

## LAMPIRAN DOKUMENTASI

### LAMPIRAN-1

#### Dokumentasi Serbuk Batu Kapur



Pengambilan Serbuk Batu Kapur



Serbuk Batu Kapur

**LAMPIRAN-2****Dokumentasi Pengujian Berat Jenis Agregat Kasar**

Penimbangan Agregat Kasar



Proses penyaringan agregat kasar

**LAMPIRAN-3****Pengujian Berat Jenis Dan Penyerapan Agregat Halus (Abu Batu)**

Piknometer + Abu Batu + Air



Proses penimbangan abu batu setelah oven



**LAMPIRAN-4****Dokumentasi Pengujian Keausan Agregat Kasar (Abrasi)**

Los Angeles



Agregat Yang Telah Di Abrasi



**LAMPIRAN-5**  
**Dokumentasi Pengujian Analisa Saringan**



Saringan



Proses Penimbangan Agregat Setelah Di Saring

**LAMPIRAN-6**  
**Dokumentasi Pemeriksaan Berat Jenis Aspal**



Timbangan



Piknometer + Aspal

**LAMPIRAN-7**  
**Dokumentasi Pemeriksaan Titik Lembek**



Bejana Gelas dan Thermometer



Proses Pencairan Aspal



**LAMPIRAN-8****Dokumentasi Pengujian Kehilangan Berat Aspal**

Proses Pengisian Aspal ke Tinbox



Tin Box Berisi Aspal dan Timbangan

**LAMPIRAN-9****Dokumentasi Pemeriksaan Penetrasi Bahan-Bahan Bitumen**

Proses Pengisian Aspal ke Tinbox



Proses Penetrasi

**LAMPIRAN-10**  
**Dokumentasi Rancangan Campuran Aspal**



Proses Pencampuran Agregat dengan Aspal



Pemanasan Agregat



## LAMPIRAN-11

### Dokumentasi Marshall



Alat Marshall



Penimbangan Bricket Aspal



**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**BERAT JENIS AGREGAT KASAR**

Tanggal : 21 Februari 2024

Nama : Nursyakila Atirah

|                                            | I      | II     | Rata-rata |
|--------------------------------------------|--------|--------|-----------|
| Berat benda uji kering oven ( $B_k$ )      | 4058,5 | 4098,0 | 4078,25   |
| Berat benda uji kering permukaan ( $B_j$ ) | 5078,5 | 5089,5 | 5084,00   |
| Berat benda uji dalam air ( $B_a$ )        | 3145,8 | 3106,0 | 3125,90   |

|                                                      | I    | II   | Rata-rata |
|------------------------------------------------------|------|------|-----------|
| Berat jenis (Bulk) $B_k B_j - B_a$                   | 2,57 | 2,52 | 2,54      |
| Berat jenis kering permukaan $B_j B_j - B_a$         | 2,63 | 2,57 | 2,60      |
| Berat jenis semu $B_k B_k - B_a$                     | 2,73 | 2,64 | 2,69      |
| Penyerapan (Absorption) $B_j - B_k B_k \times 100\%$ | 2,42 | 1,83 | 2,13      |

Parepare, 21 Februari 2024

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**BERAT JENIS AGREGAT KASAR 0,5-1**

Tanggal : 21 Februari 2024

Nama : Nursyakila Atirah

|                                            | I      | II     | Rata-rata |
|--------------------------------------------|--------|--------|-----------|
| Berat benda uji kering oven ( $B_k$ )      | 4975,2 | 4960,0 | 4968,00   |
| Berat benda uji kering permukaan ( $B_j$ ) | 5010,5 | 5085,0 | 5047,75   |
| Berat benda uji dalam air ( $B_a$ )        | 3215,6 | 3300,2 | 3257,90   |

|                                                      | I    | II   | Rata-rata |
|------------------------------------------------------|------|------|-----------|
| Berat jenis (Bulk) $B_k B_j - B_a$                   | 2,77 | 2,78 | 2,78      |
| Berat jenis kering permukaan $B_j B_j - B_a$         | 2,79 | 2,85 | 2,82      |
| Berat jenis semu $B_k B_k - B_a$                     | 2,83 | 2,99 | 2,91      |
| Penyerapan (Absorption) $B_j - B_k B_k \times 100\%$ | 0,71 | 2,50 | 1,61      |

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**BERAT JENIS AGREGAT HALUS**

Tanggal : 21 Februari 2024

Nama : Nurhyakula Atirah

|                                              | I      | II     | Rata-rata |
|----------------------------------------------|--------|--------|-----------|
| Berat benda uji kondisi SSD                  | 500,0  | 500,0  | 500,0     |
| Berat benda uji kering oven ( $B_k$ )        | 493,2  | 497,7  | 495,45    |
| Berat piknometer + air ( $B$ )               | 822,6  | 850,0  | 836,30    |
| Berat benda uji + piknometer + air ( $B_t$ ) | 1127,6 | 1153,3 | 1140,45   |

|                                                      | I    | II   | Rata-rata |
|------------------------------------------------------|------|------|-----------|
| Berat jenis (Bulk) $B_k B + SSD - B_t$               | 2,53 | 2,53 | 2,53      |
| Berat jenis kering permukaan $SSDB + SSD - B_t$      | 2,56 | 2,54 | 2,55      |
| Berat jenis semu $B_k B + B_k - B_t$                 | 2,62 | 2,56 | 2,59      |
| Penyerapan (Absorption) $SSD - B_k B_k \times 100\%$ | 1,38 | 0,46 | 0,92      |

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**KEAUSAN AGREGAT KASAR (ABRASI)**

Tanggal : 22 Februari 2024

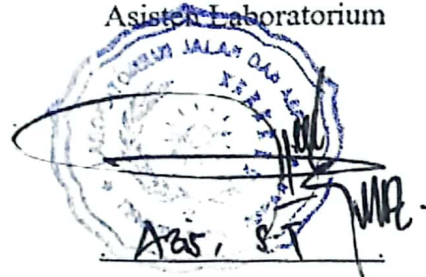
Nama : Nursyakila Atirah

| Saringan                       |                | Berat   |         |
|--------------------------------|----------------|---------|---------|
| Lolos                          | Tertahan       | Sebelum | Sesudah |
| 19 mm (3/4")                   | 12,5 mm (1/2") | 2500    |         |
| 12,5 mm (1/2")                 | 9,5 mm (3/8")  | 2500    |         |
| Jumlah berat                   |                | 5000    |         |
| Berat tertahan saringan No. 12 |                |         | 426,4   |
| Persen keausan                 |                | 15,6 %  |         |

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Aas, S.T.



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**PENGUJIAN ANALISA SARINGAN AGREGAT KASAR 1 - 2**

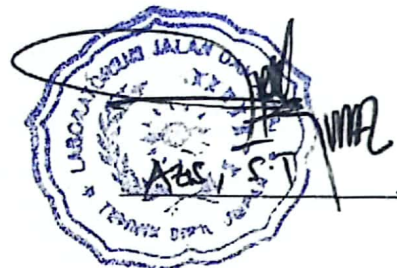
Tanggal : 21 Februari 2024

Nama : Nursyakila Atirah

| No.<br>Saringan | Sampel I          |                 |                       |              | Sampel II         |                 |                       |              | Rata-rata |
|-----------------|-------------------|-----------------|-----------------------|--------------|-------------------|-----------------|-----------------------|--------------|-----------|
|                 | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos |           |
| 3/4"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00    |
| 1/2"            | 492,20            | 32,81           | 32,81                 | 67,19        | 618,50            | 41,23           | 41,23                 | 58,77        | 62,98     |
| 3/8"            | 416,00            | 27,73           | 60,55                 | 39,45        | 367,40            | 24,49           | 65,73                 | 34,27        | 36,86     |
| 4               | 354,00            | 23,65           | 84,20                 | 15,80        | 344,90            | 22,99           | 88,72                 | 11,28        | 13,54     |
| 8               | 83,80             | 5,59            | 89,79                 | 10,21        | 94,00             | 6,32            | 95,04                 | 4,96         | 7,59      |
| 16              | 8,00              | 0,53            | 90,32                 | 9,68         | 5,00              | 0,33            | 95,37                 | 4,63         | 7,15      |
| 30              | 2,60              | 0,17            | 90,49                 | 9,51         | 0,50              | 0,03            | 95,41                 | 4,59         | 7,05      |
| 50              | 4,30              | 0,29            | 90,78                 | 9,22         | 0,00              | 0,00            | 95,41                 | 4,59         | 6,91      |
| 100             | 2,40              | 0,16            | 90,94                 | 9,06         | 0,00              | 0,00            | 95,41                 | 4,59         | 6,83      |
| 200             | 1,60              | 0,11            | 91,05                 | 8,95         | 1,10              | 0,07            | 95,48                 | 4,52         | 6,74      |
| Pan             | 134,30            | 8,95            | 100,00                | 0,00         | 67,80             | 4,52            | 100,00                | 0,00         | 0,00      |
| Jumlah          | 1500,00           | 100,00          |                       |              | 1500,00           | 100,00          |                       |              |           |

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**PENGUJIAN ANALISA SARINGAN AGREGAT KASAR 0,5 - 1**

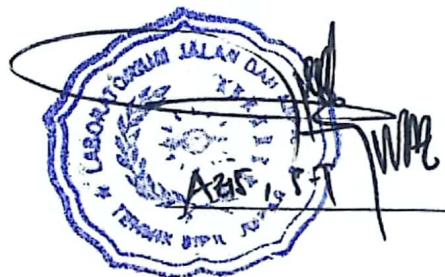
Tanggal : 21 Februari 2024

Nama : Nurizakila Atirah

| No.<br>Saringan | Sampel I          |                 |                       |              | Sampel II         |                 |                       |              | Rata-<br>rata |
|-----------------|-------------------|-----------------|-----------------------|--------------|-------------------|-----------------|-----------------------|--------------|---------------|
|                 | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos |               |
| 3/4"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00        |
| 1/2"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00        |
| 3/8"            | 219,60            | 14,64           | 14,64                 | 85,36        | 236,40            | 15,76           | 15,76                 | 84,24        | 84,80         |
| 4               | 684,10            | 45,61           | 60,25                 | 39,75        | 708,30            | 47,22           | 62,98                 | 37,02        | 30,39         |
| 8               | 426,90            | 28,46           | 88,71                 | 11,29        | 418,10            | 27,87           | 90,85                 | 9,15         | 10,22         |
| 16              | 103,40            | 6,89            | 95,60                 | 4,40         | 93,20             | 6,21            | 97,07                 | 2,93         | 3,67          |
| 30              | 52,40             | 3,49            | 99,09                 | 0,91         | 30,30             | 2,02            | 99,09                 | 0,91         | 0,91          |
| 50              | 0,70              | 0,05            | 99,14                 | 0,86         | 0,60              | 0,04            | 99,13                 | 0,87         | 0,87          |
| 100             | 0,70              | 0,05            | 99,19                 | 0,81         | 1,80              | 0,12            | 99,25                 | 0,75         | 0,78          |
| 200             | 0,00              | 0,00            | 99,19                 | 0,81         | 2,70              | 0,18            | 99,43                 | 0,57         | 0,69          |
| Pan             | 12,20             | 0,81            | 100,00                | 0,00         | 8,60              | 0,57            | 100,00                | 0,00         | 0,00          |
| Jumlah          | 1500,00           | 100,00          |                       |              | 1500,00           | 100,00          |                       |              |               |

