------------------|------------------|------------------------------------|
| 10 | 0,4031 | 9 | 1,17 | 0,037536 |
| 20 | 0,8063 | 13 | 1,69 | 0,054219 |
| 30 | 1,2095 | 15 | 1,95 | 0,062560 |
| 40 | 1,6126 | 22 | 2,86 | 0,091755 |
| 50 | 2,0158 | 26 | 3,38 | 0,108438 |
| 60 | 2,4190 | 29 | 3,77 | 0,120950 |
| 70 | 2,8222 | 31 | 4,03 | 0,129291 |
| 80 | 3,2254 | 32 | 4,16 | 0,133462 |
| 90 | 3,6285 | 32,5 | 4,23 | 0,135547 |
| 100 | 4,0317 | 32,5 | 4,23 | 0,135547 |
| 110 | 4,4349 | 30 | 3,90 | 0,125120 |
| 120 | 4,8381 | 28 | 3,64 | 0,116779 |
| 130 | 5,2413 | 27 | 3,51 | 0,112608 |
| 140 | 5,6444 | 26 | 3,38 | 0,108438 |
| 150 | 6,0476 | 25 | 3,25 | 0,104267 |

Tabel L4.3 Data Direct Shear Untuk Normal Stress 0,3 kg/cm²
 NORMAL STRESS : 0,3 kg/cm² RING CONSTANT : 0,13 kg/div

| Horizontal Dial (div) | Strain % | Prov.Ring Dial (div) | Shear Force (kg) | Shear Stress (kg/cm ²) |
|-----------------------|----------|----------------------|------------------|------------------------------------|
| 10 | 0,4031 | 15 | 1,950 | 0,062560 |
| 20 | 0,8063 | 20 | 2,600 | 0,083414 |
| 30 | 1,2095 | 25 | 3,250 | 0,104267 |
| 40 | 1,6126 | 30 | 3,900 | 0,125120 |
| 50 | 2,0158 | 34 | 4,420 | 0,141803 |
| 60 | 2,4190 | 37,5 | 4,875 | 0,156400 |
| 70 | 2,8222 | 39,5 | 5,135 | 0,164742 |
| 80 | 3,2254 | 41 | 5,330 | 0,170998 |
| 90 | 3,6285 | 44 | 5,720 | 0,183510 |
| 100 | 4,0317 | 45 | 5,850 | 0,187680 |
| 110 | 4,4349 | 47 | 6,110 | 0,196022 |
| 120 | 4,8381 | 48,5 | 6,305 | 0,202278 |
| 130 | 5,2413 | 49,7 | 6,461 | 0,207283 |
| 140 | 5,6444 | 49,7 | 6,461 | 0,207283 |
| 150 | 6,0476 | 49 | 6,370 | 0,204363 |
| 160 | 6,4507 | 47 | 6,110 | 0,196022 |
| 170 | 6,8539 | 46 | 5,980 | 0,191851 |
| 180 | 7,2571 | 44 | 5,720 | 0,183510 |
| 190 | 7,6603 | 42,5 | 5,525 | 0,177254 |

