



# **LAMPIRAN 1**

## **HASIL PENGUJIAN MATERIAL**

**Hasil Pengujian Material Agregat Halus / Pasir Lumajang**  
**MODULUS HALUS BUTIR (MHB) / ANALISA SARINGAN AGREGAT**  
**HALUS**  
**(SNI 03 – 1968 – 1990)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Pasir Lumajang       |
| Keperluan      | Tugas Akhir          |

| Lubang Ayakan (mm) | Berat Tertinggal (gram) | Berat Tertinggal (%) | Berat Tertinggal Kumulatif (%) | Persen Lolos Kumulatif (%) |
|--------------------|-------------------------|----------------------|--------------------------------|----------------------------|
| 9.60               | 0.0                     | 0.00                 | 0.00                           | 100.00                     |
| 4.80               | 6.9                     | 0.73                 | 0.73                           | 99.27                      |
| 2.40               | 69.6                    | 7.37                 | 8.10                           | 91.90                      |
| 1.20               | 112.8                   | 11.94                | 20.05                          | 79.95                      |
| 0.60               | 184.5                   | 19.53                | 39.58                          | 60.42                      |
| 0.30               | 263.5                   | 27.90                | 67.48                          | 32.52                      |
| 0.15               | 276.9                   | 29.31                | 96.80                          | 3.20                       |
| Pan                | 30.3                    | 3.20                 | 100.00                         | 0.00                       |
| Jumlah             | 944.47                  | 100.00               | 232.74                         |                            |
| Fm Pasir           |                         |                      | 2.327                          |                            |

$$\text{Modulus Halus Butir} = \frac{232.74}{100} = 2.327$$

**GRADASI PASIR**

| Lubang Ayakan (mm) | Persen Berat Tembus Kumulatif |          |          |          |
|--------------------|-------------------------------|----------|----------|----------|
|                    | Zone 1                        | Zone 2   | Zone 3   | Zone 4   |
| 10                 | 100                           | 100      | 100      | 100      |
| 4,80               | 90 – 100                      | 90 -100  | 90 -100  | 95 -100  |
| 2,40               | 60 – 95                       | 75 – 100 | 85 – 100 | 95 – 100 |
| 1,20               | 30 – 70                       | 55 – 100 | 75 – 100 | 90 – 100 |
| 0,60               | 15 – 34                       | 35 – 59  | 60 – 79  | 80 – 100 |
| 0,30               | 5 – 20                        | 8 – 30   | 12 – 40  | 15 – 50  |
| 0,15               | 0 - 10                        | 0 – 10   | 0 - 10   | 0 - 15   |

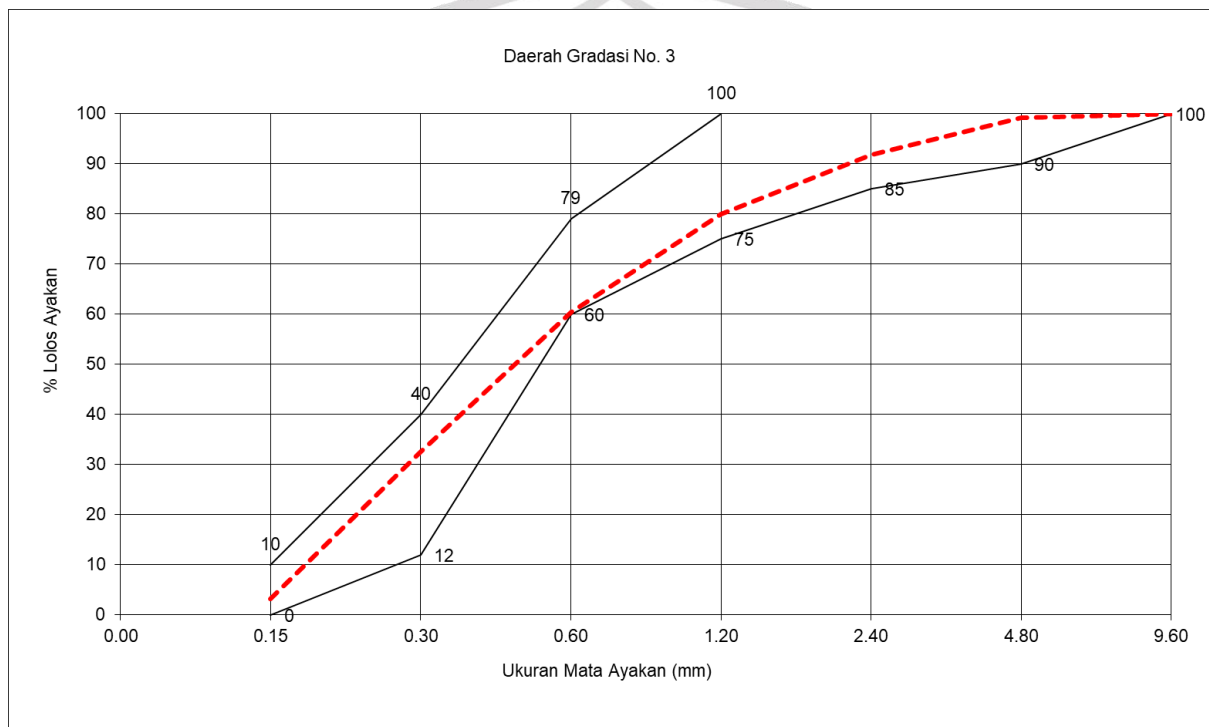
**Keterangan :** Daerah I : Pasir Kasar  
Daerah II : Pasir Agak Kasar  
Daerah III : Pasir Agak Halus  
Daerah IV : Pasir Halus

## MODULUS HALUS BUTIR (MHB) / ANALISA SARINGAN AGREGAT HALUS (SNI 03 – 1968 – 1990)

Hasil Analisa Saringan :