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PENGUJIAN ANALISA SARINGAN AGREGAT HALUS

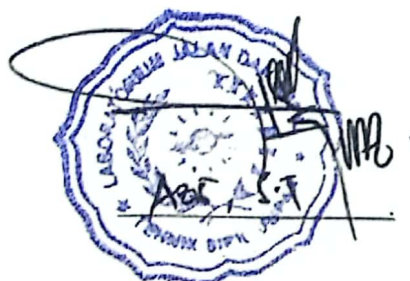
Tanggal : 21 Februari 2024

Nama : Nurisyakila Atirah

| No.<br>Saringan | Sampel I          |                 |                       |              | Sampel II         |                 |                       |              | Rata-rata |
|-----------------|-------------------|-----------------|-----------------------|--------------|-------------------|-----------------|-----------------------|--------------|-----------|
|                 | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos | Berat<br>Tertahan | (%)<br>Tertahan | Kumulatif<br>Tertahan | (%)<br>Lolos |           |
| 3/4"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00    |
| 1/2"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00    |
| 3/8"            | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00    |
| 4               | 0,00              | 0,00            | 0,00                  | 100,00       | 0,00              | 0,00            | 0,00                  | 100,00       | 100,00    |
| 8               | 178,30            | 11,89           | 11,89                 | 88,11        | 155,40            | 10,36           | 10,36                 | 89,64        | 88,88     |
| 16              | 452,90            | 30,19           | 42,08                 | 57,92        | 433,90            | 28,93           | 39,29                 | 60,71        | 59,32     |
| 30              | 339,20            | 22,28           | 64,36                 | 35,64        | 333,80            | 22,25           | 61,54                 | 38,46        | 37,05     |
| 50              | 158,60            | 10,57           | 74,93                 | 25,07        | 169,50            | 11,30           | 72,84                 | 27,16        | 26,11     |
| 100             | 127,40            | 8,49            | 83,43                 | 16,57        | 148,10            | 9,67            | 82,51                 | 17,49        | 17,03     |
| 200             | 63,60             | 4,24            | 87,67                 | 12,33        | 76,30             | 5,09            | 87,60                 | 12,40        | 12,33     |
| Pan             | 185,00            | 12,33           | 100,00                | 0,00         | 186,00            | 12,40           | 100,00                | 0,00         | 0,00      |
| Jumlah          | 1500,00           | 100,00          |                       |              | 1500,00           | 100,00          |                       |              |           |

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**PEMERIKSAAN BERAT JENIS ASPAL**

Tanggal : 22 Februari 2024

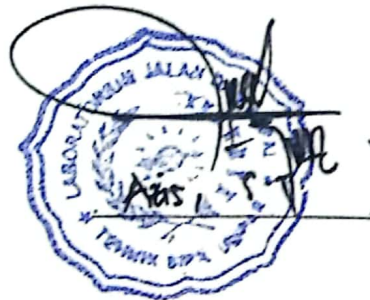
Nama : Nurisyakila Atirah

|                                                 | I      | II     | Rata-rata |
|-------------------------------------------------|--------|--------|-----------|
| Berat piknometer ( gr ) (A)                     | 46,20  | 46,70  | 46,45     |
| Berat piknometer + air suling ( gr ) (B)        | 104,40 | 106,20 | 105,30    |
| Berat piknometer + aspal ( gr ) (C)             | 95,60  | 90,70  | 93,15     |
| Berat piknometer + air suling + aspal ( g ) (D) | 105,20 | 106,70 | 105,95    |
| Berat Jenis Aspal C-AB-A- (D-C)                 | 1,02   | 1,01   | 1,01      |

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**PENGUJIAN KEHILANGAN BERAT ASPAL**

Tanggal : 22 Februari 2024

Nama : Nursyakila Atirah

|                                           | I     | II    | Rata-rata |
|-------------------------------------------|-------|-------|-----------|
| Berat tin box                             | 10,40 | 10,80 | 10,60     |
| Berat ( tin box + aspal ) sebelum di oven | 67,40 | 65,60 | 66,50     |
| Berat aspal sebelum di oven ( B - A )     | 57,00 | 54,80 | 55,90     |
| Berat ( tin box + aspal ) sesudah di oven | 67,00 | 65,50 | 66,25     |
| Berat aspal sesudah di oven ( D - A )     | 56,60 | 54,70 | 55,65     |
| Jumlah penurunan berat ( C - E )          | 0,40  | 0,10  | 0,25      |
| Prosentase penurunan berat aspal          | 0,70  | 0,18  | 0,44      |

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**PEMERIKSAAN PENETRASI BAHAN-BAHAN BITUMEN**

Nama : Nursyakila Atirah

Tanggal : 22 Februari 2024

| No.<br>Sampel | Pembacaan (detik) |    |    |    |    | Rata-rata |
|---------------|-------------------|----|----|----|----|-----------|
|               | 5                 | 5  | 5  | 5  | 5  |           |
| I             | 63                | 65 | 67 | 70 | 71 | 67,20     |
| II            | 65                | 68 | 70 | 72 | 69 | 68,80     |
| Rata - rata   |                   |    |    |    |    | 68,00     |

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**PEMERIKSAAN TITIK LEMBEK**

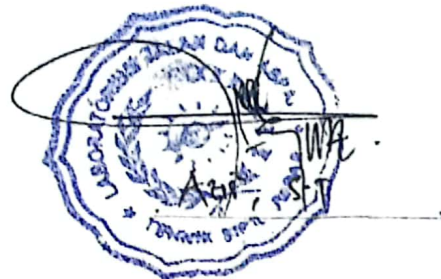
Nama : Nursyakila Atirah

Tanggal : 22 Februari 2024

| No. | Waktu (Detik) |    | Suhu Bola Jatuh (°C) |    |
|-----|---------------|----|----------------------|----|
|     | I             | II | I                    | II |
| 1   | 5             | 5  | 29                   | 29 |
| 2   | 10            | 10 | 34                   | 34 |
| 3   | 15            | 15 | 40                   | 40 |
| 4   | 17            | 17 | 48                   | 49 |
| 5   |               |    |                      |    |
| 6   |               |    |                      |    |
| 7   |               |    |                      |    |
| 8   |               |    |                      |    |
| 9   |               |    |                      |    |
| 10  |               |    |                      |    |

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**ANALISA AYAK AGREGAT**

Tanggal : 24 Februari 2024  
Nama : Nursyakila Aritah  
Variasi : Normal

| UKURAN<br>AYAKAN<br>(MM) | TERTAHAN (GRAM) |             |                  |             | TERTAHAN (%) |             |                  |             | TERTAHAN KUMULATIF (%) |             |                  |             | LOLOS KUMULATIF (%) |             |                  |             |
|--------------------------|-----------------|-------------|------------------|-------------|--------------|-------------|------------------|-------------|------------------------|-------------|------------------|-------------|---------------------|-------------|------------------|-------------|
|                          | Split<br>A      | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A   | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A             | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A          | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D |
| 37.50                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 25.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 19.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 12.50                    | 555.35          | 0.00        | 0.00             | 0.00        | 37.02        | 0.00        | 0.00             | 0.00        | 37.02                  | 0.00        | 0.00             | 0.00        | 62.98               | 100.00      | 100.00           | 100.00      |
| 9.50                     | 391.70          | 228.00      | 0.00             | 0.00        | 26.11        | 15.20       | 0.00             | 0.00        | 63.14                  | 15.20       | 0.00             | 0.00        | 36.86               | 84.80       | 100.00           | 100.00      |
| 4.75                     | 349.85          | 696.20      | 0.00             | 0.00        | 23.32        | 46.41       | 0.00             | 0.00        | 86.46                  | 61.61       | 0.00             | 0.00        | 13.54               | 38.39       | 100.00           | 100.00      |
| 2.36                     | 89.30           | 422.50      | 166.85           | 0.00        | 5.95         | 28.17       | 11.12            | 0.00        | 92.41                  | 89.78       | 11.12            | 0.00        | 7.59                | 10.22       | 88.88            | 100.00      |
| 1.18                     | 6.50            | 98.30       | 443.40           | 0.00        | 0.43         | 6.55        | 29.56            | 0.00        | 92.85                  | 96.33       | 40.68            | 0.00        | 7.15                | 3.67        | 59.32            | 100.00      |
| 0.60                     | 1.55            | 41.35       | 334.00           | 0.00        | 0.10         | 2.76        | 22.27            | 0.00        | 92.95                  | 99.09       | 62.95            | 0.00        | 7.05                | 0.91        | 37.05            | 100.00      |
| 0.30                     | 2.15            | 0.65        | 164.05           | 0.00        | 0.14         | 0.04        | 10.94            | 0.00        | 93.09                  | 99.13       | 73.89            | 0.00        | 6.91                | 0.87        | 26.11            | 100.00      |
| 0.15                     | 1.20            | 1.25        | 136.25           | 0.00        | 0.08         | 0.08        | 9.08             | 0.00        | 93.17                  | 99.22       | 82.97            | 0.00        | 6.83                | 0.78        | 17.03            | 100.00      |
| 0.075                    | 1.35            | 1.35        | 69.95            | 0.00        | 0.09         | 0.09        | 4.66             | 0.00        | 93.26                  | 99.31       | 87.63            | 0.00        | 6.74                | 0.69        | 12.37            | 100.00      |
| < 0.075                  | 101.05          | 10.40       | 185.5            | 1500.00     | 6.74         | 0.69        | 12.37            | 100.00      | 100.00                 | 100.00      | 100.00           | 100.00      | 0.00                | 0.00        | 0.00             | 0.00        |
| Jumlah                   | 1500.00         | 1500.00     | 1500.00          | 1500.00     | 100.00       | 100.00      | 100.00           | 100.00      |                        |             |                  |             |                     |             |                  |             |