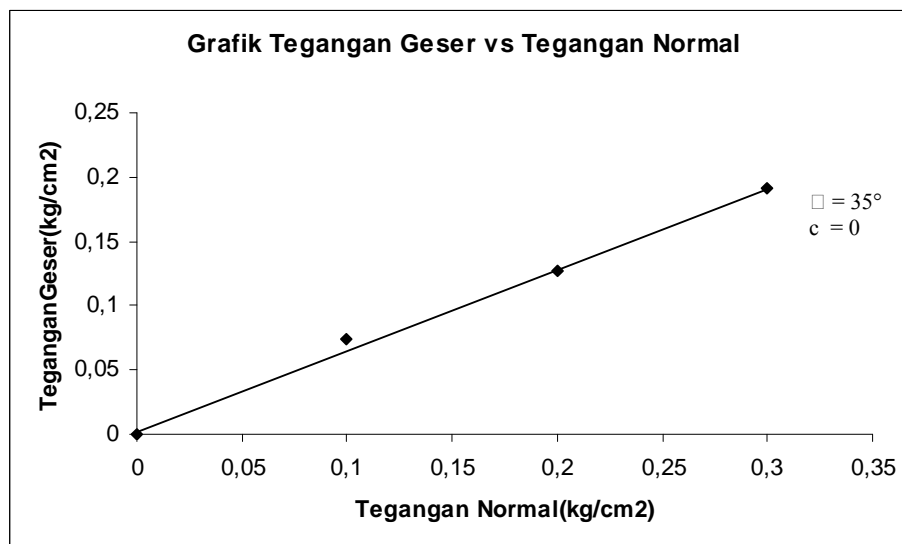
LAMPIRAN V HASIL UJI DIRECT SHEAR TEST



Gambar L5.1 Grafik Strain vs Shear Stress

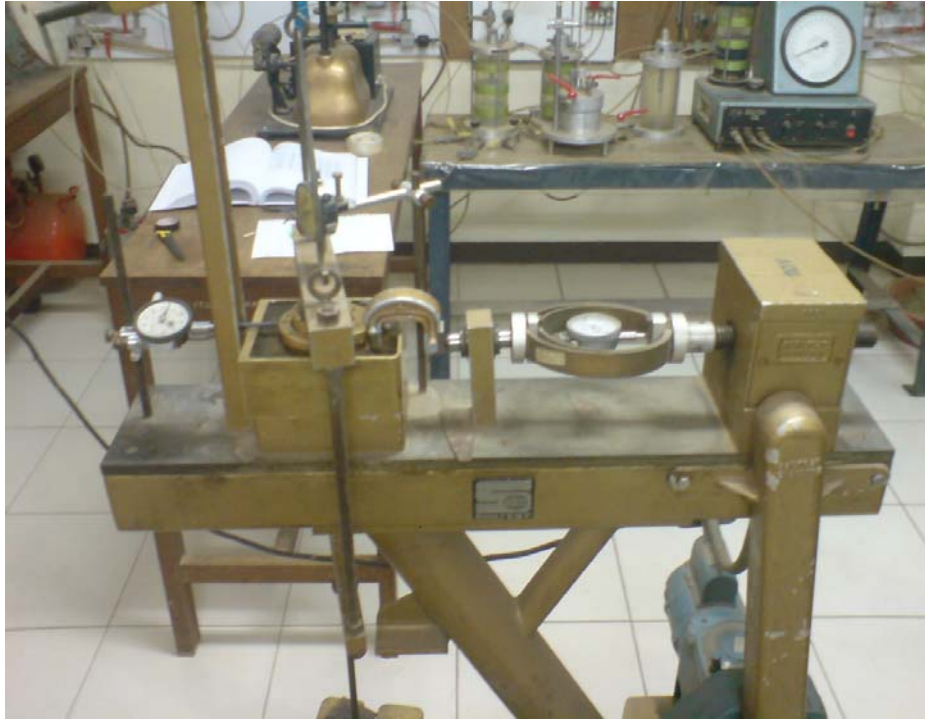
Tabel L5.1 Nilai Tegangan Geser dan Tegangan Normal

| Tegangan Normal | Tegangan Geser |
|-----------------|----------------|
| 0,1 | 0,06840 |
| 0,2 | 0,13555 |
| 0,3 | 0,20731 |



Gambar L5.2 Grafik Tegangan Geser vs Tegangan Normal

LAMPIRAN VI
ILUSTRASI DIRECT SHEAR TEST



Gambar L6.1 Alat Uji Kuat Geser

LAMPIRAN VII

BERAT ISI TANAH

Nama Instansi : Universitas Kristen Maranatha
 Nama Proyek : Praktikum Tugas Akhir
 Deskripsi Tanah : Pasir
 Nama Operator : David Sulastro

Tabel L7.1 Spesifikasi Mold

| | |
|--------------------------------|---------|
| Berat Mold (gr) | 4207 |
| Tinggi Mold (cm) | 11,5 |
| Diameter Mold (cm) | 10,1 |
| Volume Mold (cm ³) | 921,362 |

