



**Much Asphalt (Pty), Ltd.**  
**Central Laboratory**



a SANAS Accredited Testing Laboratory, T0283

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**Test Report Cover Page**

|                      |                                 |
|----------------------|---------------------------------|
| <b>Client's Name</b> | Much Asphalt Site Laboratory    |
| <b>Address</b>       | PO Box 15287<br>Bellair<br>4006 |
| <b>Attention</b>     | Timothy Gradwell                |

|                  |            |
|------------------|------------|
| <b>Our Ref:</b>  | CL109W010  |
| <b>Your Ref:</b> |            |
| <b>Date</b>      | 30/03/2009 |

**Particulars of Sample**

|                               |  |
|-------------------------------|--|
| <b>Description of Samples</b> | Various aggregate samples and Bitumen for mix design |
| <b>Condition of Samples</b>   | Good   |
| <b>Date Received</b>          | January-March 2009                                   |
| <b>Sampling Procedure</b>     | Sampled by Coedmore Staff                            |

|                                      |   |
|--------------------------------------|---|
| <b>SANAS Accredited Test Methods</b> | TMH1 : B3; TMH1 : B4; TMH1 : B14 & B15; TMH1 : C1; TMH1 : C2; TMH1 : C3; TMH1 : C4; TMH1 : C5; TMH1 : C7 (b); TMH1 : C12 T<br>ASTM-D5; IP 49; ASTM-D36; ASTM 4402' SANS 838 |
|--------------------------------------|---|

|  |  |
|--|--|
| <b>NON- Accredited Test Methods **</b> | GYRATORY TEST; ASTM: C1252-93; AASHTO: TP33 <sup>1</sup> |
|--|--|

**Deviations, Exclusions or Additions or Irregularities Observed:**  
 None

1. All measuring equipment used are traceable to National Standards where applicable .
2. This report is a true record of all measurements made and may not be reproduced other than in full except with the written approval of the Laboratory Manager.
3. Results reported in this Report, relate only to the samples tested.

**Remarks**  
 Please note that the the Gyrotary Test(marked with \*\*) are not SANAS Accredited.

|                             |                              |              |            |
|-----------------------------|------------------------------|--------------|------------|
| <b>Authorised Signatory</b> | <i>HJ Appollis</i>           | <b>Date:</b> | 30/03/2009 |
| <b>Designation</b>          | <i>Reg Technical Manager</i> |              |            |

**SANAS Disclaimer:**

Tests marked "Not SANAS Accredited" in this Report are not included in the SANAS Schedule of Accreditation for this laboratory. Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

**Much Asphalt (Pty) Ltd., Coedmore**

**Asphalt Mix Design**

Mix Type           Type D + 10% Rap ( 2% Rediset )

Ref Number        CL/09/M010

Date                30/03/2009

Report Ref Number: **CL/09/M010**

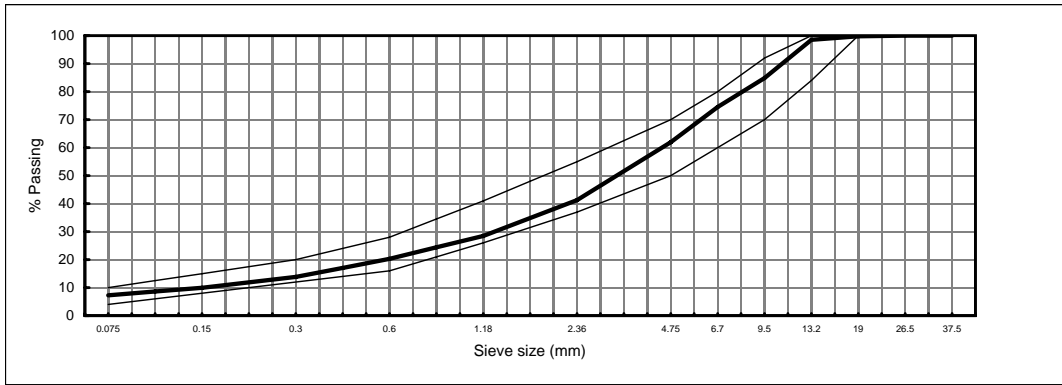


| Aggregates   |               |   |
|--------------|---------------|---|
| Number       | Nominal size  | Description and Source                    |
| 1 ( CL/0029) | 13.2mm Stone  | Crushed stone ex Afrisam Quarry           |
| 2 ( CL/0030) | 6.7mm Stone   | Crushed stone ex Afrisam Quarry           |
| 3 ( CL/0033) | Crusher dust  | Crusher Dust ex Lafarge Quarry- Ridgeview |
| 4 (CL/0073)  | C/dust hotbin | Crusher Dust hotbin ex Plant              |
| 5 ( CL/0034) | Sand          | Sand ex Multi Sand                        |
| 6 ( CL/0327) | Rap           | Rap ex Durban Corporation                 |

| Fillers |      |                        |
|---------|------|------------------------|
| Number  | Type | Description and Source |
|         |      |                        |
|         |      |                        |