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**GRADASI GABUNGAN AGREGAT AC-WC**

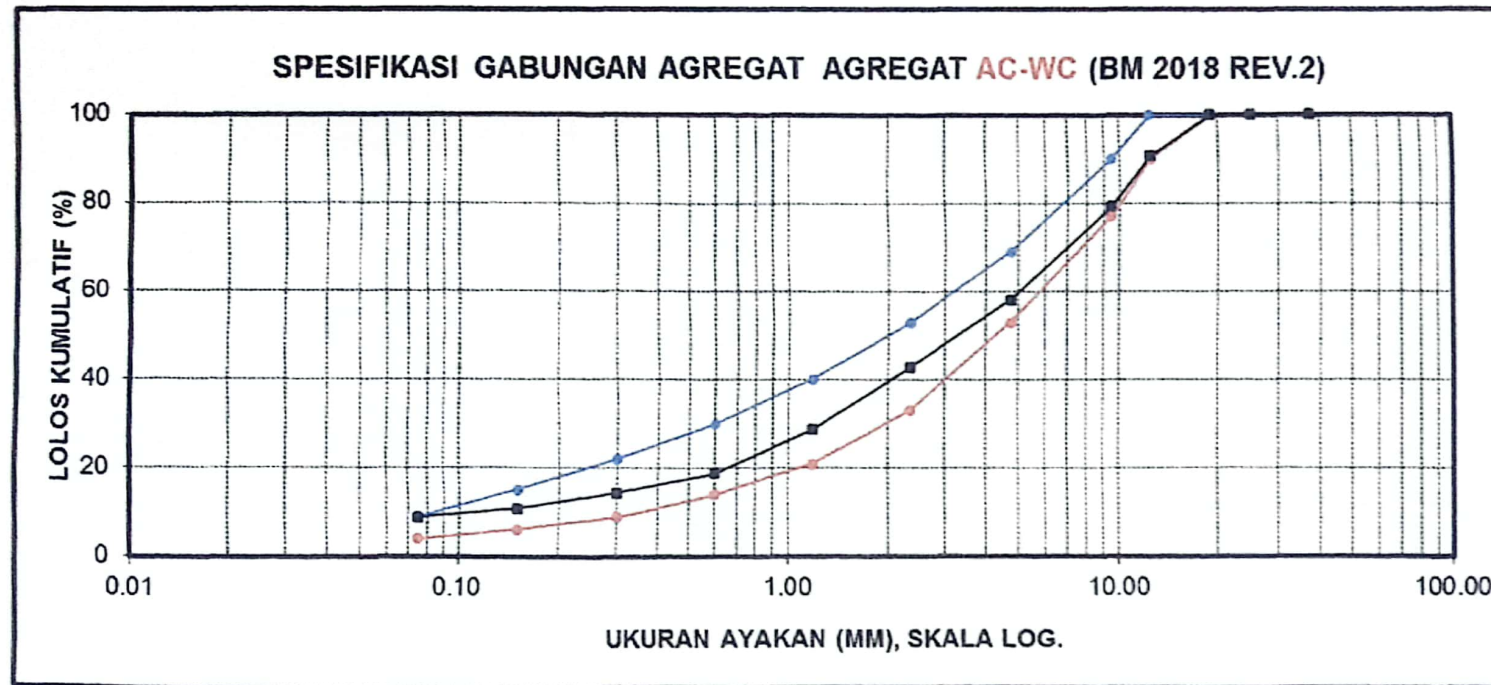
Tanggal : 24 Februari 2024  
 Nama : Nursyakila Atirah  
 Variasi : Normal

| UKURAN<br>AYAKAN (MM) | LOLOS KUMULATIF (%) |             |             |            | LOLOS KUMULATIF (%), GABUNGAN<br>AGREGAT |              |              |             |                           | LOLOS KUM. (%)<br>SPEK BM 2018<br>Rev.2 |      |
|-----------------------|---------------------|-------------|-------------|------------|------------------------------------------|--------------|--------------|-------------|---------------------------|-----------------------------------------|------|
|                       | Split(1-2)          | Screen(0,5) | Abu<br>Batu | Filler     | Split                                    | Screen       | Abu<br>Batu  | Filler      | JUMLAH<br>GAB.<br>A+B+C+D | AC-WC                                   |      |
|                       | (A)<br>100          | (B)<br>100  | (C)<br>100  | (D)<br>100 | (A)<br>25.00                             | (B)<br>33.00 | (C)<br>40.00 | (D)<br>2.00 | 100.00                    | Bawah                                   | Atas |
| 37.50                 | 100.00              | 100.00      | 100.00      | 100.00     | 25.00                                    | 33.00        | 40.00        | 2.00        | 100.00                    | 100                                     | 100  |
| 25.00                 | 100.00              | 100.00      | 100.00      | 100.00     | 25.00                                    | 33.00        | 40.00        | 2.00        | 100.00                    | 100                                     | 100  |
| 19.00                 | 100.00              | 100.00      | 100.00      | 100.00     | 25.00                                    | 33.00        | 40.00        | 2.00        | 100.00                    | 100                                     | 100  |
| 12.50                 | 62.98               | 100.00      | 100.00      | 100.00     | 15.74                                    | 33.00        | 40.00        | 2.00        | 90.74                     | 90                                      | 100  |
| 9.50                  | 36.86               | 84.80       | 100.00      | 100.00     | 9.22                                     | 27.98        | 40.00        | 2.00        | 79.20                     | 77                                      | 90   |
| 4.75                  | 13.54               | 38.39       | 100.00      | 100.00     | 3.39                                     | 12.67        | 40.00        | 2.00        | 58.05                     | 53                                      | 69   |
| 2.36                  | 7.59                | 10.22       | 88.88       | 100.00     | 1.90                                     | 3.37         | 35.55        | 2.00        | 42.82                     | 33                                      | 53   |
| 1.18                  | 7.15                | 3.67        | 59.32       | 100.00     | 1.79                                     | 1.21         | 23.73        | 2.00        | 28.73                     | 21                                      | 40   |
| 0.60                  | 7.05                | 0.91        | 37.05       | 100.00     | 1.76                                     | 0.30         | 14.82        | 2.00        | 18.88                     | 14                                      | 30   |
| 0.30                  | 6.91                | 0.87        | 26.11       | 100.00     | 1.73                                     | 0.29         | 10.45        | 2.00        | 14.46                     | 9                                       | 22   |
| 0.15                  | 6.83                | 0.78        | 17.03       | 100.00     | 1.71                                     | 0.26         | 6.81         | 2.00        | 10.78                     | 6                                       | 15   |
| 0.075                 | 6.74                | 0.69        | 12.37       | 100.00     | 1.68                                     | 0.23         | 4.95         | 2.00        | 8.86                      | 4                                       | 9    |





**LABORATORIUM JALAN DAN ASPAL**  
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**UNIVERSITAS MUHAMMADIYAH PAREPARE**



Parepare, 24 Februari 2024

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**RANCANGAN CAMPURAN ASPAL AC-WC**

Tanggal : 24 Februari 2024  
Nama : Nurriyakila Atirah  
Variasi : Normal

| URAIAN                 |  |  |    | NILAI | SATUAN |
|------------------------|--|--|----|-------|--------|
| Proporsi fraksi Kasar  |  |  | CA | 57.18 | %      |
| Proporsi fraksi Halus  |  |  | FA | 33.96 | %      |
| Proporsi Bahan Pengisi |  |  | FF | 8.86  | %      |
| Nilai Konstanta        |  |  | K  | 1.00  | %      |
| Perkiraan Kadar Aspal  |  |  | Pb | 6.12  | %      |

*Rumus Perkiraan Kadar Aspal (Pb)*

$$Pb = 0,035 (CA) + 0,045 (FA) + 0,18 (FF) + K$$

| KOMPONEN                |          | KOMPOSISI | KADAR ASPAL RENCANA (%) |        |        |        |        |
|-------------------------|----------|-----------|-------------------------|--------|--------|--------|--------|
|                         |          | AGREGAT   | 4                       | 4.5    | 5.00   | 5.5    | 6      |
| a                       | Split    | 25%       | 24.00                   | 23.88  | 23.75  | 23.63  | 23.50  |
| b                       | Screen   | 33%       | 31.68                   | 31.52  | 31.35  | 31.19  | 31.02  |
| c                       | Abu Batu | 40%       | 38.40                   | 38.20  | 38.00  | 37.80  | 37.60  |
| d                       | Filler   | 2%        | 1.92                    | 1.91   | 1.90   | 1.89   | 1.88   |
| TOTAL AGG. CAMPURAN (%) |          | 100%      | 96.00                   | 95.50  | 95.00  | 94.50  | 94.00  |
| TOTAL CAMPURAN (%)      |          |           | 100.00                  | 100.00 | 100.00 | 100.00 | 100.00 |

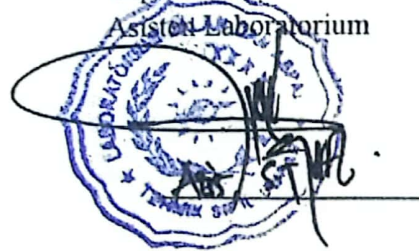


**LABORATORIUM JALAN DAN ASPAL**  
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| KOMPOSISI CAMPURAN          |          | KOMPOSISI AGGREGAT | BERAT TIMBANGAN |        |        |        |        |
|-----------------------------|----------|--------------------|-----------------|--------|--------|--------|--------|
|                             |          | %                  | 4               | 4.5    | 5      | 5.5    | 6      |
| a                           | Split    | 25%                | 288.0           | 286.5  | 285.0  | 283.5  | 282.0  |
| b                           | Screen   | 33%                | 380.2           | 378.2  | 376.2  | 374.2  | 372.2  |
| c                           | Abu Batu | 40%                | 460.8           | 458.4  | 456.0  | 453.6  | 451.2  |
| d                           | Filler   | 2%                 | 23.0            | 22.9   | 22.8   | 22.7   | 22.6   |
| BERAT AGREGAT CAMPURAN (gr) |          |                    | 1152.0          | 1146.0 | 1140.0 | 1134.0 | 1128.0 |
|                             |          |                    | 48.0            | 54.0   | 60.0   | 66.0   | 72.0   |
|                             |          |                    | 1200.0          | 1200.0 | 1200.0 | 1200.0 | 1200.0 |