Tabel L7.2 Nilai γ_{min} Berdasarkan Hasil Praktikum

| No | | 1 | 2 | 3 |
|--------------------------------------|--|---------|---------|---------|
| Berat Mold + Pasir (gr) | | 5231 | 5230 | 5233 |
| Berat Pasir (gr) | | 1024 | 1023 | 1026 |
| γ_{min} (gr/cm ³) | | 1,11135 | 1,11022 | 1,11352 |

$$\gamma_{min} = \frac{W_{pasir}}{V_{mold}} (gr / cm^3)$$

$$\gamma_{min} \text{ rata-rata} = 1111,69 \text{ kg/m}^3$$

Tabel L7.3 Nilai γ_{max} Berdasarkan Hasil Praktikum

| No | | 1 | 2 | 3 |
|--------------------------------------|--|---------|---------|---------|
| Berat Mold + Pasir (gr) | | 5577 | 5581 | 5579 |
| Berat Pasir (gr) | | 1370 | 1374 | 1372 |
| γ_{max} (gr/cm ³) | | 1,48687 | 1,49121 | 1,48904 |

$$\gamma_{max} = \frac{W_{pasir}}{V_{mold}} (gr / cm^3)$$

$$\gamma_{max} \text{ rata-rata} = 1489,04 \text{ kg/m}^3$$

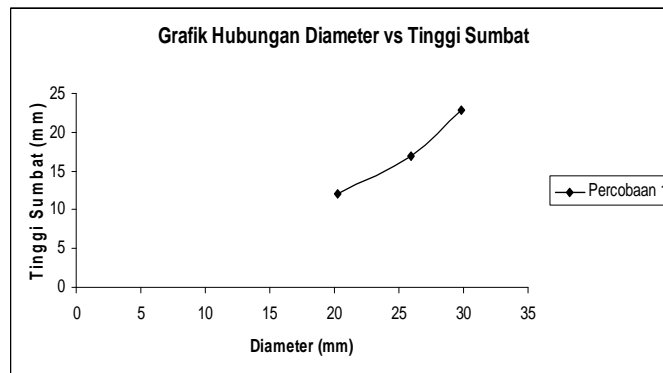
LAMPIRAN VIII

TINGGI SUMBAT

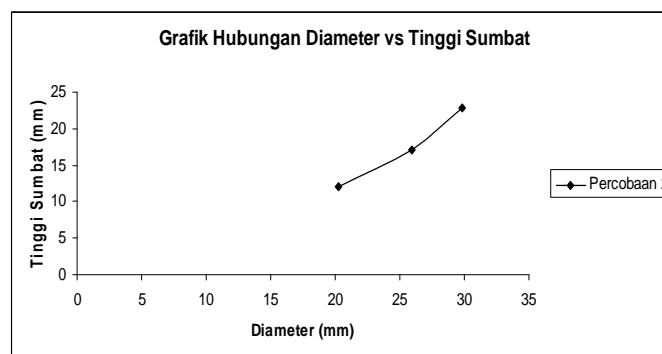
Dari hasil percobaan didapat:

Tabel L8.1 Nilai Tinggi Sumbat Menurut Hasil Praktikum

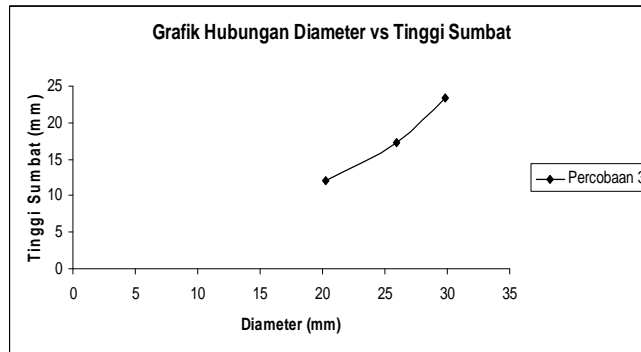
| Diameter (mm) | Tinggi Sumbat (mm) | | |
|------------------|-----------------------|-------------|-------------|
| | Percobaan 1 | Percobaan 2 | Percobaan 3 |
| 20,25 | 12 | 12 | 12 |
| 25,9 | 16,9 | 17,1 | 17,3 |
| 29,8 | 22,8 | 22,8 | 23,4 |



