

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

STANDARD METHOD OF TEST FOR PERCENT CRUSHED PARTICLES

1.0 PURPOSE

- 1.1 To set forth a standard method of test for determining the percent of crushed particles in coarse aggregate (gravel).

2.0 SCOPE

- 2.1 This method of test is applicable to that portion of crushed gravel which is retained on the 4.75 mm when that material is being used for applications where the standard specifications places a requirement on the percent of crushed particles.

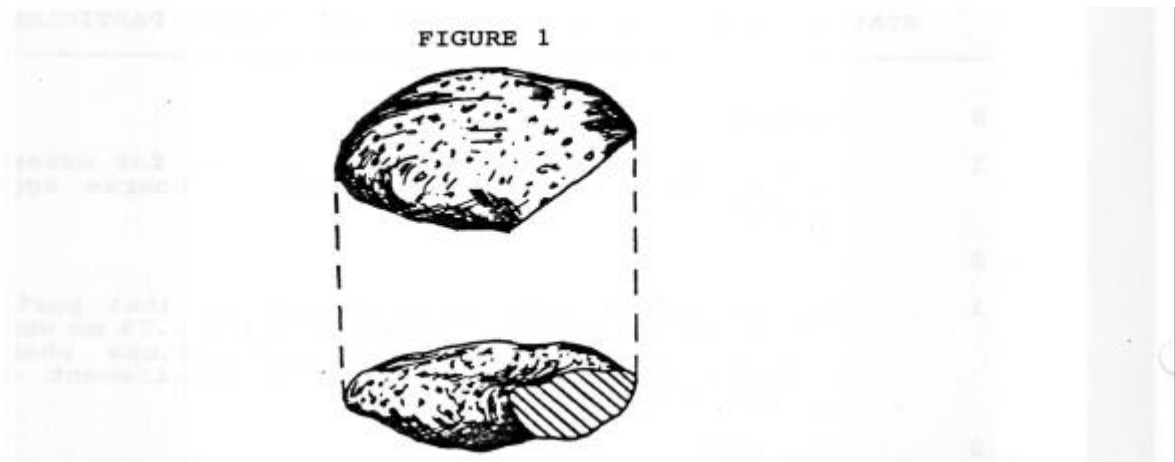
3.0 EQUIPMENT

- 3.1 A balance or scale with a minimum capacity of 5000 grams and an accuracy of one gram.
- 3.2 A 4.75 mm meeting the requirements of AASHTO M-92.
- 3.3 Pans or suitable containers in which to place the aggregate particles as they are separated.

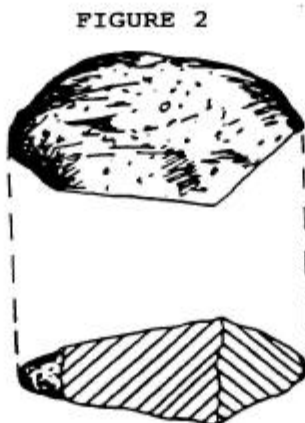
4.0 DEFINITIONS

- 4.1 Crushed Particle - A particle of aggregate which has at least one fractured face where face fracture is defined as set forth below:
- 4.2 Face Fracture - A face fracture is defined as a break that has resulted from the production process (crushing operation) and which constitutes an area of at least 25 percent of the largest two dimensional area of the particle remaining.

- 4.3 Single Face Fracture - A particle which has only one exposed break in a single plane meeting the requirements set forth in Paragraph 4.2. An example is shown by Figure 1.



- 4.4 Multi-Face or Two Face Fracture - A particle which has at least two exposed breaks in two or more different planes meeting the requirements set forth in Paragraph 4.2. An example is shown by Figure 2.



5.0 TEST PROCEDURE

5.1 Obtain from the field sample a test portion of appropriate size by use of a sample splitter.

5.2 Approximate weight of test portion of crushed gravel

<u>MAXIMUM NOMINAL SIZE OF PARTICLE</u>	<u>WEIGHT OF TEST PORTION</u>
9.5 mm	500 grams
19 mm	1500 grams
38 mm	3000 grams
Over 38 mm	5000 grams

5.3 Dry test portion to a constant weight in an oven maintained at $105 \pm 5^{\circ}\text{C}$.

5.4 Separate the test portion on a 4.75 mm discarding all minus 4.75 mm material.

5.5 Weigh the plus 4 material and enter weight on work sheet.

5.6 Place the test portion on a workbench or other suitable workspace arranged in a manner convenient for separating the sample into single-face, multi-face, and no-face fractures.

5.7 Pick up each particle and inspect it to determine the number of face fractures then place it in the appropriate pan or container.

5.8 After the entire test portion has been separated, weigh each fraction and record the weight on the work sheet.

5.9 The entire test portion will be re-combined and the test conducted by a second technician following the steps as set forth in Paragraphs 5.5 through 5.8.

5.10 When the results obtained by two technicians vary more than two percent, it is necessary for both technicians to review the test procedure and re-conduct the test beginning at Paragraph 5.5.

6.0 CALCULATIONS

6.1 Let W_1 = the weight of all particles which meet the definition of two or more face fractures.

W_2 = the weight of all particles which have only one fractured face.

W_3 = the weight of all particles which have no fractured faces.

$W_4 = W_1 + W_2$ = Total weight of all particles which exhibit at least one face fracture or more, namely all crushed particles.

W_5 = Total sample weight

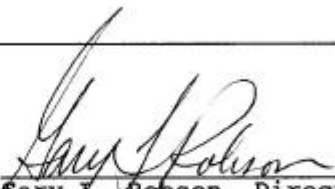
6.2 Percent Crushed Particles (Single-Face or More) =

$$\frac{W_4}{W_5} \times 100$$

6.3 Percent Multi-face Fractures =

$$\frac{W_1}{W_5} \times 100$$

6.4 When the final two results have been obtained, they shall be averaged and the average reported to the nearest whole percent.



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and Testing Division