Parepare, 24 Februari 2024

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**ANALISA AYAK AGREGAT**

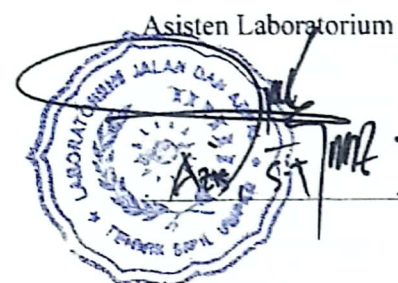
Tanggal : 24 Februari 2024

Nama : Nurhyakila Atirah

Variasi : Filler 1%

| UKURAN<br>AYAKAN<br>(MM) | TERTAHAN (GRAM) |             |                  |             | TERTAHAN (%) |             |                  |             | TERTAHAN KUMULATIF (%) |             |                  |             | LOLOS KUMULATIF (%) |             |                  |             |
|--------------------------|-----------------|-------------|------------------|-------------|--------------|-------------|------------------|-------------|------------------------|-------------|------------------|-------------|---------------------|-------------|------------------|-------------|
|                          | Split<br>A      | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A   | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A             | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A          | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D |
| 37.50                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 25.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 19.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 12.50                    | 555.35          | 0.00        | 0.00             | 0.00        | 37.02        | 0.00        | 0.00             | 0.00        | 37.02                  | 0.00        | 0.00             | 0.00        | 62.98               | 100.00      | 100.00           | 100.00      |
| 9.50                     | 391.70          | 228.00      | 0.00             | 0.00        | 26.11        | 15.20       | 0.00             | 0.00        | 63.14                  | 15.20       | 0.00             | 0.00        | 36.86               | 84.80       | 100.00           | 100.00      |
| 4.75                     | 349.85          | 696.20      | 0.00             | 0.00        | 23.32        | 46.41       | 0.00             | 0.00        | 86.46                  | 61.61       | 0.00             | 0.00        | 13.54               | 38.39       | 100.00           | 100.00      |
| 2.36                     | 89.30           | 422.50      | 166.85           | 0.00        | 5.95         | 28.17       | 11.12            | 0.00        | 92.41                  | 89.78       | 11.12            | 0.00        | 7.59                | 10.22       | 88.88            | 100.00      |
| 1.18                     | 6.50            | 98.30       | 443.40           | 0.00        | 0.43         | 6.55        | 29.56            | 0.00        | 92.85                  | 96.33       | 40.68            | 0.00        | 7.15                | 3.67        | 59.32            | 100.00      |
| 0.60                     | 1.55            | 41.35       | 334.00           | 0.00        | 0.10         | 2.76        | 22.27            | 0.00        | 92.95                  | 99.09       | 62.95            | 0.00        | 7.05                | 0.91        | 37.05            | 100.00      |
| 0.30                     | 2.15            | 0.65        | 164.05           | 0.00        | 0.14         | 0.04        | 10.94            | 0.00        | 93.09                  | 99.13       | 73.89            | 0.00        | 6.91                | 0.87        | 26.11            | 100.00      |
| 0.15                     | 1.20            | 1.25        | 136.25           | 0.00        | 0.08         | 0.08        | 9.08             | 0.00        | 93.17                  | 99.22       | 82.97            | 0.00        | 6.83                | 0.78        | 17.03            | 100.00      |
| 0.075                    | 1.35            | 1.35        | 69.95            | 0.00        | 0.09         | 0.09        | 4.66             | 0.00        | 93.26                  | 99.31       | 87.63            | 0.00        | 6.74                | 0.69        | 12.37            | 100.00      |
| < 0,075                  | 101.05          | 10.40       | 185.5            | 1500.00     | 6.74         | 0.69        | 12.37            | 100.00      | 100.00                 | 100.00      | 100.00           | 100.00      | 0.00                | 0.00        | 0.00             | 0.00        |
| Jumlah                   | 1500.00         | 1500.00     | 1500.00          | 1500.00     | 100.00       | 100.00      | 100.00           | 100.00      |                        |             |                  |             |                     |             |                  |             |

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**GRADASI GABUNGAN AGREGAT AC-WC**

Tanggal : 24 Februari 2024

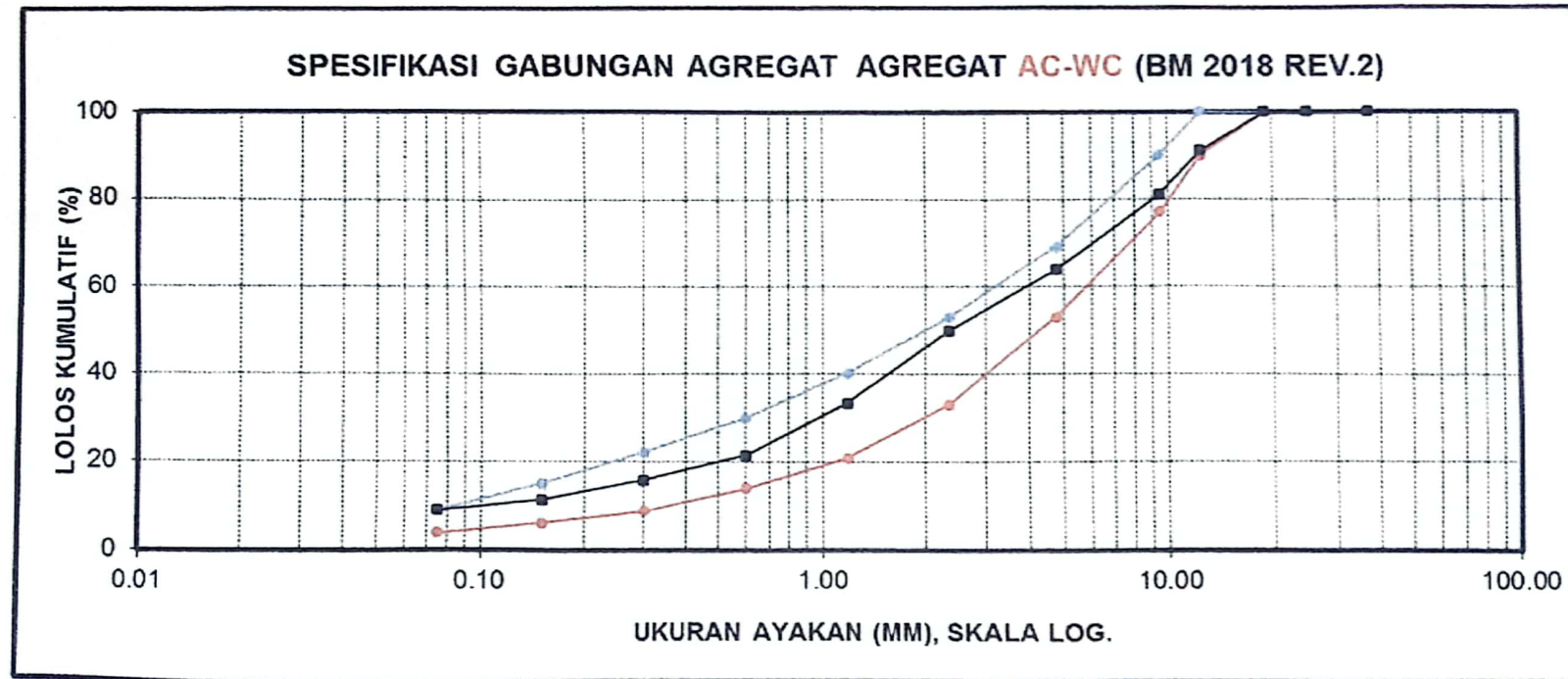
Nama : Nurizakila Akurah

Variasi : Filler 1%

| UKURAN<br>AYAKAN (MM) | LOLOS KUMULATIF (%) |             |          |        | LOLOS KUMULATIF (%), GABUNGAN AGREGAT |        |          |        |                           | LOLOS KUM. (%)        |      |
|-----------------------|---------------------|-------------|----------|--------|---------------------------------------|--------|----------|--------|---------------------------|-----------------------|------|
|                       | Split(1-2)          | Screen(0,5) | Abu Batu | Filler | Split                                 | Screen | Abu Batu | Filler | JUMLAH<br>GAB.<br>A+B+C+D | SPEK BM 2018<br>Rev.2 |      |
|                       | (A)                 | (B)         | (C)      | (D)    | (A)                                   | (B)    | (C)      | (D)    |                           | AC-WC                 |      |
|                       | 100                 | 100         | 100      | 100    | 24.00                                 | 25.00  | 50.00    | 1.00   | 100.00                    | Bawah                 | Atas |
| 37.50                 | 100.00              | 100.00      | 100.00   | 100.00 | 24.00                                 | 25.00  | 50.00    | 1.00   | 100.00                    | 100                   | 100  |
| 25.00                 | 100.00              | 100.00      | 100.00   | 100.00 | 24.00                                 | 25.00  | 50.00    | 1.00   | 100.00                    | 100                   | 100  |
| 19.00                 | 100.00              | 100.00      | 100.00   | 100.00 | 24.00                                 | 25.00  | 50.00    | 1.00   | 100.00                    | 100                   | 100  |
| 12.50                 | 62.98               | 100.00      | 100.00   | 100.00 | 15.11                                 | 25.00  | 50.00    | 1.00   | 91.11                     | 90                    | 100  |
| 9.50                  | 36.86               | 84.80       | 100.00   | 100.00 | 8.85                                  | 21.20  | 50.00    | 1.00   | 81.05                     | 77                    | 90   |
| 4.75                  | 13.54               | 38.39       | 100.00   | 100.00 | 3.25                                  | 9.60   | 50.00    | 1.00   | 63.85                     | 53                    | 69   |
| 2.36                  | 7.59                | 10.22       | 88.88    | 100.00 | 1.82                                  | 2.56   | 44.44    | 1.00   | 49.81                     | 33                    | 53   |
| 1.18                  | 7.15                | 3.67        | 59.32    | 100.00 | 1.72                                  | 0.92   | 29.66    | 1.00   | 33.29                     | 21                    | 40   |
| 0.60                  | 7.05                | 0.91        | 37.05    | 100.00 | 1.69                                  | 0.23   | 18.53    | 1.00   | 21.44                     | 14                    | 30   |
| 0.30                  | 6.91                | 0.87        | 26.11    | 100.00 | 1.66                                  | 0.22   | 13.06    | 1.00   | 15.93                     | 9                     | 22   |
| 0.15                  | 6.83                | 0.78        | 17.03    | 100.00 | 1.64                                  | 0.20   | 8.51     | 1.00   | 11.35                     | 6                     | 15   |
| 0.075                 | 6.74                | 0.69        | 12.37    | 100.00 | 1.62                                  | 0.17   | 6.18     | 1.00   | 8.97                      | 4                     | 9    |