- Pasir Masuk Daerah : Daerah III
- Jenis Pasir : Pasir Agak Halus

GAMBAR ANALISIS SARINGAN AGREGAT HALUS



**PEMERIKSAAN BERAT JENIS DAN PENYERAPAN AIR AGREGAT HALUS  
(SNI 1970 – 2008)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Pasir Lumajang       |
| Keperluan      | Tugas Akhir          |

| U R A I A N                                                      | A      | B      | Rata-rata | Satuan           |
|------------------------------------------------------------------|--------|--------|-----------|------------------|
| Berat benda uji kering permukaan jenuh (SSD)_____500             | 500    | 500    | 500       | gram             |
| Berat benda uji kering oven_____ $B_k$                           | 497.8  | 498.9  | 498.35    | gram             |
| Berat piknometer diisi air (25°C)_____ $B$                       | 1256.3 | 1244.3 | 1250.30   | gram             |
| Berat piknometer + benda uji (SSD)+ Air (25°C)_____ $B_t$        | 1573.9 | 1560.0 | 1566.95   | gram             |
| Berat Jenis (Bulk) $\frac{B_k}{(B + 500 - B_t)}$                 | 2.729  | 2.707  | 2.718     | t/m <sup>3</sup> |
| Berat Jenis Kering Permukaan Jenuh $\frac{500}{(B + 500 - B_t)}$ | 2.741  | 2.713  | 2.727     | t/m <sup>3</sup> |
| Berat Jenis Semu (Apparent) $\frac{B_k}{(B + B_k - B_t)}$        | 2.762  | 2.723  | 2.743     | t/m <sup>3</sup> |
| Penyerapan $\frac{B_j - B_k}{B_k} \times 100\%$                  | 0.442  | 0.220  | 0.331     | %                |

Catatan :  
Pengujian sesuai SNI 1970 – 2008

**PEMERIKSAAN KADAR LUMPUR PADA AGREGAT HALUS  
(SNI 03 – 4142 – 1996)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Pasir Lumajang       |
| Keperluan      | Tugas Akhir          |

| URAIAN                                                                                            | UKURAN<br>MAKSIMUM<br>AGREGAT<br>NOMOR 4<br>(4.75 mm) | SATUAN |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------|
|                                                                                                   | Benda uji Pasir                                       |        |
| BERAT KERING BENDA UJI +<br>WADAH (W <sub>1</sub> )                                               | 401.9                                                 | gram   |
| BERAT WADAH (W <sub>2</sub> )                                                                     | 151.9                                                 | gram   |
| BERAT KERING BENDA UJI AWAL W <sub>3</sub> (W <sub>1</sub> -W <sub>2</sub> )                      | 250                                                   | gram   |
| BERAT KERING BENDA UJI<br>SESUDAH PENCUCIAN + WADAH (W <sub>4</sub> )                             | 391.40                                                | gram   |
| BERAT KERING BENDA UJI<br>SESUDAH PENCUCIAN W <sub>5</sub> = (W <sub>4</sub> -W <sub>2</sub> )    | 239.50                                                | gram   |
| PERSEN BAHAN LOLOS<br>SARINGAN NOMOR 200 (0.075 mm) $W_6 = \frac{(W_3 - W_5)}{W_3} \times 100 \%$ | 4.20                                                  | %      |

Catatan :  
Pengujian sesuai SNI 03 – 4142 – 1996

Menurut Persyaratan Umum Bahan Bangunan di Indonesia 1982 (PUBI – 1982), berat bagian yang lolos ayakan no. 200 (0.075 mm) : untuk pasir maksimum 5% (lima persen).

**PEMERIKSAAN KOTORAN ORGANIK PADA AGREGAT HALUS  
(SNI 2816 – 2014)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Pasir Lumajang       |
| Keperluan      | Tugas Akhir          |

**HASIL PEMERIKSAAN KOTORAN ORGANIK PADA AGREGAT HALUS  
PASIR LUMAJANG**

Pasir 130 gram dicampur 200 cc larutan 3 % NaOH  
didiamkan 24 jam.

Warna yang terjadi : **BENING**

Catatan :  
Pengujian sesuai SNI 2816 – 2014

**GAMBAR HASIL PENGUJIAN KOTORAN ORGANIK AGREGAT HALUS**





**Hasil Pengujian Material Serbuk Cangkang Kerang**  
**MODULUS HALUS BUTIR (MHB) / ANALISA SARINGAN SERBUK**  
**CANGKANG KERANG HIJAU**  
**(SNI 03 – 1968 – 1990)**

|                |                              |
|----------------|------------------------------|
| Pengirim       | Adinda Audina Zahroh         |
| Tanggal Terima | Juni 2024                    |
| Asal Agregat   | Serbuk Cangkang Kerang Hijau |
| Keperluan      | Tugas Akhir                  |

| Lubang Ayakan (mm) | Berat Tertinggal (gram) | Berat Tertinggal (%) | Berat Tertinggal Kumulatif (%) | Persen Lolos Kumulatif (%) |
|--------------------|-------------------------|----------------------|--------------------------------|----------------------------|
| 9.60               | 0.0                     | 0.00                 | 0.00                           | 100.00                     |
| 4.80               | 0.0                     | 0.00                 | 0.00                           | 100.00                     |
| 2.40               | 80.3                    | 8.26                 | 8.26                           | 91.74                      |
| 1.20               | 485.4                   | 49.91                | 58.17                          | 41.83                      |
| 0.60               | 232.5                   | 23.91                | 82.08                          | 17.92                      |
| 0.30               | 103.1                   | 10.60                | 92.68                          | 7.32                       |
| 0.15               | 55.7                    | 5.73                 | 98.41                          | 1.59                       |
| Pan                | 15.4                    | 1.59                 | 100.00                         | 0.00                       |
| Jumlah             | 972.47                  | 100.00               | 339.60                         |                            |
| Fm Pasir           |                         |                      | 3.396                          |                            |

$$\text{Modulus Halus Butir} = \frac{339.60}{100} = 3.396$$

**GRADASI PASIR**

| Lubang Ayakan (mm) | Persen Berat Tembus Kumulatif |          |          |          |
|--------------------|-------------------------------|----------|----------|----------|
|                    | Zone 1                        | Zone 2   | Zone 3   | Zone 4   |
| 10                 | 100                           | 100      | 100      | 100      |
| 4,80               | 90 – 100                      | 90 -100  | 90 -100  | 95 -100  |
| 2,40               | 60 – 95                       | 75 – 100 | 85 – 100 | 95 – 100 |
| 1,20               | 30 – 70                       | 55 – 100 | 75 – 100 | 90 – 100 |
| 0,60               | 15 – 34                       | 35 – 59  | 60 – 79  | 80 – 100 |
| 0,30               | 5 – 20                        | 8 – 30   | 12 – 40  | 15 – 50  |
| 0,15               | 0 - 10                        | 0 – 10   | 0 - 10   | 0 - 15   |

