**PERCENTAGE OF FRACTURED
COARSE AGGREGATE
PARTICLES**

(An Arizona Method)

1.   SCOPE

1.1   This test method describes the procedure for determining the percentage of fractured particles in coarse aggregate. This test procedure is performed on plus No. 8 and larger material, unless otherwise specified.

1.2   When this test procedure is referenced for the determination of "crushed faces", such as in specifications or other test procedures, it shall be understood to be the determination of "fractured coarse aggregate particles".

1.3   A fractured face is defined as an angular, broken surface of an aggregate particle created by crushing, by other artificial means, or by nature. A face is only considered fractured if it has sharp and well defined edges and the projected area of the fractured face is at least 25 percent of the maximum projected area of the aggregate particle visible considering the particle's outline at all possible orientations of the aggregate particle.

1.4   This test method may involve hazardous material, operations, or equipment. This test method does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and determine the applicability of any regulatory limitations prior to use.

1.5   See Appendix A1 of the Materials Testing Manual for information regarding the procedure to be used for rounding numbers to the required degree of accuracy.

2.   APPARATUS

2.1   Requirements for the frequency of equipment calibration and verification are found in Appendix A3 of the Materials Testing Manual.

2.2   A balance or scale capable of measuring the maximum weight to be determined and conforming to the requirements of AASHTO M 231, except the readability and sensitivity of any balance or scale utilized shall be at least 1 gram.

2.3   A magnifying glass, preferably mounted on a stand and with a built-in light.

2.4   Sieves conforming to AASHTO M 92, of sizes necessary for the material being tested.

2.5   Miscellaneous pans, containers, spatulas, etc.

3.   **SAMPLE PREPARATION**

3.1   A representative sample of the aggregate shall be obtained. The coarse aggregate test sample shall be proportionate for the gradation of the material being tested. The size of the test sample shall be such that it contains a minimum of 500 particles. It is not expected that an actual count of the number of particles be made to assure compliance with this requirement. It is required, however, that a reasonably accurate estimate be made to determine that the test sample contains at least 500 particles. Fractured face determination must be made on all particles in the test sample.

4.   **PROCEDURE**

4.1   Weigh the test sample, and record the weight to the nearest gram as "Wa". To facilitate the inspection of the particles, the test sample may be washed and dried to constant weight prior to determining the test sample weight.

4.2   Spread the test sample onto a flat surface, and observe the aggregate particles under the magnifying glass with adequate light.

4.3   If not otherwise specified, separate aggregate particles having at least one fractured face from those that are unfractured. If specifications require that a percentage of the aggregate particles having at least two fractured faces be determined, separate aggregate particles having at least two fractured faces from those that have less than two fractured faces. A spatula or other blade-like tool may be helpful in separating particles.

4.4   Weigh the portion of fractured particles, and record the weight to the nearest gram. If aggregate particles with at least one fractured face have been determined, record the weight as "Wf". If aggregate particles with at least two fractured faces have been determined, record the weight as "W2".

5.   **CALCULATIONS**

5.1   If aggregate particles with at least one fractured face have been determined, calculate the percentage of fractured particles, "FF", and record to the nearest percent as shown below:

$$FF = \frac{W_f}{W_a} \times 100$$

     Where: FF = Percentage of fractured particles with at least one fractured face.
              W_f = Weight of fractured particles with at least one fractured face.
              W_a = Weight of test sample.

5.2   If aggregate particles with at least two fractured faces have been determined, calculate the percentage of fractured particles, "FF2", and record to the nearest percent as shown below:

$$FF_2 = \frac{W_2}{W_a} \times 100$$

     Where: FF_2 = Percentage of fractured particles with at least two fractured faces.
              W_2 = Weight of fractured particles with at least two fractured faces.
              W_a = Weight of test sample.