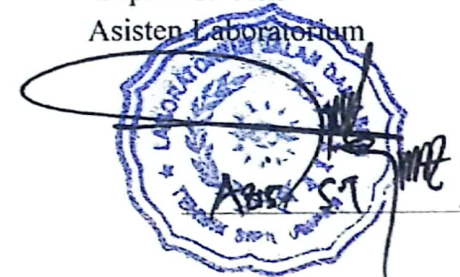
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**UNIVERSITAS MUHAMMADIYAH PAREPARE**



Parepare, 24 Februari 2024

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**RANCANGAN CAMPURAN ASPAL AC-WC**

Tanggal : 24 Februari 2024  
Nama : Nursyakila Atirah  
Variasi : Filler 1%

| URAIAN                 |  |  |    | NILAI | SATUAN |
|------------------------|--|--|----|-------|--------|
| Proporsi fraksi Kasar  |  |  | CA | 50.19 | %      |
| Proporsi fraksi Halus  |  |  | FA | 40.84 | %      |
| Proporsi Bahan Pengisi |  |  | FF | 8.97  | %      |
| Nilai Konstanta        |  |  | K  | 1.00  | %      |
| Perkiraan Kadar Aspal  |  |  | Pb | 6.21  | %      |

*Rumus Perkiraan Kadar Aspal (Pb)*

$$Pb = 0,035 (CA) + 0,045 (FA) + 0,18 (FF) + K$$

| KOMPONEN                |          | KOMPOSISI | KADAR ASPAL RENCANA (%) |        |        |        |        |
|-------------------------|----------|-----------|-------------------------|--------|--------|--------|--------|
|                         |          | AGREGAT   | 4                       | 4.5    | 5.00   | 5.5    | 6      |
| a                       | Split    | 24%       | 23.04                   | 22.92  | 22.80  | 22.68  | 22.56  |
| b                       | Screen   | 25%       | 24.00                   | 23.88  | 23.75  | 23.63  | 23.50  |
| c                       | Abu Batu | 50%       | 48.00                   | 47.75  | 47.50  | 47.25  | 47.00  |
| e                       | Filler   | 1%        | 0.96                    | 0.96   | 0.95   | 0.95   | 0.94   |
| TOTAL AGG. CAMPURAN (%) |          | 100%      | 96.00                   | 95.50  | 95.00  | 94.50  | 94.00  |
| TOTAL CAMPURAN (%)      |          |           | 100.00                  | 100.00 | 100.00 | 100.00 | 100.00 |





**LABORATORIUM JALAN DAN ASPAL**  
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| KOMPOSISI CAMPURAN          |          | KOMPOSISI AGGREGAT | BERAT TIMBANGAN |        |        |        |        |
|-----------------------------|----------|--------------------|-----------------|--------|--------|--------|--------|
|                             |          | %                  | 4               | 4.5    | 5      | 5.5    | 6      |
|                             | Split    | 24%                | 276.5           | 275.0  | 273.6  | 272.2  | 270.7  |
|                             | Screen   | 25%                | 288.0           | 286.5  | 285.0  | 283.5  | 282.0  |
| c                           | Abu Batu | 50%                | 576.0           | 573.0  | 570.0  | 567.0  | 564.0  |
| e                           | Filler   | 1%                 | 11.5            | 11.5   | 11.4   | 11.3   | 11.3   |
| BERAT AGREGAT CAMPURAN (gr) |          |                    | 1152.0          | 1146.0 | 1140.0 | 1134.0 | 1128.0 |
|                             |          |                    | 48.0            | 54.0   | 60.0   | 66.0   | 72.0   |
|                             |          |                    | 1200.0          | 1200.0 | 1200.0 | 1200.0 | 1200.0 |

Parepare, 24 Februari 2024

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**ANALISA AYAK AGREGAT**

Tanggal : 24 Februari 2024  
 Nama : Nursyakila Atirah  
 Variasi : 1.5 %

| UKURAN<br>AYAKAN<br>(MM) | TERTAHAN (GRAM) |             |                  |             | TERTAHAN (%) |             |                  |             | TERTAHAN KUMULATIF (%) |             |                  |             | LOLOS KUMULATIF (%) |             |                  |             |
|--------------------------|-----------------|-------------|------------------|-------------|--------------|-------------|------------------|-------------|------------------------|-------------|------------------|-------------|---------------------|-------------|------------------|-------------|
|                          | Split<br>A      | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A   | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A             | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D | Split<br>A          | Screen<br>B | Abu<br>Batu<br>C | Filler<br>D |
| 37.50                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 25.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 19.00                    | 0.00            | 0.00        | 0.00             | 0.00        | 0.00         | 0.00        | 0.00             | 0.00        | 0.00                   | 0.00        | 0.00             | 0.00        | 100.00              | 100.00      | 100.00           | 100.00      |
| 12.50                    | 555.35          | 0.00        | 0.00             | 0.00        | 37.02        | 0.00        | 0.00             | 0.00        | 37.02                  | 0.00        | 0.00             | 0.00        | 62.98               | 100.00      | 100.00           | 100.00      |
| 9.50                     | 391.70          | 228.00      | 0.00             | 0.00        | 26.11        | 15.20       | 0.00             | 0.00        | 63.14                  | 15.20       | 0.00             | 0.00        | 36.86               | 84.80       | 100.00           | 100.00      |
| 4.75                     | 349.85          | 696.20      | 0.00             | 0.00        | 23.32        | 46.41       | 0.00             | 0.00        | 86.46                  | 61.61       | 0.00             | 0.00        | 13.54               | 38.39       | 100.00           | 100.00      |
| 2.36                     | 89.30           | 422.50      | 166.85           | 0.00        | 5.95         | 28.17       | 11.12            | 0.00        | 92.41                  | 89.78       | 11.12            | 0.00        | 7.59                | 10.22       | 88.88            | 100.00      |
| 1.18                     | 6.50            | 98.30       | 443.40           | 0.00        | 0.43         | 6.55        | 29.56            | 0.00        | 92.85                  | 96.33       | 40.68            | 0.00        | 7.15                | 3.67        | 59.32            | 100.00      |
| 0.60                     | 1.55            | 41.35       | 334.00           | 0.00        | 0.10         | 2.76        | 22.27            | 0.00        | 92.95                  | 99.09       | 62.95            | 0.00        | 7.05                | 0.91        | 37.05            | 100.00      |
| 0.30                     | 2.15            | 0.65        | 164.05           | 0.00        | 0.14         | 0.04        | 10.94            | 0.00        | 93.09                  | 99.13       | 73.89            | 0.00        | 6.91                | 0.87        | 26.11            | 100.00      |
| 0.15                     | 1.20            | 1.25        | 136.25           | 0.00        | 0.08         | 0.08        | 9.08             | 0.00        | 93.17                  | 99.22       | 82.97            | 0.00        | 6.83                | 0.78        | 17.03            | 100.00      |
| 0.075                    | 1.35            | 1.35        | 69.95            | 0.00        | 0.09         | 0.09        | 4.66             | 0.00        | 93.26                  | 99.31       | 87.63            | 0.00        | 6.74                | 0.69        | 12.37            | 100.00      |
| < 0.075                  | 101.05          | 10.40       | 185.5            | 1500.00     | 6.74         | 0.69        | 12.37            | 100.00      | 100.00                 | 100.00      | 100.00           | 100.00      | 0.00                | 0.00        | 0.00             | 0.00        |
| Jumlah                   | 1500.00         | 1500.00     | 1500.00          | 1500.00     | 100.00       | 100.00      | 100.00           | 100.00      |                        |             |                  |             |                     |             |                  |             |

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**GRADASI GABUNGAN AGREGAT AC-WC**