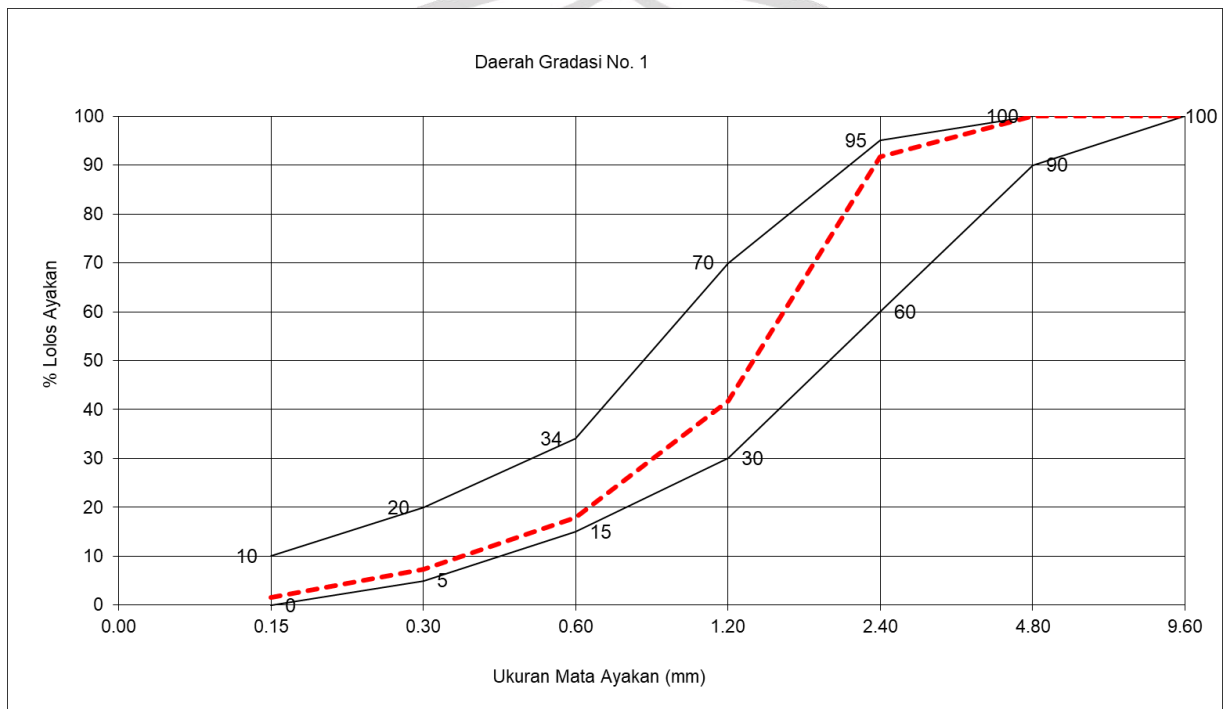
**Keterangan :** Daerah I : Pasir Kasar  
Daerah II : Pasir Agak Kasar  
Daerah III : Pasir Agak Halus  
Daerah IV : Pasir Halus

## MODULUS HALUS BUTIR (MHB) / ANALISA SARINGAN AGREGAT HALUS (SNI 03 – 1968 – 1990)

Hasil Analisa Saringan :

- Pasir Masuk Daerah : Daerah I
- Jenis Pasir : Pasir Kasar

### GAMBAR ANALISIS SARINGAN SERBUK CANGKANG KERANG HIJAU





**PEMERIKSAAN BERAT JENIS DAN PENYERAPAN AIR AGREGAT HALUS  
(SNI 1970 – 2008)**

|                |                              |
|----------------|------------------------------|
| Pengirim       | Adinda Audina Zahroh         |
| Tanggal Terima | Juni 2024                    |
| Asal Agregat   | Serbuk Cangkang Kerang Hijau |
| Keperluan      | Tugas Akhir                  |

| U R A I A N                                                      | A      | B      | Rata-rata | Satuan           |
|------------------------------------------------------------------|--------|--------|-----------|------------------|
| Berat benda uji kering permukaan jenuh (SSD)_____500             | 500    | 500    | 500       | gram             |
| Berat benda uji kering oven_____ $B_k$                           | 489.0  | 488.7  | 488.85    | gram             |
| Berat piknometer diisi air (25°C)_____ $B$                       | 1256.3 | 1244.3 | 1250.30   | gram             |
| Berat piknometer + benda uji (SSD)+ Air (25°C)_____ $B_t$        | 1564.6 | 1552.3 | 1558.45   | gram             |
| Berat Jenis (Bulk) $\frac{B_k}{(B + 500 - B_t)}$                 | 2.551  | 2.545  | 2.548     | t/m <sup>3</sup> |
| Berat Jenis Kering Permukaan Jenuh $\frac{500}{(B + 500 - B_t)}$ | 2.608  | 2.604  | 2.606     | t/m <sup>3</sup> |
| Berat Jenis Semu (Apparent) $\frac{B_k}{(B + B_k - B_t)}$        | 2.706  | 2.704  | 2.705     | t/m <sup>3</sup> |
| Penyerapan $\frac{B_j - B_k}{B_k} \times 100\%$                  | 2.249  | 2.312  | 2.281     | %                |

Catatan :  
Pengujian sesuai SNI 1970 – 2008

**PEMERIKSAAN KADAR LUMPUR PADA AGREGAT HALUS  
(SNI 03 – 4142 – 1996)**

|                |                              |
|----------------|------------------------------|
| Pengirim       | Adinda Audina Zahroh         |
| Tanggal Terima | Juni 2024                    |
| Asal Agregat   | Serbuk Cangkang Kerang Hijau |
| Keperluan      | Tugas Akhir                  |

| URAIAN                                                                                            | UKURAN<br>MAKSIMUM<br>AGREGAT<br>NOMOR 4<br>(4.75 mm) | SATUAN |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------|
|                                                                                                   | Benda uji Pasir                                       |        |
| BERAT KERING BENDA UJI +<br>WADAH (W <sub>1</sub> )                                               | 287.7                                                 | gram   |
| BERAT WADAH (W <sub>2</sub> )                                                                     | 37.7                                                  | gram   |
| BERAT KERING BENDA UJI AWAL W <sub>3</sub> (W <sub>1</sub> -W <sub>2</sub> )                      | 250                                                   | gram   |
| BERAT KERING BENDA UJI<br>SESUDAH PENCUCIAN + WADAH (W <sub>4</sub> )                             | 276.40                                                | gram   |
| BERAT KERING BENDA UJI<br>SESUDAH PENCUCIAN W <sub>5</sub> = (W <sub>4</sub> -W <sub>2</sub> )    | 238.70                                                | gram   |
| PERSEN BAHAN LOLOS<br>SARINGAN NOMOR 200 (0.075 mm) $W_6 = \frac{(W_3 - W_5)}{W_3} \times 100 \%$ | 4.52                                                  | %      |

Catatan :  
Pengujian sesuai SNI 03 – 4142 – 1996

Menurut Persyaratan Umum Bahan Bangunan di Indonesia 1982 (PUBI – 1982), berat bagian yang lolos ayakan no. 200 (0.075 mm) : untuk pasir maksimum 5% (lima persen).