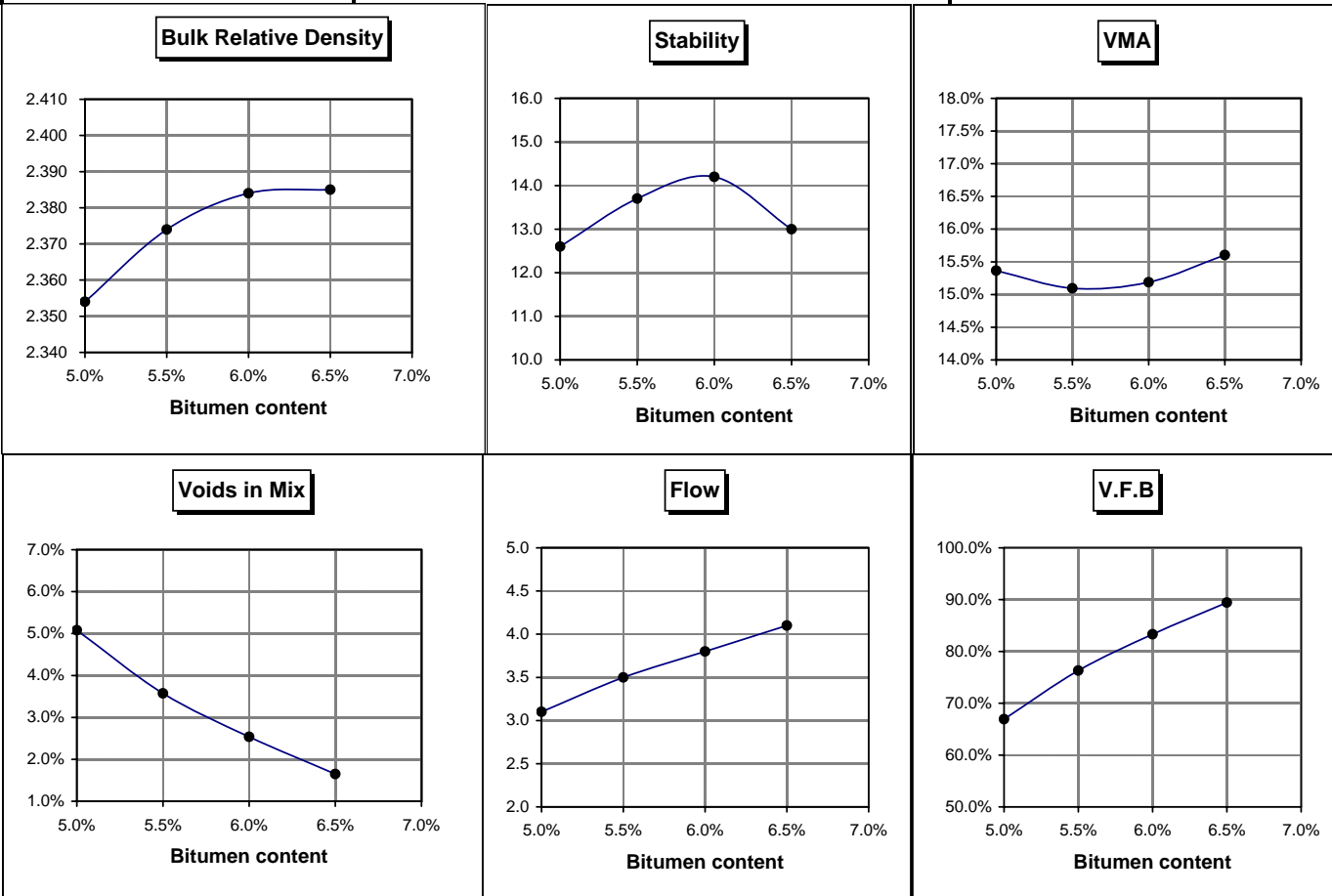
| Sample Number             | Sieve Analysis and % Passing |            |            |           |           |            |         |  |  |  | Combined Grading | Specification    |
|---------------------------|------------------------------|------------|------------|-----------|-----------|------------|---------|--|--|--|------------------|------------------|
|                           | Aggregates                   |            |            |           |           |            | Fillers |  |  |  |                  |                  |
|                           | 1                            | 2          | 3          | 4         | 5         | 6          |         |  |  |  |                  |                  |
| <b>% In Mix</b>           | <b>24%</b>                   | <b>17%</b> | <b>36%</b> | <b>8%</b> | <b>5%</b> | <b>10%</b> |         |  |  |  | <b>100.0%</b>    |                  |
| <b>37.5</b>               |                              |            |            |           |           |            |         |  |  |  |                  |                  |
| <b>26.5</b>               |                              |            |            |           |           |            |         |  |  |  |                  |                  |
| <b>19.0</b>               | 100                          |            |            |           |           |            |         |  |  |  | 100              | <b>100 - 100</b> |
| <b>13.2</b>               | 95                           |            |            |           |           |            |         |  |  |  | 99               | <b>84 - 100</b>  |
| <b>9.5</b>                | 42                           | 100        | 100        |           |           |            |         |  |  |  | 85               | <b>70 - 92</b>   |
| <b>6.7</b>                | 13                           | 88         | 99         | 100       | 100       | 78         |         |  |  |  | 75               |                  |
| <b>4.75</b>               | 9                            | 34         | 95         | 97        | 99        | 71         |         |  |  |  | 62               | <b>50 - 70</b>   |
| <b>2.36</b>               | 6                            | 2          | 69         | 60        | 91        | 53         |         |  |  |  | 41               | <b>37 - 55</b>   |
| <b>1.18</b>               | 5                            | 1          | 48         | 32        | 67        | 39         |         |  |  |  | 28               | <b>26 - 41</b>   |
| <b>0.600</b>              | 5                            | 1          | 36         | 17        | 32        | 30         |         |  |  |  | 20               | <b>16 - 28</b>   |
| <b>0.300</b>              | 4                            | 1          | 26         | 9         | 8         | 22         |         |  |  |  | 14               | <b>12 - 20</b>   |
| <b>0.150</b>              | 3                            | 1          | 20         | 4         | 1         | 15         |         |  |  |  | 10               | <b>8 - 15</b>    |
| <b>0.075</b>              | 2.5                          | 0.7        | 14.7       | 2.2       | 0.4       | 10.5       |         |  |  |  | 7.3              | <b>4 - 10</b>    |
| <b>BRD of Aggregate</b>   | 2.670                        | 2.569      | 2.656      | 2.667     | 2.619     | 2.643      |         |  |  |  | 2.642            |                  |
| <b>Flakiness Index %</b>  | 24.5                         | 39.5       |            |           |           |            |         |  |  |  |                  |                  |
| <b>LUW</b>                | 1435                         | 1326       | 1672       | 1646      | 1541      |            |         |  |  |  |                  |                  |
| <b>RUW</b>                | 1586                         | 1468       | 1862       | 1812      | 1686      |            |         |  |  |  |                  |                  |
|                           |                              |            |            |           |           |            |         |  |  |  |                  |                  |
| <b>Sand Equivalent %</b>  |                              |            | 25         | 79        | 91        |            |         |  |  |  |                  |                  |
| <b>Water Absorption %</b> | 0.7                          | 1.2        | 1.0        | 0.8       | 0.3       |            |         |  |  |  |                  |                  |



