



# Oklahoma Department of Transportation Binder Mix Design Report

Asphalt Concrete, Type S4 (PG 64-22 OK) Mat'l. Code: asco012  
 (Material Full Name and Material Code)  
 Millennial Asphalt P/S # m01104  
 (Producer/Supplier Name and Producer/Supplier Code)  
 Millennial Asphalt, Inc. PLANT ID # m01104-01  
 (Plant Name and Plant ID)

Binder - Recycled ID: B2  
 (Design Type and Design Type ID)  
 S4pv0441800500  
 (Mix ID)

| Aggregate   | Producer/Supplier  | % USED |
|-------------|--|--------|
| 3/4" Chips  | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605             | 22     |
| 3/8" Chips  | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605             | 16     |
| Man. Sand   | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605             | 25     |
| Sand        | Holiday Sand & Gravel Plant 17 (Broken Arrow, OK) P/S # m002097308 | 8      |
| Drag Sand   | Mine Chat @ Tri City Area P/S # MineChat                           | 8      |
| Fine R.A.P. | Contractor / Project Site P/S # Contractor                         | 20     |
| B. H. Fines | Contractor / Project Site P/S # Contractor                         | 1      |

**Asphalt Cement:** Asphaltic Cement Type PG 64-22 OK, acem003, Lion Oil Co. (Muskogee, OK), m00511  
 (Material Full Name, Material Code, Producer/Supplier Name, Producer/Supplier Code)

| Sieve Size       | Producer/Supplier:                                     |  |  |  |  |  |  |     | Comb. Agg. | Requirements |      |      | % Tol. (±) |
|------------------|--|--|--|--|--|--|--|-----|------------|--------------|------|------|------------|
|                  | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605 | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605 | Greenhill Materials Co. (Catoosa, OK) P/S # m001956605 | Holiday Sand & Gravel Plant 17 (Broken Arrow, OK) P/S # m002097308 | Mine Chat @ Tri City Area P/S # MineChat | Contractor / Project Site P/S # Contractor | Contractor / Project Site P/S # Contractor |     |            | JMF          | Min. | Max. |            |
| 3/4 in (19 mm)   | 100  | 100  | 100  | 100  | 100                                      | 100  | 100  | 100 | 100        | 100          | 100  | 0    |            |
| 1/2 in (12.5 mm) | 78   | 100  | 100  | 100  | 100                                      | 97   | 100  | 95  | 95         | 88           | 100  | 7    |            |
| 3/8 in (9.5 mm)  | 54   | 99   | 100  | 100  | 100                                      | 92   | 100  | 88  | 88         | 81           | 95   | 7    |            |
| #4 (4.75 mm)     | 15   | 30   | 99   | 99   | 93                                       | 65   | 100  | 62  | 62         | 55           | 69   | 7    |            |
| #8 (2.36 mm)     | 2  | 4  | 78   | 89   | 60                                       | 44   | 100  | 42  | 42         | 37           | 47   | 5    |            |
| #16 (1.18 mm)    | 2  | 2  | 44   | 70   | 33                                       | 32   | 100  | 27  | 27         | 23           | 31   | 4    |            |
| #30 (.600 mm)    | 2  | 2  | 23   | 47   | 19                                       | 23   | 100  | 17  | 17         | 13           | 21   | 4    |            |
| #50 (.300 mm)    | 2  | 2  | 15   | 20   | 12                                       | 16   | 100  | 11  | 11         | 7            | 15   | 4    |            |
| #100 (.150 mm)   | 2  | 2  | 8  | 2  | 4  | 11   | 100  | 6   | 6          | 3            | 9    | 3    |            |
| #200 (.075 mm)   | 0.9  | 1.3  | 5.5  | 0.5  | 2.0                                      | 7.9  | 100.0                                      | 4.6 | 4.6        | 2.6          | 6.6  | 2    |            |
| AC Content %     |  |  |  |  |  | 5.0  |  | 5.1 | 5.1        | 4.7          | 5.5  | 0.4  |            |

Requires Form 93-E0 signed by the Department for production use. -Oklahoma D.O.T. Materials-

Mix temperature @ discharge from mixer: 305 (152) ± 20 °F (± 10 °C) **Required**  
 Optimum roadway compaction temperature: 290 (143)  
 Laboratory mixing temperature: 325 (163)  
 Laboratory compaction temperature: 300 (149)

| Tests on Asphalt Cement   | Found  |
|---------------------------|--------|
| Specific Gravity @ 77 ° F | 1.0100 |

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| Tests on Compressed Mixtures (@ Design AC) |        |                  |                    |
|--|--------|------------------|--------------------|
|  | # Gyr. | % Density of Gmm | % Density Required |
| Nini                                       | 6      | 87.7             | 85.5 - 91.5        |
| Ndes                                       | 50     |                  | 96.0               |

| Tests on Aggregates | Required | Units                           |
|---------------------|----------|---------------------------------|
| Durability Index    | 70       | 40 min. %                       |
| F.A.A. %U           | N/A      | %                               |
| Flat and Elongated  | 2        | 10 max. %                       |
| Fractured Faces     | 100/100  | 85/80 min. %                    |
| Insoluble Residue   | 7        | N/A %                           |
| LA Abrasion         | 30       | 40 max. %                       |
| Micro-Deval         | 24.3     | N/A %                           |
| Permeability        | 3.1      | 12.5 max. 10 <sup>-5</sup> cm/s |
| Sand Equivalent     | 86       | 40 min. %                       |
| IOC                 | 0.43     | %                               |
| Gse                 | 2.619    |                                 |
| Gsb                 | 2.590    |                                 |
| Specimen Weight     | 4825     | g                               |

| Tests on Compressed Mixtures |       |       |                  |                    |       |                |       |
|------------------------------|-------|-------|------------------|--------------------|-------|----------------|-------|
| %AC                          | Gmb   | Gmm   | % Density of Gmm | % Density Required | % VMA | % VMA Required | % VFA |
| 4.8                          | 2.315 | 2.433 | 95.2             | Design / Field     | 14.9  | Design / Field | 67.8  |
| 5.3                          | 2.333 | 2.415 | 96.6             | 96.0 / 94.5 - 97.4 | 14.7  | 14.5 / 14.0    | 76.9  |
| 5.8                          | 2.358 | 2.397 | 98.4             |                    | 14.2  |                | 88.7  |

**Dust Prop.** 1.0 **Dust Prop. Req.** 0.6 - 1.6  
 0.9  
 0.9

**ITS (PSI)** 132.3 N/A min.  
**TSR** 0.86 0.80 / 0.75 min. (Design / Field)  
 Compacted Wt. (lbs/sy/1" thick) = 106.6 @ 5.1 % Asphalt Cement  
 4.1 % New Asphalt Cement

**Hamburg Rut Test Depth (mm)** 4.67 12.50 max. @ 10,000 cycles

MEETS SPECIFICATION REQUIREMENTS PER SPECIAL PROVISION 708-26(a-f) 09

Comments: \_\_\_\_\_

Last Modified By: Smith, Jerry D. jsmith  
 (User Name and User ID)

Date: 2/28/2018  
 (mm/dd/yyyy)