**PEMERIKSAAN KOTORAN ORGANIK PADA AGREGAT HALUS  
(SNI 2816 – 2014)**

|                |                              |
|----------------|------------------------------|
| Pengirim       | Adinda Audina Zahroh         |
| Tanggal Terima | Juni 2024                    |
| Asal Agregat   | Serbuk Cangkang Kerang Hijau |
| Keperluan      | Tugas Akhir                  |

**HASIL PEMERIKSAAN KOTORAN ORGANIK PADA SERBUK CANGKANG KERANG**

**SERBUK CANGKANG KERANG**

Serbuk Cangkang Kerang 130 gram dicampur 200 cc larutan 3 % NaOH didiamkan 24 jam.

Warna yang terjadi : **BENING SEDIKIT KERUH**

Catatan :

Pengujian sesuai SNI 2816 – 2014

**GAMBAR HASIL PENGUJIAN KOTORAN ORGANIK SERBUK CANGKANG KERANG**



**Hasil Pengujian Material Semen**  
**PENGUJIAN KEHALUSAN PADA SEMEN**  
**(SNI 03 – 6827 – 2002)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Semen Portland       |
| Keperluan      | Tugas Akhir          |

**KEHALUSAN SEMEN**

| Uraian                                  | Hasil Uji | Satuan |
|-----------------------------------------|-----------|--------|
| Berat contoh mula-mula                  | 100.00    | gram   |
| Berat tertahan saringan no. 100 (w 100) | 0.00      | gram   |
| Berat tertahan saringan no. 200 (w 200) | 0.67      | gram   |
| Kehalusan                               |           |        |
| Lolos saringan no. 100 (= P 100)        | 100.00    | %      |
| Lolos saringan no. 200 (= P 200)        | 99.33     | %      |

Catatan :  
 Pengujian sesuai SNI 03 – 6827 - 2002

**PENGUJIAN BERAT JENIS PADA SEMEN  
(SNI 15 – 2049 – 2004)**

|                |                      |
|----------------|----------------------|
| Pengirim       | Adinda Audina Zahroh |
| Tanggal Terima | Juni 2024            |
| Asal Agregat   | Semen Portland       |
| Keperluan      | Tugas Akhir          |

| Percobaan                                | Satuan           | 1      | 2      |
|------------------------------------------|------------------|--------|--------|
| Berat Semen ( W1 )                       | gram             | 64     | 64     |
| Berat Semen + Minyak + Labu Takar ( W2 ) | gram             | 351.99 | 360.32 |
| Berat Minyak + Labu Takar ( W3 )         | gram             | 288.21 | 296.54 |
| Bacaan Akhir ( V1 )                      |                  | 0.00   | 0.00   |
| Bacaan Akhir ( V2 )                      |                  | 20.90  | 19.60  |
| Berat Jenis = ( W2 - W3/ V2 )            | t/m <sup>3</sup> | 3.05   | 3.25   |
| Berat Jenis rata-rata                    | t/m <sup>3</sup> | 3.15   |        |

Catatan :  
Pengujian sesuai SNI 15 – 2049 - 2004



# **LAMPIRAN 2**

## **HASIL PENGUJIAN *PAVING BLOCK***



{Nomor Sertifikat}  
Date: July 17, 2024

Issuing Office:  
Jl. Jend. A. Yani. No. 315 Surabaya 60234, Indonesia  
Phone/Facs: +62 31 8470547/8470635  
Email: labsurabaya@sucofindo.co.id

## REPORT OF ANALYSIS

CLIENT : **ITS SURABAYA**  
Kampus ITS, Keputih, Sukolilo  
Surabaya – Jawa Timur 60111

**THE SAMPLE WAS SUBMITTED BY THE CLIENT WITH THE FOLLOWING IDENTIFICATION:**

TYPE OF SAMPLE : **ASH**  
DATE OF RECEIVED : July 9, 2024  
DATE OF ANALYSIS : July 10 up to 17, 2024  
TEST REQUIRED : Full analysis  
DESCRIPTION OF SAMPLE : Form : Powder  
Weight / Volume :  $\pm$  160 gram  
Packing : Plastic bag

SAMPLE IDENTIFICATION : **GRUNDED CANGKANG KERANG**  
(STATED BY CLIENT)

**We have tested the sample(s) submitted, and the following results were obtained:**

| No. | Parameter                                            | Unit | Test Result | Test Method                           |
|-----|------------------------------------------------------|------|-------------|---------------------------------------|
| 1.  | Calcium Oxide (CaO)                                  | % wt | 50.20       | PO – MOM – 01<br>(X-ray Fluorescence) |
| 2.  | Iron Trioxide (Fe <sub>2</sub> O <sub>3</sub> )      | % wt | 0.92        |                                       |
| 3.  | Silicon Dioxide (SiO <sub>2</sub> )                  | % wt | 0.67        |                                       |
| 4.  | Sodium Oxide (Na <sub>2</sub> O)                     | % wt | 0.47        |                                       |
| 5.  | Aluminium Trioxide (Al <sub>2</sub> O <sub>3</sub> ) | % wt | 0.11        |                                       |
| 6.  | Magnesium Oxide (MgO)                                | % wt | 0.06        |                                       |
| 7.  | Potassium Oxide (K <sub>2</sub> O)                   | % wt | 0.02        |                                       |
| 8.  | Titanium Oxide (TiO <sub>2</sub> )                   | % wt | 0.01        |                                       |
| 9.  | Manganese Dioxide (MnO <sub>2</sub> )                | % wt | 0.01        |                                       |
| 10. | Chromium Trioxide (Cr <sub>2</sub> O <sub>3</sub> )  | % wt | 0.01        |                                       |
| 11. | Loss On Ignition (LOI)                               | % wt | 47.21       | PO – MOM – 03 (Gravimetric)           |

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**Dept. Of Mineral and Coal Inspection and Testing**

71030524001871

**Iwan Sasmito**

SBY201400001885

## HASIL TEST KUAT TEKAN

Dikirim oleh : Peneliti  
 Tanggal : Agustus - November  
 Untuk Pekerjaan : Tugas Akhir Penelitian Paving Block