**MIX TYPE** Type D + 10% Rap ( 2% Rediset )  
**REF NUMBER** CL/09/M010



| Binder                         |                         |             |
|--------------------------------|-------------------------|-------------|
| Grade: 40/50 Pen + 2% Rediset  | Bulk Relative Density   | 1.025       |
| Source : Sapref                | Mixing Temperature :    | 140- 145 °c |
| Penetration: 44 (Base)         | Compaction Temperature: | 125 ° c     |
| Sample No. CL/0037 ( Base Bit) |                         |             |



|                                  |                 | 5.0%  | 5.5%  | 6.0%  | 6.5%  |  |  |  |
|----------------------------------|-----------------|-------|-------|-------|-------|--|--|--|
| Binder Content                   | %               | 5.0%  | 5.5%  | 6.0%  | 6.5%  |  |  |  |
| Bulk Relative Density            |                 | 2.354 | 2.374 | 2.384 | 2.385 |  |  |  |
| Max. Theor. Density              |                 | 2.480 | 2.462 | 2.446 | 2.425 |  |  |  |
| Voids in Mix                     | %               | 5.1%  | 3.6%  | 2.5%  | 1.6%  |  |  |  |
| VMA                              | %               | 15.4% | 15.1% | 15.2% | 15.6% |  |  |  |
| V.F.B                            | %               | 66.9% | 76.3% | 83.3% | 89.4% |  |  |  |
| Stability                        | kN              | 12.6  | 13.7  | 14.2  | 13.0  |  |  |  |
| Flow                             | mm              | 3.1   | 3.5   | 3.8   | 4.1   |  |  |  |
| Stability/Flow Ratio             |                 | 4.1   | 3.9   | 3.7   | 3.2   |  |  |  |
| Film Thickness                   | µ               | 7.1   | 7.9   | 8.7   | 9.6   |  |  |  |
| Binder Absorption                | %               | 0.5%  | 0.6%  | 0.6%  | 0.5%  |  |  |  |
| Air Permeability @ 7% Voids      | CM <sup>2</sup> |       |       |       |       |  |  |  |
| Dynamic Creep @ 40°C             | mPa             |       |       |       |       |  |  |  |
| Indirect Tensile Strength @ 25°C | kPa             |       |       |       |       |  |  |  |
| Filler/Bitumen Ratio             |                 | 1.5   | 1.3   | 1.2   | 1.1   |  |  |  |
| Voids @ 300 Gyration             | %               |       |       |       |       |  |  |  |
| Modified Lotman*TSR              |                 |       |       |       |       |  |  |  |