**Gambar L8.1 Hubungan diameter vs Tinggi Sumbat
(Percobaan 1)**



**Gambar L8.2 Hubungan diameter vs Tinggi Sumbat
(Percobaan 2)**



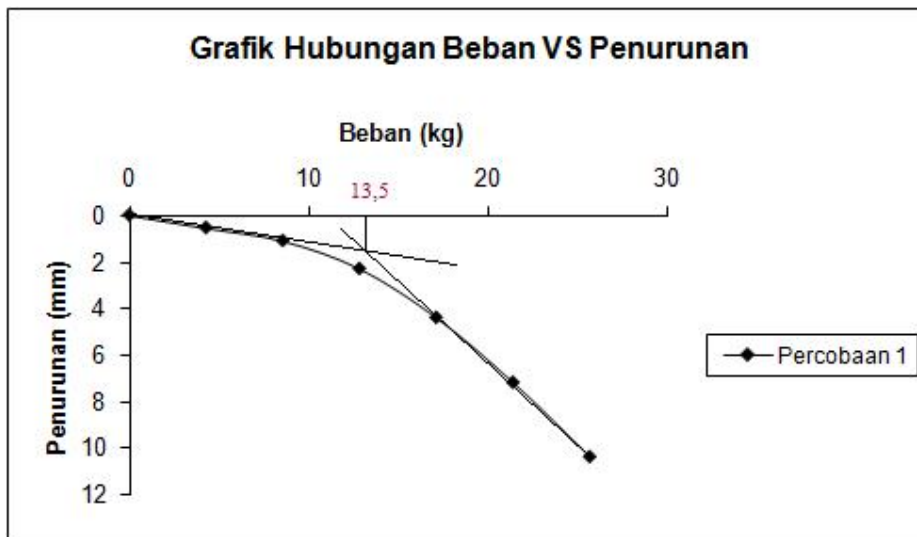
**Gambar L8.3 Hubungan diameter vs Tinggi Sumbat
(Percobaan 3)**

LAMPIRAN IX UJI PEMBEBANAN PONDASI TIANG

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 20,25 mm
 Tested By : David Sulastro
 Test No. : 1

Tabel L9.1 Data Hasil Percobaan Daya Dukung (Percobaan 1)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 70 | 0,54 |
| 6 | 8,57 | 157 | 1,10 |
| 9 | 12,86 | 264 | 2,30 |
| 12 | 17,14 | 453 | 4,41 |
| 15 | 21,43 | 701 | 7,20 |
| 18 | 25,72 | 949 | 10,40 |

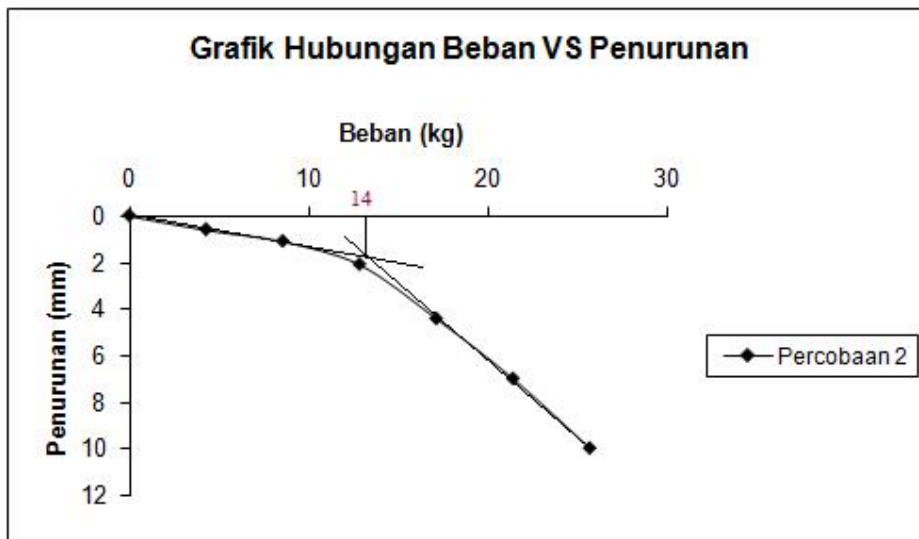


**Gambar L9.1 Hubungan Beban vs Penurunan
(Percobaan 1)**

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 20,25 mm
 Tested By : David Sulastro
 Test No. : 2

Tabel L9.2 Data Hasil Percobaan Daya Dukung (Percobaan 2)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 70 | 0,60 |
| 6 | 8,57 | 157 | 1,10 |
| 9 | 12,86 | 264 | 2,10 |
| 12 | 17,14 | 453 | 4,43 |
| 15 | 21,43 | 701 | 7,01 |
| 18 | 25,72 | 949 | 10,00 |