Contoh : Hasil Kuat Tekan Paving Campuran Normal

| No. | Uraian                                             | Benda Uji |        |        |
|-----|----------------------------------------------------|-----------|--------|--------|
|     |                                                    | 1         | 2      | 3      |
| 1   | Berat benda uji sebelum di test (gram)             | 2700      | 2600   | 2700   |
| 2   | Kuat Tekan (P) (KN)                                | 525       | 390    | 480    |
| 3   | Kuat Tekan (P) (N)                                 | 525000    | 390000 | 480000 |
| 4   | Luas permukaan paving ( L ) (mm <sup>2</sup> )     | 20000     | 20000  | 20000  |
| 5   | Kuat Tekan $\text{Kuat tekan} = \frac{P}{L}$ (Mpa) | 26.25     | 19.50  | 24.00  |
| 6   | Rata -rata Kuat Tekan (mm/menit)                   | 23.25     |        |        |

|              |                          |             |             |             |
|--------------|--------------------------|-------------|-------------|-------------|
| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 |
| 1.           | Panjang benda uji (mm) : | 200.000     | 200.000     | 200.000     |
|              | Lebar benda uji (mm) :   | 100.000     | 100.000     | 100.000     |

Contoh : Hasil Kuat Tekan Paving Campuran 10%

| No. | Uraian                                             | Benda Uji |        |        |
|-----|----------------------------------------------------|-----------|--------|--------|
|     |                                                    | 1         | 2      | 3      |
| 1   | Berat benda uji sebelum di test (gram)             | 2645      | 2589   | 2567   |
| 2   | Kuat Tekan (P) (KN)                                | 655       | 725    | 775    |
| 3   | Kuat Tekan (P) (N)                                 | 655000    | 725000 | 775000 |
| 4   | Luas permukaan paving ( L ) (mm <sup>2</sup> )     | 20000     | 20000  | 20000  |
| 5   | Kuat Tekan $\text{Kuat tekan} = \frac{P}{L}$ (Mpa) | 32.75     | 36.25  | 38.75  |
| 6   | Rata -rata Kuat Tekan (mm/menit)                   | 35.92     |        |        |

|              |                          |             |             |             |
|--------------|--------------------------|-------------|-------------|-------------|
| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 |
| 1.           | Panjang benda uji (mm) : | 200.000     | 200.000     | 200.000     |
|              | Lebar benda uji (mm) :   | 100.000     | 100.000     | 100.000     |

Contoh : Hasil Kuat Tekan Paving Campuran 20%

| No. | Uraian                                             | Benda Uji |        |        |
|-----|----------------------------------------------------|-----------|--------|--------|
|     |                                                    | 1         | 2      | 3      |
| 1   | Berat benda uji sebelum di test (gram)             | 2736      | 2694   | 2735   |
| 2   | Kuat Tekan (P) (KN)                                | 485       | 510    | 650    |
| 3   | Kuat Tekan (P) (N)                                 | 485000    | 510000 | 650000 |
| 4   | Luas permukaan paving ( L ) (mm <sup>2</sup> )     | 20000     | 20000  | 20000  |
| 5   | Kuat Tekan $\text{Kuat tekan} = \frac{P}{L}$ (Mpa) | 24        | 26     | 33     |
| 6   | Rata -rata Kuat Tekan (mm/menit)                   | 27.42     |        |        |

|              |                          |             |             |             |
|--------------|--------------------------|-------------|-------------|-------------|
| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 |
| 1.           | Panjang benda uji (mm) : | 200.000     | 200.000     | 200.000     |
|              | Lebar benda uji (mm) :   | 100.000     | 100.000     | 100.000     |

Contoh : Hasil Kuat Tekan Paving Campuran 30%

| No. | Uraian                                             | Benda Uji |        |        |
|-----|----------------------------------------------------|-----------|--------|--------|
|     |                                                    | 1         | 2      | 3      |
| 1   | Berat benda uji sebelum di test (gram)             | 2720      | 2761   | 2698   |
| 2   | Kuat Tekan (P) (KN)                                | 595       | 495    | 660    |
| 3   | Kuat Tekan (P) (N)                                 | 595000    | 495000 | 660000 |
| 4   | Luas permukaan paving ( L ) (mm <sup>2</sup> )     | 20000     | 20000  | 20000  |
| 5   | Kuat Tekan $\text{Kuat tekan} = \frac{P}{L}$ (Mpa) | 29.75     | 24.75  | 33.00  |
| 6   | Rata -rata Kuat Tekan (mm/menit)                   | 29.17     |        |        |

|              |                          |             |             |             |
|--------------|--------------------------|-------------|-------------|-------------|
| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 |
| 1.           | Panjang benda uji (mm) : | 200.000     | 200.000     | 200.000     |
|              | Lebar benda uji (mm) :   | 100.000     | 100.000     | 100.000     |

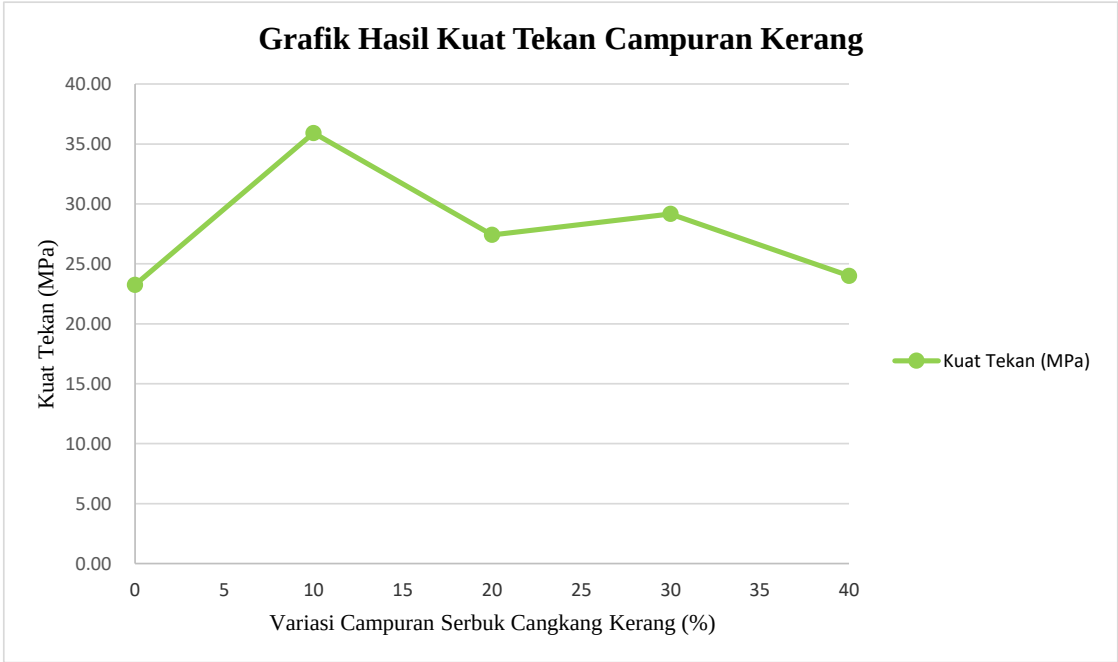
Contoh : Hasil Kuat Tekan Paving Campuran 40%