Nama : Nursyakila Atirah

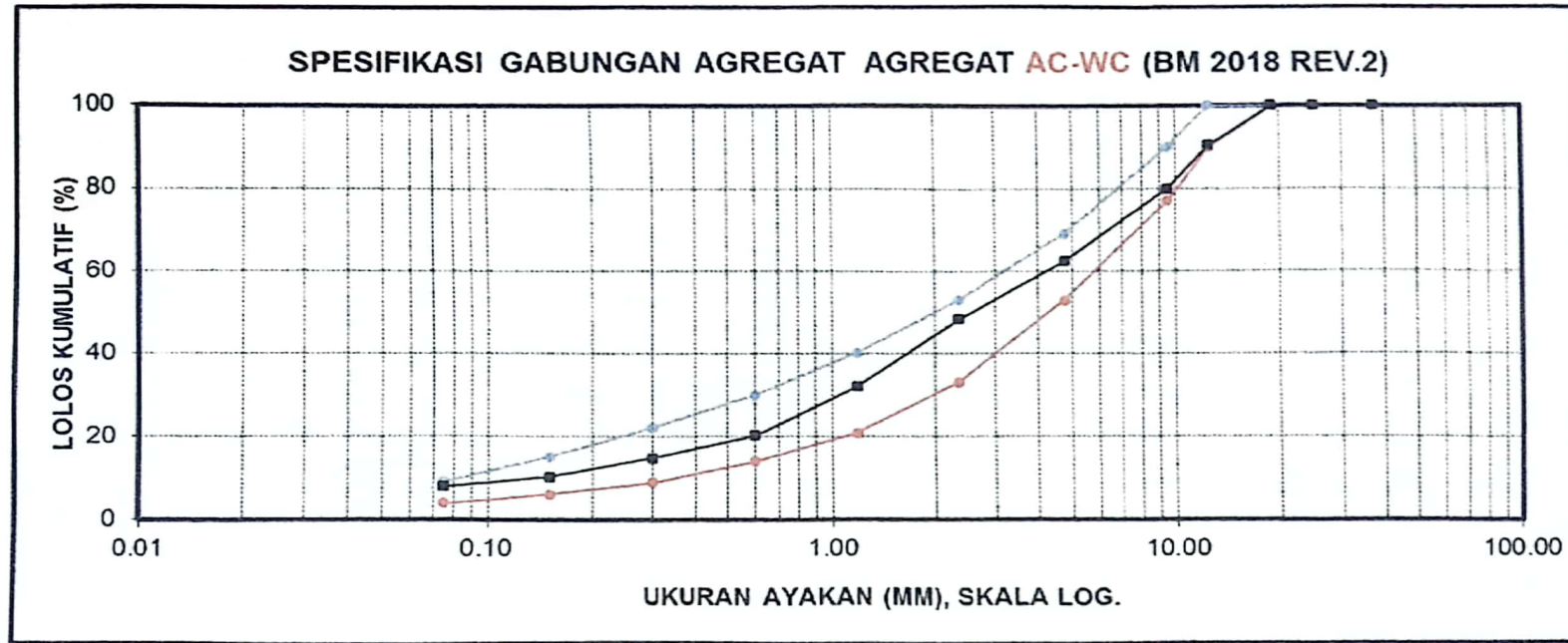
Variasi : Filler 1,5%

| UKURAN<br>AYAKAN (MM) | LOLOS KUMULATIF (%) |             |          |        | LOLOS KUMULATIF (%), GABUNGAN AGREGAT |        |          |        |             | LOLOS KUM. (%) SPEK<br>BM 2018 Rev.2 |      |
|-----------------------|---------------------|-------------|----------|--------|---------------------------------------|--------|----------|--------|-------------|--------------------------------------|------|
|                       | Split(1-2)          | Screen(0,5) | Abu Batu | Filler | Split                                 | Screen | Abu Batu | Filler | JUMLAH GAB. | AC-WC                                |      |
|                       | (A)                 | (B)         | (C)      | (D)    | (A)                                   | (B)    | (C)      | (D)    | A+B+C+D     | Bawah                                | Atas |
|                       | 100                 | 100         | 100      | 100    | 24,00                                 | 30,00  | 44,50    | 1,50   | 100,00      |                                      |      |
| 37,50                 | 100,00              | 100,00      | 100,00   | 100,00 | 24,00                                 | 30,00  | 44,50    | 1,50   | 100,00      | 100                                  | 100  |
| 25,00                 | 100,00              | 100,00      | 100,00   | 100,00 | 24,00                                 | 30,00  | 44,50    | 1,50   | 100,00      | 100                                  | 100  |
| 19,00                 | 100,00              | 100,00      | 100,00   | 100,00 | 24,00                                 | 30,00  | 44,50    | 1,50   | 100,00      | 100                                  | 100  |
| 12,50                 | 62,98               | 100,00      | 100,00   | 100,00 | 15,11                                 | 30,00  | 44,50    | 1,50   | 91,11       | 90                                   | 100  |
| 9,50                  | 36,86               | 84,80       | 100,00   | 100,00 | 8,85                                  | 25,44  | 44,50    | 1,50   | 80,29       | 77                                   | 90   |
| 4,75                  | 13,54               | 38,39       | 100,00   | 100,00 | 3,25                                  | 11,52  | 44,50    | 1,50   | 60,77       | 53                                   | 69   |
| 2,36                  | 7,59                | 10,22       | 88,88    | 100,00 | 1,82                                  | 3,07   | 39,55    | 1,50   | 45,94       | 33                                   | 53   |
| 1,18                  | 7,15                | 3,67        | 59,32    | 100,00 | 1,72                                  | 1,10   | 26,40    | 1,50   | 30,71       | 21                                   | 40   |
| 0,60                  | 7,05                | 0,91        | 37,05    | 100,00 | 1,69                                  | 0,27   | 16,49    | 1,50   | 19,95       | 14                                   | 30   |
| 0,30                  | 6,91                | 0,87        | 26,11    | 100,00 | 1,66                                  | 0,26   | 11,62    | 1,50   | 15,04       | 9                                    | 22   |
| 0,15                  | 6,83                | 0,78        | 17,03    | 100,00 | 1,64                                  | 0,23   | 7,58     | 1,50   | 10,95       | 6                                    | 15   |
| 0,075                 | 6,74                | 0,69        | 12,37    | 100,00 | 1,62                                  | 0,21   | 5,50     | 1,50   | 8,83        | 4                                    | 9    |



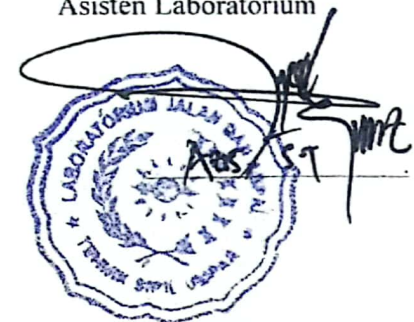


**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**



Parepare, 24 Februari 2024

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**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**RANCANGAN CAMPURAN ASPAL AC-WC**

Nama : Nursyakila Atirah  
Variasi : Filler serbuk kapur 1,5%

| URAIAN                 |    | NILAI | SATUAN |
|------------------------|----|-------|--------|
| Proporsi fraksi Kasar  | CA | 54,06 | %      |
| Proporsi fraksi Halus  | FA | 37,11 | %      |
| Proporsi Bahan Pengisi | FF | 8,83  | %      |
| Nilai Konstanta        | K  | 1,00  | %      |
| Perkiraan Kadar Aspal  | Pb | 6,15  | %      |

*Rumus Perkiraan Kadar Aspal (Pb)*

$$Pb = 0,035 (CA) + 0,045 (FA) + 0,18 (FF) + K$$

| KOMPONEN                |          | KOMPOSISI | KADAR ASPAL RENCANA (%) |        |        |        |        |
|-------------------------|----------|-----------|-------------------------|--------|--------|--------|--------|
|                         |          | AGREGAT   | 4                       | 4,5    | 5,00   | 5,5    | 6      |
| a                       | Split    | 24%       | 23,04                   | 22,92  | 22,80  | 22,68  | 22,56  |
| b                       | Screen   | 30%       | 28,80                   | 28,65  | 28,50  | 28,35  | 28,20  |
| c                       | Abu Batu | 45%       | 42,72                   | 42,50  | 42,28  | 42,05  | 41,83  |
| d                       | Filler   | 2%        | 1,44                    | 1,43   | 1,43   | 1,42   | 1,41   |
| TOTAL AGG. CAMPURAN (%) |          | 100%      | 96,00                   | 95,50  | 95,00  | 94,50  | 94,00  |
| TOTAL CAMPURAN (%)      |          |           | 100,00                  | 100,00 | 100,00 | 100,00 | 100,00 |

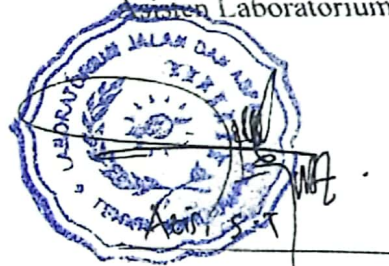


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**UNIVERSITAS MUHAMMADIYAH PAREPARE**

| KOMPOSISI CAMPURAN          |          | KOMPOSISI AGGREGAT | BERAT TIMBANGAN |        |        |        |        |
|-----------------------------|----------|--------------------|-----------------|--------|--------|--------|--------|
|                             |          | %                  | 4               | 4,5    | 5      | 5,5    | 6      |
| a                           | Split    | 24%                | 276,5           | 275,0  | 273,6  | 272,2  | 270,7  |
| b                           | Screen   | 30%                | 345,6           | 343,8  | 342,0  | 340,2  | 338,4  |
| c                           | Abu Batu | 45%                | 512,6           | 510,0  | 507,3  | 504,6  | 502,0  |
| d                           | Filler   | 2%                 | 17,3            | 17,2   | 17,1   | 17,0   | 16,9   |
| BERAT AGREGAT CAMPURAN (gr) |          |                    | 1152,0          | 1146,0 | 1140,0 | 1134,0 | 1128,0 |
|                             |          |                    | 48,0            | 54,0   | 60,0   | 66,0   | 72,0   |
|                             |          |                    | 1200,0          | 1200,0 | 1200,0 | 1200,0 | 1200,0 |

Parepare, 24 Februari 2024

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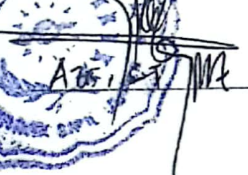
**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**PENGUJIAN MARSHALL (MARSHALL TEST)**

Nama : Nursyakila Akrah

Variasi : 0% (Normal)

| NO          | % Aspal Terhadap Campuran | % Aspal Terhadap Agregat | Bj Bulk Agg Mix (Gsb) | Bj Semu Agg Mix (Gsn) | Bj Efektif Agg Mix (Gse) | Berat Uji Benda |           |         | Isi Benda Uji | Berat Isi Benda Uji (Kepadatan) | Bj. Maks Campuran (Gmm) | % Rongga               |                         |                    | Bacaan Arloji Stabilitas | Stabilitas         |               |                  | Flow    | MQ     |
|-------------|---------------------------|--------------------------|-----------------------|-----------------------|--------------------------|-----------------|-----------|---------|---------------|---------------------------------|-------------------------|------------------------|-------------------------|--------------------|--------------------------|--------------------|---------------|------------------|---------|--------|
|             |                           |                          |                       |                       |                          | Kering          | Dalam Air | SSD     |               |                                 |                         | Diantara Agregat (VMA) | Terhadap Campuran (VIM) | Terisi Aspal (VFA) |                          | Terhadap Kalibrasi | Nilai Koreksi | Terhadap Koreksi |         |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                          |                    |               |                  |         |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                          |                    |               |                  |         |        |
| (%)         | (%)                       | (gr/cc)                  | (gr/cc)               | (gr/cc)               | (gram)                   | (gram)          | (gram)    | (cc)    | (gr/cc)       | (gr/cc)                         | (%)                     | (%)                    | (%)                     |                    | (9,97)                   |                    | (Kg)          | (mm)             | (Kg/mm) |        |
| A           | B                         | C                        | D                     | E                     | F                        | G               | H         | I       | J             | K                               | L                       | M                      | N                       | O                  | P                        | Q                  | R             | S                | T       |        |
| 1           | 5,00                      | 5,26                     | 2,62                  | 2,73                  | 2,67                     | 1091,80         | 630,00    | 1100,53 | 470,53        | 2,32                            | 2,47                    | 15,95                  | 6,09                    | 61,84              | 169,00                   | 1684,93            | 0,96          | 1617,53          | 3,61    | 448,07 |
|             | 5,00                      | 5,26                     | 2,62                  | 2,73                  | 2,67                     | 1079,40         | 622,00    | 1082,88 | 460,88        | 2,34                            | 2,47                    | 15,16                  | 5,21                    | 65,65              | 178,00                   | 1774,66            | 0,93          | 1650,43          | 2,51    | 657,54 |
|             | Rata-rata                 |                          |                       |                       |                          | 1085,60         | 626,00    | 1091,71 | 465,71        | 2,33                            | 2,47                    | 15,56                  | 5,65                    | 63,74              | 173,50                   | 1729,80            | 0,95          | 1633,98          | 3,06    | 552,81 |
| 2           | 5,50                      | 5,82                     | 2,62                  | 2,73                  | 2,67                     | 1119,50         | 643,00    | 1121,60 | 478,60        | 2,34                            | 2,45                    | 15,72                  | 4,61                    | 70,69              | 225,00                   | 2243,25            | 0,86          | 1929,20          | 3,50    | 494,67 |
|             | 5,50                      | 5,82                     | 2,62                  | 2,73                  | 2,67                     | 1132,10         | 646,00    | 1133,50 | 487,50        | 2,32                            | 2,45                    | 16,32                  | 5,29                    | 67,57              | 217,00                   | 2163,49            | 0,96          | 2076,95          | 3,18    | 653,13 |
|             | Rata-rata                 |                          |                       |                       |                          | 1125,80         | 644,50    | 1127,55 | 483,05        | 2,33                            | 2,45                    | 16,02                  | 4,95                    | 69,13              | 221,00                   | 2203,37            | 0,91          | 2003,07          | 3,54    | 573,90 |
|             | 6,00                      | 6,38                     | 2,62                  | 2,73                  | 2,67                     | 1156,40         | 665,00    | 1158,10 | 493,10        | 2,35                            | 2,43                    | 15,95                  | 3,64                    | 77,19              | 170,00                   | 1694,50            | 1,00          | 1694,90          | 4,34    | 390,53 |
| 3           | 6,00                      | 6,38                     | 2,62                  | 2,73                  | 2,67                     | 1120,30         | 632,00    | 1122,00 | 490,00        | 2,29                            | 2,43                    | 18,05                  | 6,06                    | 66,46              | 179,00                   | 1784,63            | 1,00          | 1784,63          | 3,52    | 507,00 |
|             | Rata-rata                 |                          |                       |                       |                          | 1138,35         | 648,50    | 1140,05 | 491,55        | 2,32                            | 2,43                    | 17,00                  | 4,85                    | 71,82              | 174,50                   | 1739,77            | 1,00          | 1739,77          | 3,93    | 448,76 |
| SPESIFIKASI |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Min                     | 15                     | 3                       | 65                 | -                        | -                  | -             | 800              | 2       | 250    |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Max                     | -                      | 5                       | -                  | -                        | -                  | -             | -                | 4       | -      |