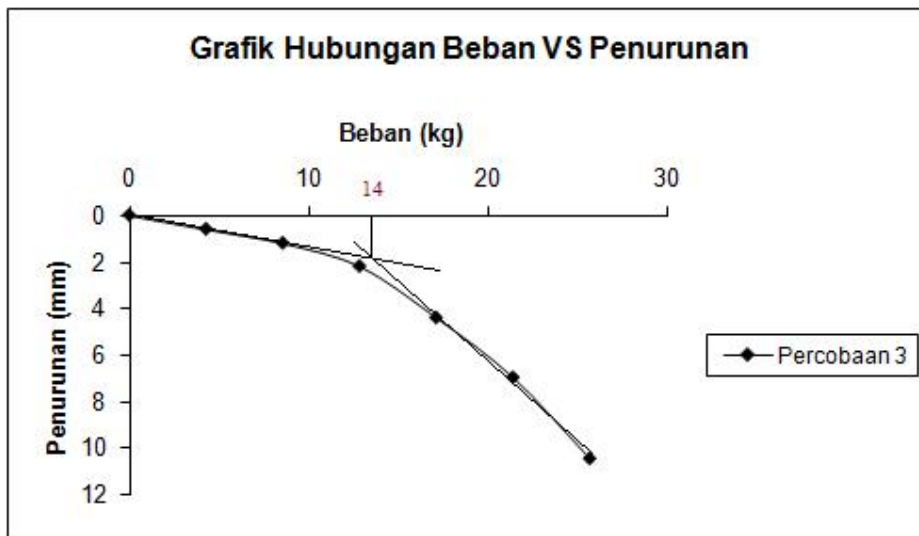


**Gambar L9.2 Hubungan Beban vs Penurunan
(Percobaan 2)**

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 20,25 mm
 Tested By : David Sulastro
 Test No. : 3

Tabel L9.3 Data Hasil Percobaan Daya Dukung (Percobaan 3)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 70 | 0,60 |
| 6 | 8,57 | 157 | 1,20 |
| 9 | 12,86 | 264 | 2,20 |
| 12 | 17,14 | 453 | 4,42 |
| 15 | 21,43 | 701 | 7,00 |
| 18 | 25,72 | 949 | 10,50 |

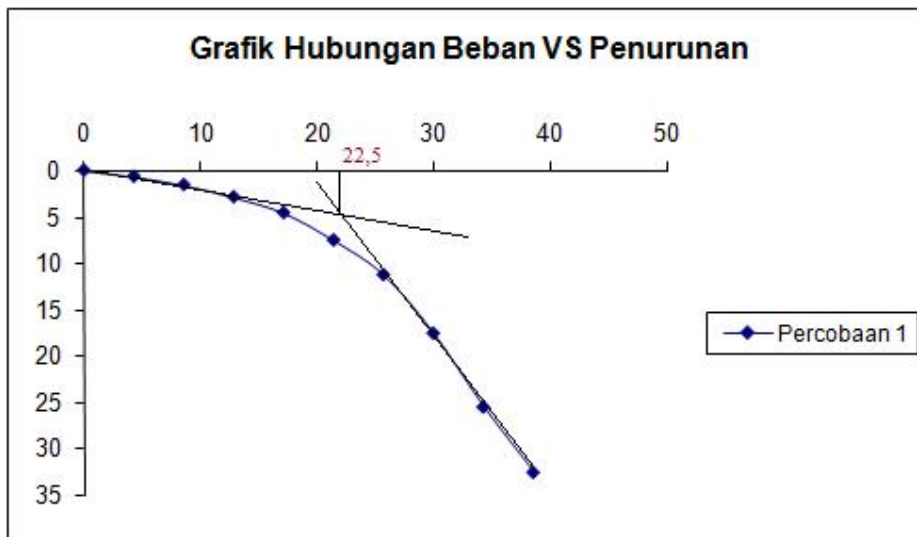


Gambar L9.3 Hubungan Beban vs Penurunan (Percobaan 3)

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 25,9 mm
 Tested By : David Sulastro
 Test No. : 1

Tabel L9.4 Data Hasil Percobaan Daya Dukung (Percobaan 1)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 66 | 0,66 |
| 6 | 8,57 | 156 | 1,56 |
| 9 | 12,86 | 287 | 2,87 |
| 12 | 17,14 | 457 | 4,57 |
| 15 | 21,43 | 697 | 6,97 |
| 18 | 25,72 | 956 | 9,56 |
| 21 | 30,00 | 1457 | 14,57 |
| 24 | 34,29 | 2154 | 21,54 |
| 27 | 38,57 | 2958 | 29,58 |