| No. | Uraian                                             | Benda Uji |        |        |
|-----|----------------------------------------------------|-----------|--------|--------|
|     |                                                    | 1         | 2      | 3      |
| 1   | Berat benda uji sebelum di test (gram)             | 2680      | 2595   | 2722   |
| 2   | Kuat Tekan (P) (KN)                                | 445       | 575    | 420    |
| 3   | Kuat Tekan (P) (N)                                 | 445000    | 575000 | 420000 |
| 4   | Luas permukaan paving ( L ) (mm <sup>2</sup> )     | 20000     | 20000  | 20000  |
| 5   | Kuat Tekan $\text{Kuat tekan} = \frac{P}{L}$ (Mpa) | 22.25     | 28.75  | 21.00  |
| 6   | Rata -rata Kuat Tekan (mm/menit)                   | 24.00     |        |        |

|              |                        |   |  |             |             |             |
|--------------|------------------------|---|--|-------------|-------------|-------------|
| Keterangan : |                        |   |  | benda uji 1 | benda uji 2 | benda uji 3 |
| 1.           | Panjang benda uji (mm) | : |  | 200.000     | 200.000     | 200.000     |
|              | Lebar benda uji (mm)   | : |  | 100.000     | 100.000     | 100.000     |

Contoh : Rekapitulasi Kuat Tekan

| No. | Variasi Campuran Cangkang Kerang (%) | Kuat Tekan (MPa) | Mutu Paving Block | Fungsi |
|-----|--------------------------------------|------------------|-------------------|--------|
| 1   | 0                                    | 23.25            | B                 | Parkir |
| 2   | 10                                   | 35.92            | B                 | Parkir |
| 3   | 20                                   | 27.42            | B                 | Parkir |
| 4   | 30                                   | 29.17            | B                 | Parkir |
| 5   | 40                                   | 24.00            | B                 | Parkir |



# **HASIL TEST PENYERAPAN AIR**

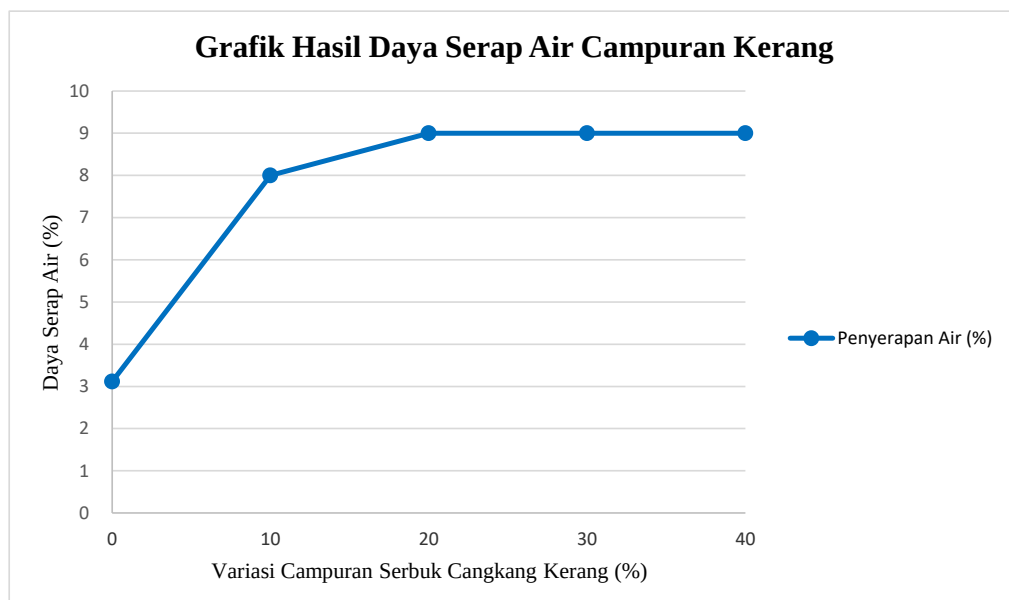
Dikirim oleh : Peneliti  
 Tanggal : Agustus - November  
 Untuk Pekerjaan : Penelitian Paving Block Untuk Tugas Akhir

Contoh : **Hasil Penyerapan Air Paving Campuran Serbuk Canggang Kerang**

| No. | Uraian                                                         | Campuran |                      |                      |                      |                      |
|-----|----------------------------------------------------------------|----------|----------------------|----------------------|----------------------|----------------------|
|     |                                                                | Normal   | 10%<br>(Sampel No.4) | 20%<br>(Sampel No.4) | 30%<br>(Sampel No.4) | 40%<br>(Sampel No.4) |
| 1   | Berat benda uji Kering Sebelum di Oven (gram)                  | 2.70     | 2616                 | 2736                 | 2715                 | 2700                 |
| 2   | Berat benda uji Kondisi Basah (gram)                           | 2.88     | 2824                 | 2881                 | 2862                 | 2841                 |
| 3   | Berat benda uji Kering Setelah di Oven (gram)                  | 2.79     | 2615                 | 2643                 | 2635                 | 2612                 |
| 4   | Selisih berat yang hilang ( A ) (gram)                         | 0.09     | 209                  | 238                  | 227                  | 229                  |
| 5   | Serapan Air (%)                                                | 0.03     | 0.08                 | 0.09                 | 0.09                 | 0.09                 |
|     | $\text{Serapan air} = \frac{M_b - M_k}{M_k} \times 100 \%$ (%) | 3        | 8                    | 9                    | 9                    | 9                    |

Contoh : Rekapitulasi Penyerapan Air

| No. | Variasi Campuran Canggang Kerang (%) | Penyerapan Air (%) | Mutu Paving Block | Fungsi |
|-----|--------------------------------------|--------------------|-------------------|--------|
| 1   | 0                                    | 3                  | A                 | Jalan  |
| 2   | 10                                   | 8                  | C                 | Parkir |
| 3   | 20                                   | 9                  | D                 | Taman  |
| 4   | 30                                   | 9                  | D                 | Taman  |
| 5   | 40                                   | 9                  | D                 | Taman  |



## HASIL TEST AUS PAVING

Dikirim oleh : Peneliti  
 Tanggal : Agustus - November  
 Untuk Pekerjaan : Penelitian Paving Block Untuk Tugas Akhir

