METHOD OF SAMPLING AND TESTING
MT 320-04
MECHANICAL ANALYSIS OF AGGREGATE
RECOVERED FROM IGNITION OVEN BURN (MT 319)

1 Scope:

1.1 This method of test covers a procedure for the determination of the particle size distribution of fine and coarse aggregates recovered from bituminous mixtures, using sieves with square openings.

2 Referenced Documents:

2.1 ***AASHTO Standards:***
M 231 Weighing Devices Used in the Testing of Materials

MT Manual:
MT 405 Sieves for Testing Purposes
MT 607 Reducing Field Samples of Aggregate to Testing Size

3 Apparatus:

3.1 *Balance* - The balance or scale shall have a capacity larger than the size of the sample being tested. The balance or scale used for weighing shall have a sensitivity of (0.1 grams) and conforming to the requirements of M 231.

3.2 *Sieves* - The sieves with square openings shall be mounted on substantial frames constructed in a manner that will prevent loss of material during sieving. Suitable sieve sizes shall be selected to furnish the information required by the specifications covering the material to be tested. The sieves shall conform to the requirements of MT-405, Wire Cloth Sieves for Testing Purposes.

3.3 *Container* - A container sufficient to contain the sample covered with water and to permit vigorous agitation without inadvertent loss of any part of the sample or water. The container used shall be approved by the District or Area Materials Supervisor prior to use.

3.4 Oven, Hot Plate or alternate heating source.

4 Sample:

4.1 The sample shall consist of the aggregate obtained from Bituminous Paving Mixtures from which the bituminous material has been ignited.

Note 1- A sample that is overloading screens will have to be split or quartered in accordance with MT 607, Reducing Field Samples to Testing Size, and graded separately and the weights combined to obtain a representative gradation. It requires amounts in excess of the following table to overload a screen.

4 Sample: (continued)

MAXIMUM WEIGHT RETAINED

Screen Size	203 mm Diameter (8" Diameter) Screen Maximum Grams	203 mm Diameter (8" Diameter) Screen Maximum Pounds	304.8 mm Diameter (12" Diameter) Screen Maximum Grams	304.8 mm Diameter (12" Diameter) Screen Maximum Pounds	14 3/4" X 22 3/4" Tray Gilson Screen Maximum Grams	14 3/4" X 22 3/4" Tray Gilson Screen Maximum Pounds
31.75 mm (1 1/4")			3821.9	8.4	11339.8	25
25.0 mm (1")			3057.5	6.7	9071.8	20
19.0 mm (3/4")			2598.9	5.7	7711.0	17
16.0 mm (5/8")			2293.2	5.1	6803.9	15
12.5 mm (2")			1987.4	4.4	5896.7	13
9.5 mm (3/8")			1223.0	2.7	3628.7	8
4.75 mm (4 M)	318	0.7	917.3	2.0	2721.5	6
2.36 mm (8 M)	194	0.4	436.5	0.9	1814.1	4
2.00 mm (10 M)	194	0.4	436.5	0.9	1814.1	4
425 μm (40 M)	194	0.4	436.5	0.9		
180 μm (80 M)	194	0.4	436.5	0.9		
75 μm (200 M)	194	0.4	436.5	0.9		

5 Procedure:

5.1 The sample shall be dried until further drying does not alter the weight 0.1 percent, constant mass. The total weight of aggregate in the bituminous mixture being tested is the sum of the weights of the dried aggregates and the mineral matter.

5.2 The test sample after being dried and weighed shall be placed in a container and covered with water. Add a sufficient amount of wetting agent (Note 2) to assure a thorough separation of the material finer than the 200 mesh from the coarser particles. The contents of the container shall be agitated vigorously and the wash water immediately poured over a nest of two sieves consisting of a 10 or 16 mesh sieve superimposed on a 200 mesh sieve. The use of a large metal spoon to stir and agitate the aggregate in the wash water has been found satisfactory.

Note 2 - Wetting agents may include any dispersing agent such as Calgon, Joy or other detergent, or a soap, which will promote the separation of fine material.

5.3 The agitation shall be sufficiently vigorous to result in the complete separation from the coarse particles of all particles finer than the 200 mesh sieve and bring them into suspension in order that they may be removed by decantation of the wash water. Care shall be taken to avoid, as much as possible, the decantation of the coarse particles of the sample. The operation shall be repeated until the wash water is clear.

5.4 The washed aggregate shall be dried to constant mass in an oven or alternate heating source and weighed to the nearest 0.1 grams.

5.5 The aggregate shall then be sieved over sieves of the various sizes required by the specification. The weight of material passing each sieve and the amount passing the 200 mesh sieve shall be recorded. The summation of these various weights must check the dried weight after washing within 0.3 percent of the total weight. The weights of fractions retained on the various sieves and the total passing the 200 mesh sieve shall be converted to percentages by dividing each by the total weight of aggregate in the bituminous mixture.

6 Calculations:

6.1 The individual weights retained must be converted to total weight passing each of the various sieves. The total weight passing is then divided by the total weight of the sample, multiplied by

100, which will result in the percent passing.

7 Report:

7.1 The results of the sieve analysis shall be reported as the total percentages passing each sieve size and reported to the nearest whole number for all material coarser than the 200 mesh. The 200 mesh material shall be reported to one tenth of one percent. Percentages shall be calculated on the basis of the total weight of the sample, including any material finer than the 200 mesh sieve.

GRADATION WORKSHEET EXAMPLE

Date:_____ Project_____

Termini_____ Sample Number_____

Before Wash 2405 After Wash 2352.2 LBW. 52.8

Wt. Retained		Wt. Pass.	Percent Passing
0.0	25M	2405	100
144.0	19M	2261	94
312.0	12.5M	2093	87
673.0	9.5M	1732	72
1322.0	4.75M	1083	45
1538.0	2.36M	867	36
1827.1	1.18M	577.9	24
2019.1	0.60M	385.9	16
2115.1	0.30M	289.9	12
2163.1	0.15M	241.9	10
2259.1	0.075M	145.9	6.1
2352.0	Dry Pan	53.0	

Remarks:

All weights are recorded to 0.1 of a gram.

GRADATION WORKSHEET

Date:_____ Project_____

Termini_____Sample Number_____

Before Wash _____ After Wash _____ LBW. _____

Wt. Retained		Wt. Pass.	Percent Passing
_____	25M	_____	_____
_____	19M	_____	_____
_____	12.5M	_____	_____
_____	9.5M	_____	_____
_____	4.75M	_____	_____
_____	2.36M	_____	_____
_____	1.18M	_____	_____
_____	0.60M	_____	_____
_____	0.30M	_____	_____
_____	0.15M	_____	_____
_____	0.075M	_____	_____
_____	Dry Pan	_____	

Remarks:

All weights are recorded to 0.1 of a gram.