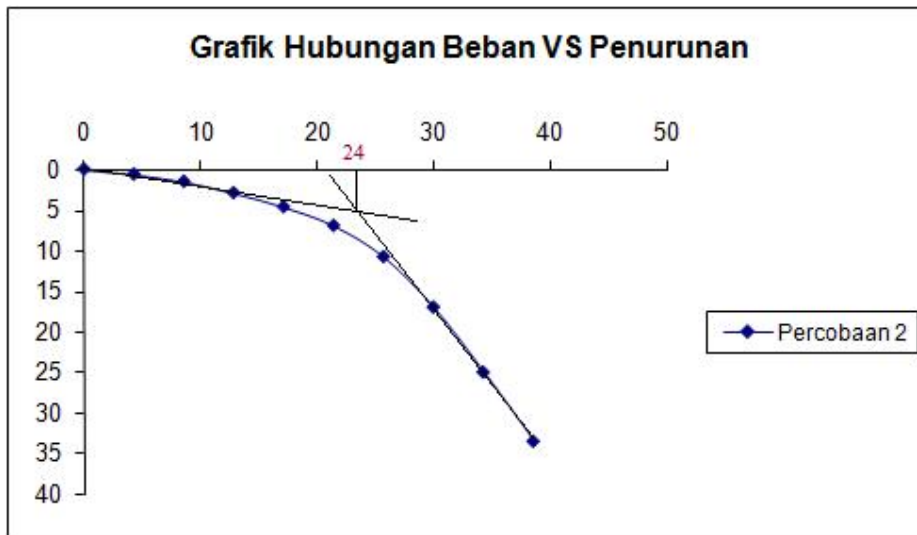


Gambar L9.4 Hubungan Beban vs Penurunan (Percobaan 1)

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 25,9 mm
 Tested By : David Sulastro
 Test No. : 2

Tabel L9.5 Data Hasil Percobaan Daya Dukung (Percobaan 2)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 70 | 0,70 |
| 6 | 8,57 | 157 | 1,57 |
| 9 | 12,86 | 264 | 2,64 |
| 12 | 17,14 | 453 | 4,53 |
| 15 | 21,43 | 701 | 7,01 |
| 18 | 25,72 | 949 | 9,49 |
| 21 | 30,00 | 1460 | 14,60 |
| 24 | 34,29 | 2146 | 21,46 |
| 27 | 38,57 | 2899 | 28,99 |

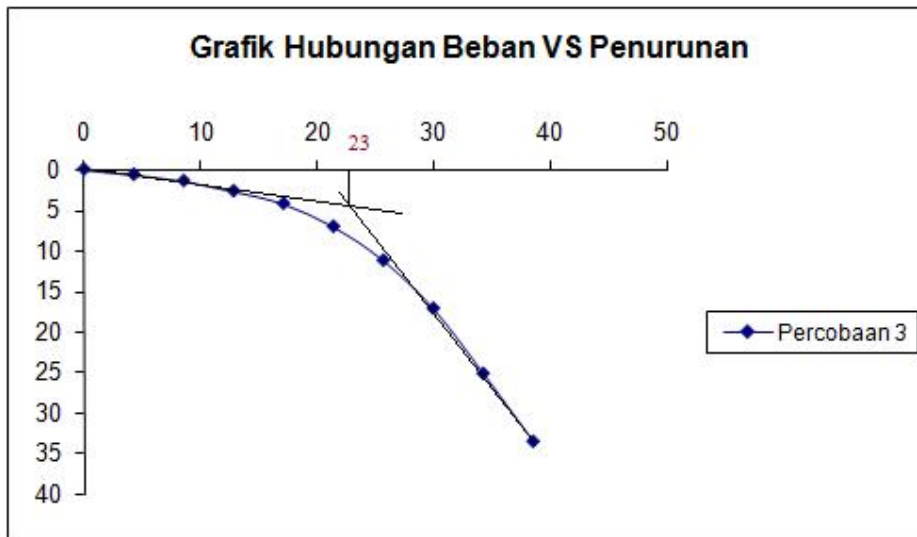


Gambar L9.5 Hubungan Beban vs Penurunan (Percobaan 2)

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 25,9 mm
 Tested By : David Sulastro
 Test No. : 3