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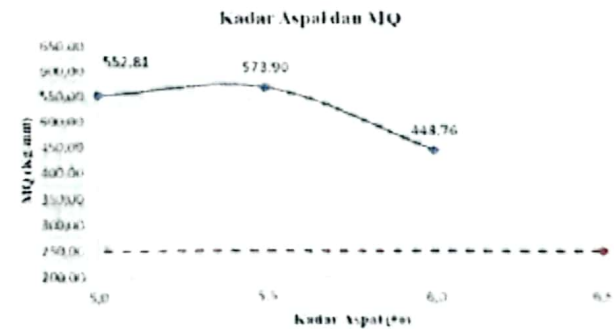
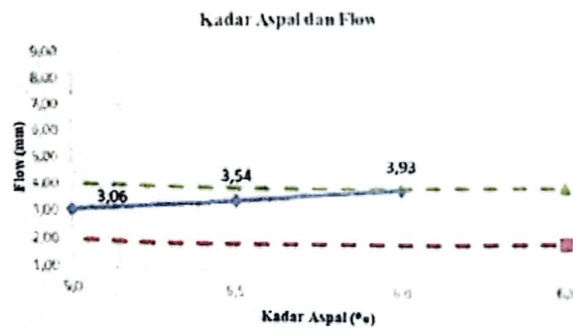
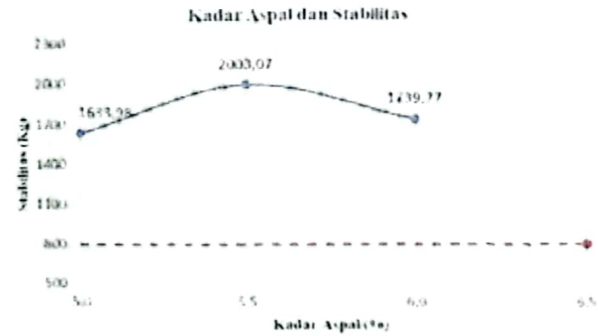
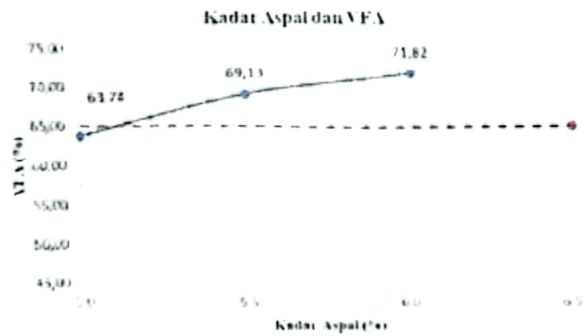
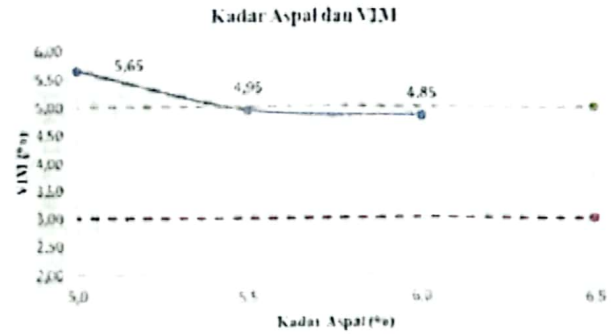
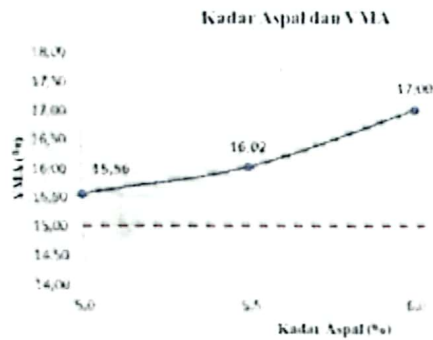

# LABORATORIUM JALAN DAN ASPAL

## JURUSAN SIPIL FAKULTAS TEKNIK

### UNIVERSITAS MUHAMMADIYAH PAREPARE

#### GRAFIK MARSHALL

Nama : Nurzakila Akrah  
Variasi : 0% (Normal)





**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**PENGUJIAN MARSHALL (MARSHALL TEST)**

Nama : Nursyakila Alirah

Variasi : 1,5%

| NO          | % Aspal Terhadap Campuran | % Aspal Terhadap Agregat | Bj Bulk Agg Mix (Gsb) | Bj Semu Agg Mix (Gsa) | Bj Efektif Agg Mix (Gse) | Berat Uji Benda |           |         | Isi Benda Uji | Berat Isi Benda Uji (Kepadatan) | Bj. Maks Campuran (Gmm) | % Rongga               |                         |                    | Bacaan Arloji Stabilitas | Stabilitas         |               |                  | Flow    | MQ     |
|-------------|---------------------------|--------------------------|-----------------------|-----------------------|--------------------------|-----------------|-----------|---------|---------------|---------------------------------|-------------------------|------------------------|-------------------------|--------------------|--------------------------|--------------------|---------------|------------------|---------|--------|
|             |                           |                          |                       |                       |                          | Kering          | Dalam Air | SSD     |               |                                 |                         | Diantara Agregat (VMA) | Terhadap Campuran (VIM) | Terisi Aspal (VFA) |                          | Terhadap Kalibrasi | Nilai Koreksi | Terhadap Koreksi |         |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                          |                    |               |                  |         |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                          |                    |               |                  |         |        |
| (%)         | (%)                       | (gr/cc)                  | (gr/cc)               | (gr/cc)               | (gram)                   | (gram)          | (gram)    | (cc)    | (gr/cc)       | (gr/cc)                         | (%)                     | (%)                    | (%)                     |                    | (9,97)                   |                    | (Kg)          | (mm)             | (Kg/mm) |        |
| A           | B                         | C                        | D                     | E                     | F                        | G               | H         | I       | J             | K                               | L                       | M                      | N                       | O                  | P                        | Q                  | R             | S                | T       |        |
| 1           | 5,00                      | 5,26                     | 2,61                  | 2,71                  | 2,66                     | 1165,20         | 670,00    | 1170,60 | 500,60        | 2,33                            | 2,46                    | 15,35                  | 5,42                    | 64,69              | 155,00                   | 1545,35            | 0,93          | 1437,18          | 3,20    | 449,12 |
|             | 5,00                      | 5,26                     | 2,61                  | 2,71                  | 2,66                     | 1201,20         | 677,00    | 1210,20 | 533,20        | 2,25                            | 2,46                    | 18,07                  | 8,46                    | 53,18              | 236,00                   | 2352,92            | 0,89          | 2094,10          | 4,30    | 487,00 |
|             | Rata-rata                 |                          |                       |                       |                          | 1183,20         | 673,50    | 1190,40 | 516,90        | 2,29                            | 2,46                    | 16,71                  | 6,94                    | 58,94              | 195,50                   | 1949,14            | 0,91          | 1765,64          | 3,75    | 468,06 |
| 2           | 5,50                      | 5,82                     | 2,61                  | 2,71                  | 2,66                     | 1165,80         | 666,00    | 1175,30 | 509,30        | 2,29                            | 2,44                    | 17,19                  | 6,28                    | 63,44              | 200,00                   | 1994,00            | 0,93          | 1854,42          | 4,00    | 463,61 |
|             | 5,50                      | 5,82                     | 2,61                  | 2,71                  | 2,66                     | 1174,90         | 670,00    | 1180,90 | 510,90        | 2,30                            | 2,44                    | 16,80                  | 5,85                    | 65,20              | 204,00                   | 2033,88            | 0,96          | 1952,52          | 3,80    | 513,82 |
|             | Rata-rata                 |                          |                       |                       |                          | 1170,35         | 668,00    | 1178,10 | 510,10        | 2,29                            | 2,44                    | 17,00                  | 6,07                    | 64,32              | 202,00                   | 2013,94            | 0,95          | 1903,47          | 3,90    | 488,71 |
| 3           | 6,00                      | 6,38                     | 2,61                  | 2,71                  | 2,66                     | 1164,80         | 659,00    | 1167,80 | 508,80        | 2,29                            | 2,42                    | 17,62                  | 5,57                    | 68,39              | 202,00                   | 2013,94            | 0,93          | 1872,96          | 4,10    | 456,82 |
|             | 6,00                      | 6,38                     | 2,61                  | 2,71                  | 2,66                     | 1165,80         | 668,00    | 1170,20 | 502,20        | 2,32                            | 2,42                    | 16,46                  | 4,25                    | 74,21              | 212,00                   | 2113,64            | 0,89          | 1881,14          | 4,50    | 418,03 |
|             | Rata-rata                 |                          |                       |                       |                          | 1165,30         | 663,50    | 1169,00 | 505,50        | 2,31                            | 2,42                    | 17,04                  | 4,91                    | 71,30              | 207,00                   | 2063,79            | 0,91          | 1877,05          | 4,30    | 437,43 |
| SPESIFIKASI |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Min                     | 15                     | 3                       | 65                 | -                        | -                  | -             | 800              | 2       | 250    |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Max                     | -                      | 5                       | -                  | -                        | -                  | -             | -                | 4       | -      |

