METHODS OF SAMPLING AND TESTING
MT 607-04
PROCEDURE FOR REDUCING FIELD SAMPLES OF AGGREGATE TO TESTING SIZE
(*Modified AASHTO R 76*)

1 Scope

1.1 These methods cover the reduction of field samples of aggregate to the appropriate size for testing. The methods apply to fine aggregate (FA), coarse aggregate (CA), and mixes of the two, and employ techniques that are intended to minimize variations in measured characteristics between the test samples and the field sample.

Note 1 – Under certain circumstances, reduction in size of the field sample prior to testing is not recommended. Substantial differences between the selected test samples sometimes cannot be avoided, as for example, in the case of an aggregate having relatively few large size particles in the field sample. The laws of chance dictate that these few particles may be unequally distributed among the reduced size test samples. Similarly, if the test sample is being examined for certain contaminants occurring as a few discrete fragments in only small percentages, caution should be used in interpreting results from the reduced size test sample. Chance inclusion or exclusion of only one or two particles in the selected sample may importantly influence interpretation of the characteristics of the field sample. In these cases, the entire field sample should be tested.

2 Referenced Documents

AASHTO
R 76 Reducing Samples of Aggregate to Testing Size
T 84 Specific Gravity and Absorption of Fine Aggregate

MT Materials Manual
MT 201 Sampling Roadway Materials

3 Selection of Method

3.1 Fine Aggregates

3.1.1 Field samples of fine aggregate (FA) that are drier than the saturated-surface-dry (SSD) condition (Note 2) shall be reduced to test size by a mechanical splitter according to Method A. Field samples of FA that are wetter than SSD may be reduced to test size by quartering according to Method B, or the entire field sample may be dried to drier than SSD, using temperatures that do not exceed those specified for any of the tests contemplated, and then reduced to test sample size using Method A.

3.1.2 Field samples of fine aggregate wetter than SSD may be reduced to testing size by treatment as a miniature stockpile as described in Method C.

3.1.3 If a moist field sample is very large, a preliminary split may be made by quartering according to Method B to reduce the sample to not less than 5000 g. The portion obtained is then dried and reduced to test sample size using Method A.

3.1.4 Mixtures of FA and CA that are wetter than SSD shall be reduced to test sample size according to Method B.

Note 2 – The method of determining the saturated-surface-dry condition is described in AASHTO T 84 Section 7.2f. As a quick approximation, if the fine aggregate will retain its shape when molded in the hand, it may be considered to be wetter than saturated-surface-dry.

3.2 Coarse Aggregates

3.2.1 Use of a mechanical splitter in accordance with Method A is preferred, however, the field sample may be reduced by quartering in accordance with Method B.

4 Field Sample Size

4.1 The size of the field sample shall conform to MT 201.

METHOD A – MECHANICAL SPLITTER

5 Apparatus

5.1 *Sample Splitter* – Sample splitters shall have an even number of equal width chutes, but not less than a total of eight for coarse aggregate or twelve for fine aggregate which discharge alternately to each side of the splitter. The minimum width of the individual chutes shall be approximately 50 percent larger than the largest particles in the sample to be split (Table 1). The splitter shall be equipped with two receptacles to hold the two halves of the sample following splitting. It shall also be equipped with a hopper or straight-edged pan, which has a width equal to or slightly less than the overall width of the assembly of chutes by which the sample may be fed at a controlled rate to the chutes. The splitter and accessory equipment shall be so designed that the sample will flow smoothly without restriction or loss of material.

Table 1. Minimum width of splitter opening

Size Passing - 100%	Splitter Opening
2 in.	3 in. or 6 bars
1½ in.	2¼ in. or 6 bars
1 in.	1½ in. or 3 bars
¾ in.	1½ in. or 3 bars
½ in.	¾ in. or 2 bars
⅜ in.	9/16 in. or 2 bars
4M	½ in. or 1 bar

Each bar = ½ inch

Example – When splitting 1½ inch Crushed Base Course, the total sample would require 2¼ inches or 6 bars and the minus 4M would require ½ inch or 1 bar.

6 Procedure

6.1 Place the field sample in the hopper or pan and uniformly distribute it from edge to edge, so that when it is introduced into the chutes, approximately equal amounts will flow through each chute (Note 3). The rate at which the sample is introduced shall be such as to allow free flowing through the chutes into the receptacles below. Reintroduce the portion of the sample in one of the receptacles into the splitter as many times as necessary to reduce the sample to the size specified for the intended test. The portion of the material collected in the other receptacle may be reserved for reduction in size for other tests.

Note 3 – A sample splitter that has a hopper equipped with a dumping device may be filled and leveled with a straightedge prior to dumping into the chutes. A sample splitter that has a free-flowing hopper shall be filled by a container, which has a width equal to or slightly less than the overall width of the assembly of chutes. The side of the container shall be placed against the edge of the hopper and dumped in a single motion into the hopper. In no case shall the material be poured into the hopper from the end of the container, scoop, or shovel.

METHOD B – QUARTERING

7 Apparatus

7.1 The apparatus shall consist of a straightedge, scoop, shovel, or trowel; a broom or brush; and a canvas blanket approximately 6 x 8 ft (2 x 2.5 m).

8 Procedure

8.1 Place the field sample on a hard, clean, level surface where there will be neither loss of material nor the accidental addition of foreign material. Mix the material thoroughly by turning the entire sample over three times. With the last turning, shovel the entire sample into a conical pile by depositing each shovelful on top of the preceding one. Carefully flatten the conical pile to a uniform thickness and diameter by pressing down the apex with a shovel so that each quarter sector of the resulting pile will contain the material originally in it. The diameter should be approximately four to eight times the thickness. Divide the flattened mass into four equal quarters with a shovel or trowel and remove two diagonally opposite quarters, including all fine material, and brush the cleared spaces clean. Successively mix and quarter the remaining material until the sample is reduced to the desired size.

8.2 As an alternate method when the floor surface is uneven, the field sample may be placed on a canvas blanket and mixed with a shovel as described above or by alternately lifting each corner of the canvas and pulling it over the sample toward the diagonally opposite corner causing the material to be rolled. Flatten the pile as described in paragraph 8.1. Divide the sample as also described in paragraph 8.1 or if the surface beneath the blanket is uneven, insert a stick or pipe beneath the blanket and under the center of the pile, then lift both ends of the stick dividing the sample into two equal parts. Remove the stick leaving a fold of the blanket between the divided portions. Insert the stick under the center of the pile at right angles to the first division and again lift both ends of the stick, dividing the sample into four equal parts. Remove two diagonally opposite quarters, being careful to clean the fines from the blanket. The remaining two quarters shall be successively remixed and quartered until the sample is reduced to the desired size.

METHOD C – MINIATURE STOCKPILE SAMPLING

9 Apparatus

9.1 The apparatus shall consist of a small sampling thief, small scoop, or spoon.

10 Procedure

10.1 Place the field sample on a hard, clean, level, non-absorbent surface. Thoroughly mix the sample and form a miniature stockpile. Obtain a sample for each test by selecting at least five increments of material at random locations from the miniature stockpile, using any of the devices described in paragraph 9.