Tabel L9.6 Data Hasil Percobaan Daya Dukung (Percobaan 3)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 68 | 0,68 |
| 6 | 8,57 | 149 | 1,49 |
| 9 | 12,86 | 274 | 2,74 |
| 12 | 17,14 | 432 | 4,32 |
| 15 | 21,43 | 697 | 6,97 |
| 18 | 25,72 | 951 | 9,51 |
| 21 | 30,00 | 1398 | 13,98 |
| 24 | 34,29 | 2158 | 21,58 |
| 27 | 38,57 | 2847 | 28,47 |

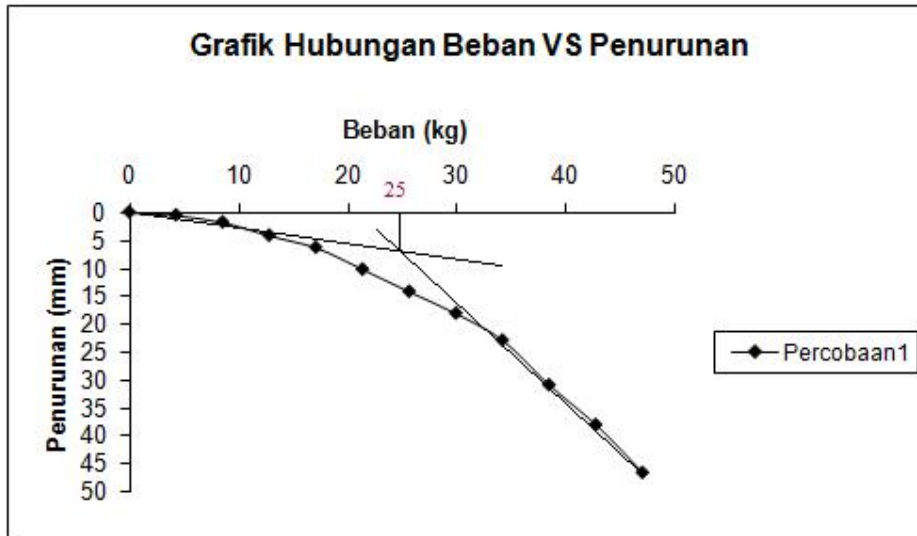


Gambar L9.6 Hubungan Beban vs Penurunan (Percobaan 3)

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 29,8 mm
 Tested By : David Sulastro
 Test No. : 1

Tabel L9.7 Data Hasil Percobaan Daya Dukung (Percobaan 1)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0,00 | 0 | 0 |
| 3 | 4,29 | 56 | 0,51 |
| 6 | 8,57 | 115 | 1,78 |
| 9 | 12,86 | 165 | 4,15 |
| 12 | 17,14 | 289 | 6,32 |
| 15 | 21,43 | 459 | 10,23 |
| 18 | 25,72 | 783 | 14,21 |
| 21 | 30,00 | 1055 | 18,12 |
| 24 | 34,29 | 1648 | 22,95 |
| 27 | 38,57 | 2531 | 30,97 |
| 30 | 42,86 | 3487 | 38,10 |
| 33 | 47,15 | 4675 | 46,68 |

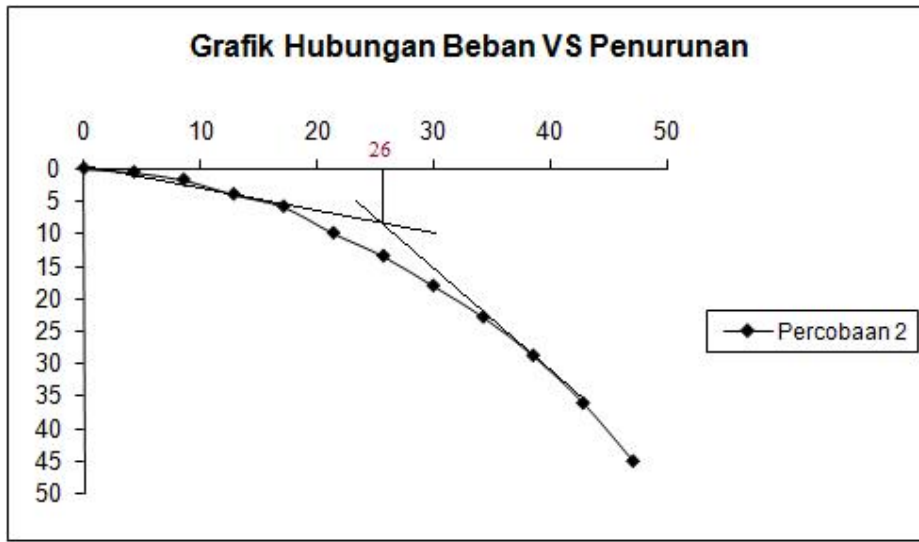


**Gambar L9.7 Hubungan Beban vs Penurunan
(Percobaan 1)**

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 29,8 mm
 Tested By : David Sulastro
 Test No. : 2