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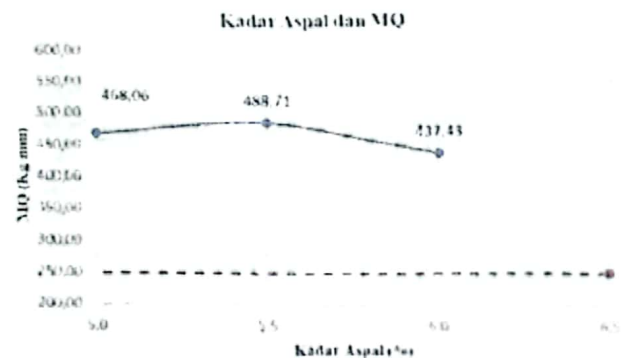
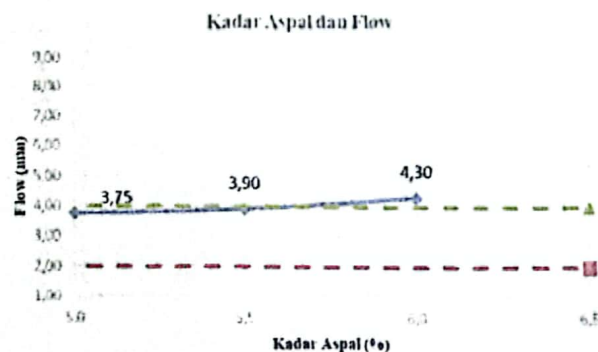
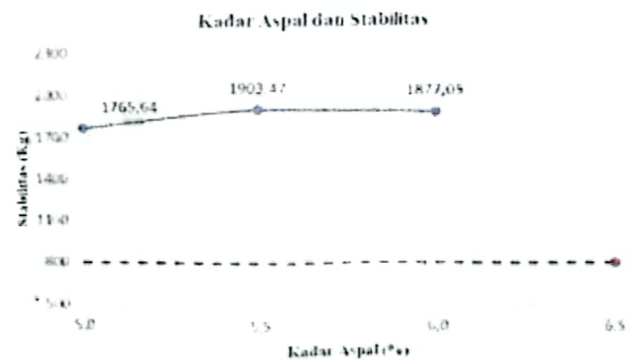
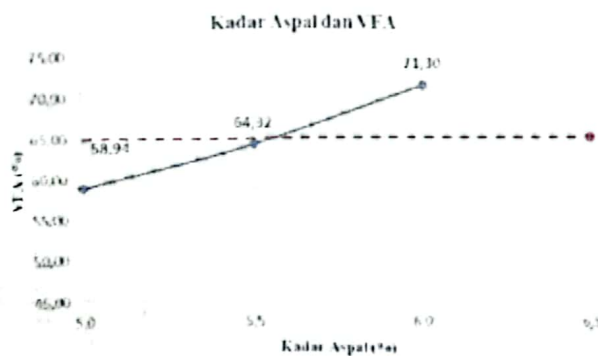
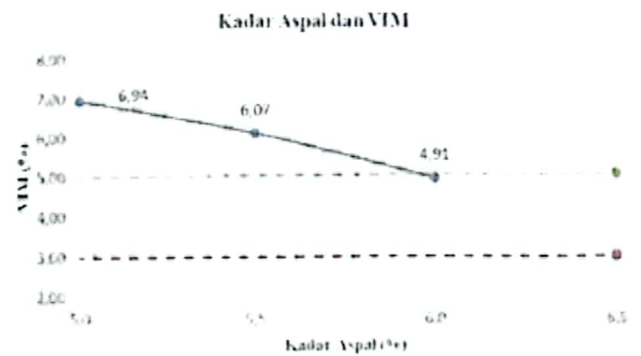
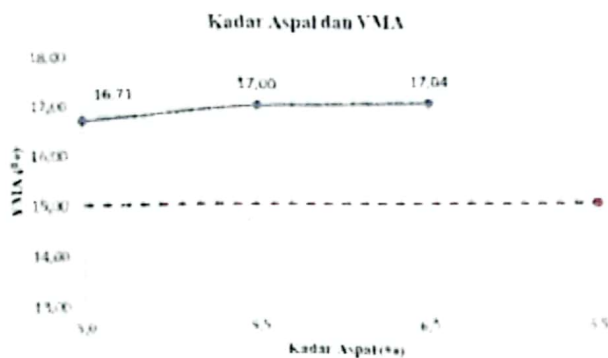




# LABORATORIUM JALAN DAN ASPAL JURUSAN SIPIL FAKULTAS TEKNIK UNIVERSITAS MUHAMMADIYAH PAREPARE

## GRAFIK MARSHALL

Nama : Nurcyakila Atirah  
Variasi : 1,5%





**LABORATORIUM JALAN DAN ASPAL**  
**JURUSAN SIPIL FAKULTAS TEKNIK**  
**UNIVERSITAS MUHAMMADIYAH PAREPARE**

**PENGUJIAN MARSHALL (MARSHALL TEST)**

Nama : *Nuesyakkila Aulrah*

Variasi : *1%*

| NO          | % Aspal Terhadap Campuran | % Aspal Terhadap Agregat | Bj Bulk Agg Mix (Gsb) | Bj Semu Agg Mix (Gsa) | Bj Efektif Agg Mix (Gse) | Berat Uji Benda |           |         | Isi Benda Uji | Berat Isi Benda Uji (Kepadatan) | Bj. Maks Campuran (Gmm) | % Rongga               |                         |                    | Beban Arloji Stabilitas | Stabilitas         |               |                  | Flow | VOC    |
|-------------|---------------------------|--------------------------|-----------------------|-----------------------|--------------------------|-----------------|-----------|---------|---------------|---------------------------------|-------------------------|------------------------|-------------------------|--------------------|-------------------------|--------------------|---------------|------------------|------|--------|
|             |                           |                          |                       |                       |                          | Kering          | Dalam Air | SSD     |               |                                 |                         | Diantara Agregat (VMA) | Terhadap Campuran (VIM) | Terisi Aspal (VFA) |                         | Terhadap Kalibrasi | Nilai Koreksi | Terhadap Koreksi |      |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                         |                    |               |                  |      |        |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 |                         |                        |                         |                    |                         |                    |               |                  |      |        |
| (%)         | (%)                       | (gr/cc)                  | (gr/cc)               | (gr/cc)               | (gram)                   | (gram)          | (gram)    | (cc)    | (gr/cc)       | (gr/cc)                         | (%)                     | (%)                    | (%)                     | (3.57)             |                         | (Kg)               | (mm)          | (Kg/mm)          |      |        |
| A           | B                         | C                        | D                     | E                     | F                        | G               | H         | I       | J             | K                               | L                       | M                      | N                       | O                  | P                       | Q                  | R             | S                | T    |        |
| 1           | 5,00                      | 5,26                     | 2,60                  | 2,69                  | 2,65                     | 1160,20         | 663,00    | 1169,60 | 506,60        | 2,29                            | 2,45                    | 15,22                  | 6,42                    | 60,43              | 172,00                  | 1714,84            | 0,89          | 1526,20          | 3,80 | 401,63 |
|             | 5,00                      | 5,26                     | 2,60                  | 2,69                  | 2,65                     | 1154,50         | 659,00    | 1158,80 | 499,80        | 2,31                            | 2,45                    | 15,50                  | 5,61                    | 63,79              | 183,00                  | 1824,51            | 0,88          | 1569,08          | 3,10 | 506,15 |
|             | Rata-rata                 |                          |                       |                       |                          | 1157,35         | 661,00    | 1164,28 | 503,20        | 2,30                            | 2,45                    | 15,86                  | 6,02                    | 62,11              | 177,50                  | 1769,68            | 0,88          | 1547,64          | 3,45 | 453,89 |
| 2           | 5,50                      | 5,82                     | 2,60                  | 2,69                  | 2,65                     | 1140,50         | 650,00    | 1149,80 | 499,80        | 2,28                            | 2,43                    | 15,96                  | 6,06                    | 64,28              | 174,00                  | 1754,78            | 0,93          | 1613,35          | 3,20 | 504,17 |
|             | 5,50                      | 5,82                     | 2,60                  | 2,69                  | 2,65                     | 1144,50         | 659,00    | 1148,80 | 489,80        | 2,34                            | 2,43                    | 14,97                  | 3,80                    | 74,59              | 196,00                  | 1954,12            | 0,96          | 1875,96          | 4,10 | 457,55 |
|             | Rata-rata                 |                          |                       |                       |                          | 1142,50         | 654,50    | 1149,30 | 494,80        | 2,31                            | 2,43                    | 15,97                  | 4,93                    | 69,44              | 185,00                  | 1844,45            | 0,95          | 1744,65          | 3,65 | 480,86 |
| 3           | 6,00                      | 6,38                     | 2,60                  | 2,69                  | 2,65                     | 1189,30         | 679,00    | 1196,30 | 517,30        | 2,30                            | 2,41                    | 16,78                  | 4,65                    | 72,30              | 175,00                  | 1744,75            | 0,89          | 1552,83          | 4,40 | 352,92 |
|             | 6,00                      | 6,38                     | 2,60                  | 2,70                  | 2,65                     | 1158,40         | 673,00    | 1169,30 | 496,30        | 2,33                            | 2,41                    | 15,51                  | 3,20                    | 79,40              | 200,00                  | 1994,00            | 0,96          | 1914,24          | 4,00 | 478,56 |
|             | Rata-rata                 |                          |                       |                       |                          | 1173,85         | 676,00    | 1182,80 | 506,80        | 2,32                            | 2,41                    | 16,15                  | 3,92                    | 75,85              | 187,50                  | 1869,38            | 0,93          | 1733,53          | 4,20 | 415,74 |
| SPESIFIKASI |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Min                     | 15                     | 3                       | 65                 | -                       | -                  | -             | 800              | 2    | 250    |
|             |                           |                          |                       |                       |                          |                 |           |         |               |                                 | Max                     | -                      | 5                       | -                  | -                       | -                  | -             | -                | 4    | -      |

26 Februari 2024  
 PAREPARE  
 Diperiksa oleh  
 Asisten Laboratorium  




# LABORATORIUM JALAN DAN ASPAL

## JURUSAN SIPIL FAKULTAS TEKNIK

### UNIVERSITAS MUHAMMADIYAH PAREPARE

#### GRAFIK MARSHALL

Nama : Nunsyakila Ahrach  
Variasi : 1%