Contoh : Hasil Tes Aus Paving Campuran normal

| No. | Uraian                                                       | Benda Uji |        |        |        |        |        |
|-----|--------------------------------------------------------------|-----------|--------|--------|--------|--------|--------|
|     |                                                              | 1         | 2      | 3      | 4      | 5      | 6      |
| 1   | Berat benda uji sebelum di test (gram)                       | 120.90    | 114.70 | 102.20 | 106.20 | 100.30 | 100.10 |
| 2   | Berat benda uji setelah di aus (gram)                        | 106.30    | 96.60  | 89.70  | 94.40  | 85.00  | 83.80  |
| 3   | Selisih berat yang hilang ( A ) (gram)                       | 14.60     | 18.10  | 12.50  | 11.80  | 15.30  | 16.30  |
| 4   | Luas permukaan aus ( L ) (cm <sup>2</sup> )                  | 25.00     | 25.00  | 25.00  | 25.00  | 25.00  | 25.00  |
| 5   | Berat jenis ( Bj ) (gram/m <sup>3</sup> )                    | 2.27      | 2.27   | 2.28   | 2.30   | 2.32   | 2.28   |
| 6   | Waktu pengujian ( W ) (menit)                                | 15.00     | 15.00  | 15.00  | 15.00  | 15.00  | 15.00  |
| 7   | Kausan $\frac{A \times 10}{Bj \times L \times W}$ (mm/menit) | 0.172     | 0.213  | 0.146  | 0.137  | 0.176  | 0.191  |
| 8   | Rata -rata keausan (mm/menit)                                | 0.172     |        |        |        |        |        |

Keterangan :

|    |                          | benda uji 1 | benda uji 2 | benda uji 3 | benda uji 4 | benda uji 5 | benda uji 6 |
|----|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1. | Panjang benda uji (cm) : | 5.000       | 5.000       | 5.000       | 5.000       | 5.000       | 5.000       |
|    | Lebar benda uji (cm) :   | 5.000       | 5.000       | 5.000       | 5.000       | 5.000       | 5.000       |

2. Pengujian menurut SNI 03 - 0691 - 1996

Contoh : Hasil Tes Aus Paving Campuran 10%

| No. | Uraian                                                       | Benda Uji |        |        |        |       |       |
|-----|--------------------------------------------------------------|-----------|--------|--------|--------|-------|-------|
|     |                                                              | 1         | 2      | 3      | 4      | 5     | 6     |
| 1   | Berat benda uji sebelum di test (gram)                       | 135.26    | 132.10 | 132.17 | 125.43 | 0.00  | 0.00  |
| 2   | Berat benda uji setelah di aus (gram)                        | 130.10    | 125.45 | 126.97 | 119.92 | 0.00  | 0.00  |
| 3   | Selisih berat yang hilang ( A ) (gram)                       | 5.16      | 6.65   | 5.20   | 5.51   | 0.00  | 0.00  |
| 4   | Luas permukaan aus ( L ) (cm <sup>2</sup> )                  | 25.00     | 25.00  | 25.00  | 25.00  | 0.00  | 0.00  |
| 5   | Berat jenis ( Bj ) (gram/m <sup>3</sup> )                    | 2.24      | 2.24   | 2.22   | 2.22   | 0.00  | 0.00  |
| 6   | Waktu pengujian ( W ) (menit)                                | 15.00     | 15.00  | 15.00  | 15.00  | 0.00  | 0.00  |
| 7   | Kausan $\frac{A \times 10}{Bj \times L \times W}$ (mm/menit) | 0.062     | 0.079  | 0.062  | 0.066  | 0.000 | 0.000 |
| 8   | Rata -rata keausan (mm/menit)                                | 0.045     |        |        |        |       |       |

Keterangan :

|    |                          | benda uji 1 | benda uji 2 | benda uji 3 | benda uji 4 | benda uji 5 | benda uji 6 |
|----|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1. | Panjang benda uji (cm) : | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |
|    | Lebar benda uji (cm) :   | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |

2. Pengujian menurut SNI 03 - 0691 - 1996



$$\vdots$$

| No. | Uraian                                                         | Benda Uji    |        |        |        |       |       |
|-----|----------------------------------------------------------------|--------------|--------|--------|--------|-------|-------|
|     |                                                                | 1            | 2      | 3      | 4      | 5     | 6     |
| 1   | Berat benda uji sebelum di test (gram)                         | 124.90       | 121.69 | 106.69 | 110.68 | 0.00  | 0.00  |
| 2   | Berat benda uji setelah di aus (gram)                          | 120.53       | 116.61 | 101.31 | 105.10 | 0.00  | 0.00  |
| 3   | Selisih berat yang hilang ( A ) (gram)                         | 4.37         | 5.08   | 5.38   | 5.58   | 0.00  | 0.00  |
| 4   | Luas permukaan aus ( L ) (cm <sup>2</sup> )                    | 25.00        | 25.00  | 25.00  | 25.00  | 0.00  | 0.00  |
| 5   | Berat jenis ( Bj ) (gram/m <sup>3</sup> )                      | 2.20         | 2.21   | 2.21   | 2.20   | 0.00  | 0.00  |
| 6   | Waktu pengujian ( W ) (menit)                                  | 15.00        | 15.00  | 15.00  | 15.00  | 0.00  | 0.00  |
| 7   | Keausan $\frac{A \times 10}{B_j \times L \times W}$ (mm/menit) | 0.053        | 0.061  | 0.065  | 0.067  | 0.000 | 0.000 |
| 8   | Rata -rata keausan (mm/menit)                                  | <b>0.041</b> |        |        |        |       |       |

Keterangan :

| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 | benda uji 4 | benda uji 5 | benda uji 6 |
|--------------|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1.           | Panjang benda uji (cm) : | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |
|              | Lebar benda uji (cm) :   | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |

## 2. Pengujian menurut SNI 03 - 0691 - 1996

$$\vdots$$

| No. | Uraian                                                        | Benda Uji    |        |        |        |       |       |
|-----|---------------------------------------------------------------|--------------|--------|--------|--------|-------|-------|
|     |                                                               | 1            | 2      | 3      | 4      | 5     | 6     |
|     |                                                               |              |        |        |        |       |       |
| 1   | Berat benda uji sebelum di test (gram)                        | 111.11       | 120.44 | 113.15 | 120.72 | 0.00  | 0.00  |
|     |                                                               |              |        |        |        |       |       |
| 2   | Berat benda uji setelah di aus (gram)                         | 104.98       | 115.98 | 108.71 | 117.11 | 0.00  | 0.00  |
|     |                                                               |              |        |        |        |       |       |
| 3   | Selisih berat yang hilang ( A ) (gram)                        | 6.13         | 4.46   | 4.44   | 3.61   | 0.00  | 0.00  |
|     |                                                               |              |        |        |        |       |       |
| 4   | Luas permukaan aus ( L ) (cm <sup>2</sup> )                   | 25.00        | 25.00  | 25.00  | 25.00  | 0.00  | 0.00  |
|     |                                                               |              |        |        |        |       |       |
| 5   | Berat jenis ( Bj ) (gram/m <sup>3</sup> )                     | 2.23         | 2.20   | 2.21   | 2.21   | 0.00  | 0.00  |
|     |                                                               |              |        |        |        |       |       |
| 6   | Waktu pengujian ( W ) (menit)                                 | 15.00        | 15.00  | 15.00  | 15.00  | 0.00  | 0.00  |
| 7   | Keausan $\frac{A \times 10}{Bj \times L \times W}$ (mm/menit) | 0.073        | 0.054  | 0.054  | 0.044  | 0.000 | 0.000 |
| 8   | Rata -rata keausan (mm/menit)                                 | <b>0.037</b> |        |        |        |       |       |