Tabel L9.8 Data Hasil Percobaan Daya Dukung (Percobaan 2)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 56 | 0,59 |
| 6 | 8,57 | 115 | 1,75 |
| 9 | 12,86 | 165 | 3,98 |
| 12 | 17,14 | 289 | 5,88 |
| 15 | 21,43 | 459 | 9,97 |
| 18 | 25,72 | 783 | 13,52 |
| 21 | 30,00 | 1055 | 18,12 |
| 24 | 34,29 | 1648 | 22,95 |
| 27 | 38,57 | 2531 | 30,97 |
| 30 | 42,86 | 3487 | 36,23 |
| 33 | 47,15 | 4675 | 46,68 |

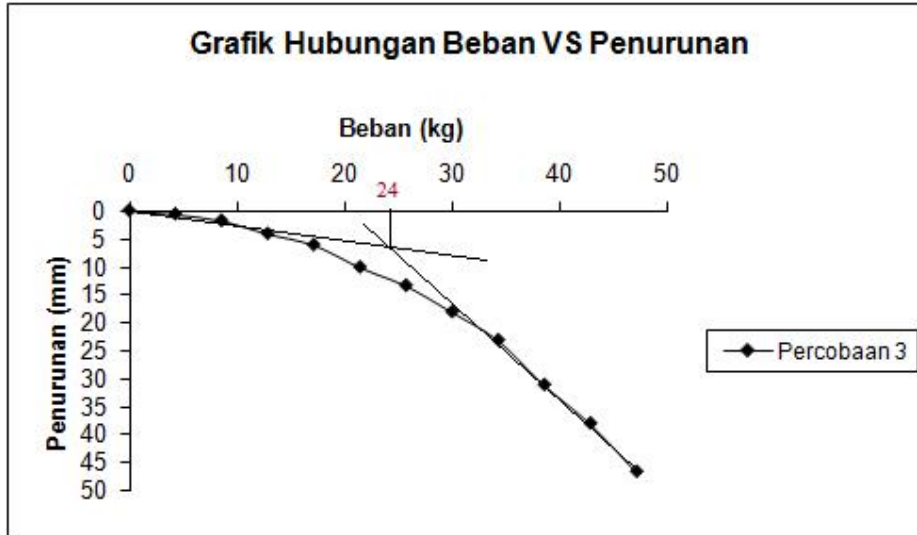


**Gambar L9.8 Hubungan Beban vs Penurunan
(Percobaan 2)**

Soil Sample : Pasir Beton Lolos Tapis No.4
 Test Type : Tiang Pancang Pipa Diameter 29,8 mm
 Tested By : David Sulastro
 Test No. : 3

Tabel L9.9 Data Hasil Percobaan Daya Dukung (Percobaan 3)

| Proving Ring Dial | Beban (kg) | Dial Gauge | Penurunan 0,01 |
|-------------------|------------|------------|----------------|
| 0 | 0 | 0 | 0 |
| 3 | 4,29 | 56 | 0,62 |
| 6 | 8,57 | 115 | 1,78 |
| 9 | 12,86 | 165 | 4,12 |
| 12 | 17,14 | 289 | 6,12 |
| 15 | 21,43 | 459 | 10,12 |
| 18 | 25,72 | 783 | 13,41 |
| 21 | 30,00 | 1055 | 18,13 |
| 24 | 34,29 | 1648 | 23,18 |
| 27 | 38,57 | 2531 | 31,20 |
| 30 | 42,86 | 3487 | 36,23 |
| 33 | 47,15 | 4675 | 46,75 |



**Gambar L9.9 Hubungan Beban vs Penurunan
(Percobaan 3)**

LAMPIRAN X
ILUSTRASI PROSES PEMBEBANAN



Gambar L10.1 Alat Uji Pembebanan