Keterangan :

| Keterangan : |                          | benda uji 1 | benda uji 2 | benda uji 3 | benda uji 4 | benda uji 5 | benda uji 6 |
|--------------|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1.           | Panjang benda uji (cm) : | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |
|              | Lebar benda uji (cm) :   | 5.000       | 5.000       | 5.000       | 5.000       | 0.000       | 0.000       |

2. Pengujian menurut SNI 03 - 0691 - 1996

Contoh : Hasil Tes Aus Paving Campuran 40%

| No. | Uraian                                                        | Benda Uji |        |        |        |       |       |
|-----|---------------------------------------------------------------|-----------|--------|--------|--------|-------|-------|
|     |                                                               | 1         | 2      | 3      | 4      | 5     | 6     |
| 1   | Berat benda uji sebelum di test (gram)                        | 110.25    | 119.80 | 115.88 | 122.11 | 0.00  | 0.00  |
| 2   | Berat benda uji setelah di aus (gram)                         | 102.74    | 109.97 | 108.39 | 113.48 | 0.00  | 0.00  |
| 3   | Selisih berat yang hilang ( A ) (gram)                        | 7.51      | 9.83   | 7.49   | 8.63   | 0.00  | 0.00  |
| 4   | Luas permukaan aus ( L ) (cm <sup>2</sup> )                   | 25.00     | 25.00  | 25.00  | 25.00  | 0.00  | 0.00  |
| 5   | Berat jenis ( Bj ) (gram/m <sup>3</sup> )                     | 2.19      | 2.22   | 2.19   | 2.21   | 0.00  | 0.00  |
| 6   | Waktu pengujian ( W ) (menit)                                 | 15.00     | 15.00  | 15.00  | 15.00  | 0.00  | 0.00  |
| 7   | Kearsan $\frac{A \times 10}{Bj \times L \times W}$ (mm/menit) | 0.091     | 0.118  | 0.091  | 0.104  | 0.000 | 0.000 |
| 8   | Rata -rata kearsan (mm/menit)                                 | 0.067     |        |        |        |       |       |

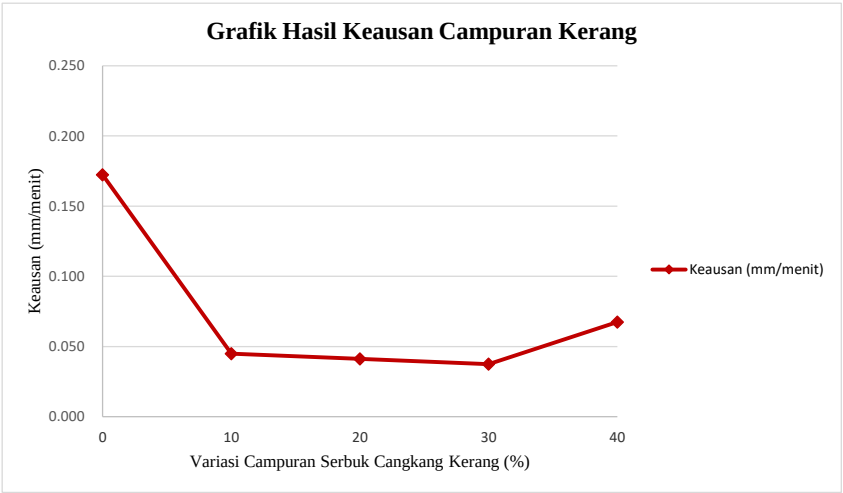
Keterangan : benda uji 1 benda uji 2 benda uji 3 benda uji 4 benda uji 5 benda uji 6

|    |                        |   |       |       |       |       |       |       |
|----|------------------------|---|-------|-------|-------|-------|-------|-------|
| 1. | Panjang benda uji (cm) | : | 5.000 | 5.000 | 5.000 | 5.000 | 0.000 | 0.000 |
|    | Lebar benda uji (cm)   | : | 5.000 | 5.000 | 5.000 | 5.000 | 0.000 | 0.000 |

2. Pengujian menurut SNI 03 - 0691 - 1996

Contoh : Rekapitulasi Tes Aus

| No | Variasi serbuk cangkang kerang | Kearsan (mm/menit) | Mutu Paving Block | Fungsi       |
|----|--------------------------------|--------------------|-------------------|--------------|
| 1  | 0                              | 0.172              | C                 | pejalan kaki |
| 2  | 10                             | 0.045              | A                 | jalan        |
| 3  | 20                             | 0.041              | A                 | jalan        |
| 4  | 30                             | 0.037              | A                 | jalan        |
| 5  | 40                             | 0.067              | A                 | jalan        |





# **LAMPIRAN 3**

## **DOKUMENTASI PENELITIAN**

## **DOKUMENTASI PENELITIAN *PAVING BLOCK***

### **BAHAN**



**Pasir Lumajang**



**Semen Portland**



**Serbuk Cangkang Kerang Hijau**





**Air Bersih**

## **ALAT**



***Sieve Shaker dan Saringan***



***Cetakan Paving block dan Mixer Beton***



**Oli dan Kuas**



**Ember dan Kapi**



**Gelas Ukur 1000 ml**



**Timbangan**





**Sekop**



**Drying Oven dan Loyang**

## PROSES PEMBUATAN SECARA MANUAL



**Pembuatan Benda Uji *Paving block***

## BENDA UJI



Benda uji Benda Uji yang telah dibuat



Pengujian Kandungan Organik Pada Agregat



Pengujian Kadar Lumpur Pada Agregat



## **PENGUJIAN *PAVING BLOCK***



**Benda Uji Untuk Pengujian Kuat Tekan**



**Pengujian Kuat Tekan *Paving block***



**Benda Uji Setelah Pengujian Kuat Tekan**



**Benda Uji Untuk Pengujian Penyerapan Air**



**Pengujian Penyerapan Air *Paving block***



**Benda Uji untuk Pengujian Keausan**



**Pengujian Keausan *Paving block***