

# WSDOT FOP for AASHTO T 248<sup>1</sup>

## *Reducing Samples of Aggregate to Testing Size*

### 1. Scope

- 1.1 This methods covers for the reduction of large samples of aggregate to the appropriate size for testing employing techniques that are intended to minimize variations in measured characteristics between the test samples so selected and the large sample.
- 1.2 The values stated in English units are to be regarded as the standard.
- 1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 AASHTO Standards

T 2 – Sampling of Aggregate

T 84 – Specific Gravity and Absorption of Coarse Aggregate

#### 2.2 ASTM Standards

C 125 – Terminology Relating to Concrete and Concrete Aggregates

### 3. Terminology

- 3.1 Definitions – The terms used in this practice are defined in ASTM C 125.

### 4. Significance and Use

- 4.1 Specifications for aggregates require sampling portions of the material for testing. Other factors being equal, larger samples will tend to be more representative of the total supply. These methods provides for reducing the large sample obtained in the field or produced in the laboratory to a convenient size for conducting a number of tests to describe the material and measure its quality in a manner that the smaller test sample portion is most likely to be a representation of the larger sample, and thus of the total supply. The individual test methods provide for minimum amount of material to be tested.
- 4.2 Under certain circumstances, reduction in size of the large 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 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 test sample may importantly influence interpretation of the characteristics of the original sample. In these cases, the entire original sample should be tested.

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<sup>1</sup>This FOP is based on AASHTO T 248-11.

- 4.3 Failure to carefully follow the procedures in this practice could result in providing a nonrepresentative sample to be used in subsequent testing.

## 5. Selection of Method

- 5.1 Fine Aggregate – Samples of fine aggregate that are at saturated-surface-dry condition or drier (Note 1) may be reduced using a mechanical splitter according to Method A. Samples having free moisture on the particle surfaces may be reduced in size by quartering according to Method B, or by treating as a miniature stockpile as described in Method C.

- 5.1.1 If the use of Method B or Method C is desired, and the sample does not have free moisture on the particle surfaces, the sample may be moistened to achieve this condition, thoroughly mixed, and then the sample reduction performed.

*Note 1:* The method of determining the saturated-surface-dry condition is described in Test Method T 84. 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.

- 5.1.2 If use of Method A is desired and the sample has free moisture on the particle surfaces, the entire sample may be dried to at least the saturated-surface-dry condition, using temperatures that do not exceed those specified for any of the tests contemplated, and then the sample reduction performed. Alternatively, if the moist sample is very large, a preliminary split may be made using a mechanical splitter having wide chute openings of 1½ in (38 mm) or more to reduce the sample to not less than 5000 g. The portion so obtained is then dried, and reduction to test sample size is completed using Method A.

## 5.2 Mixtures of Coarse and Fine Aggregates

- 5.2.1 If the sample does not exceed a saturated surface dry condition (there is no visible free water, sample may still appear damp) then the sample may be reduced using Method A.
- 5.2.2 If the sample exceeds a saturated surface dry condition the sample may be reduced using Method B or dried to a constant mass per WSDOT FOP for T 255 and then reduced using Method A.

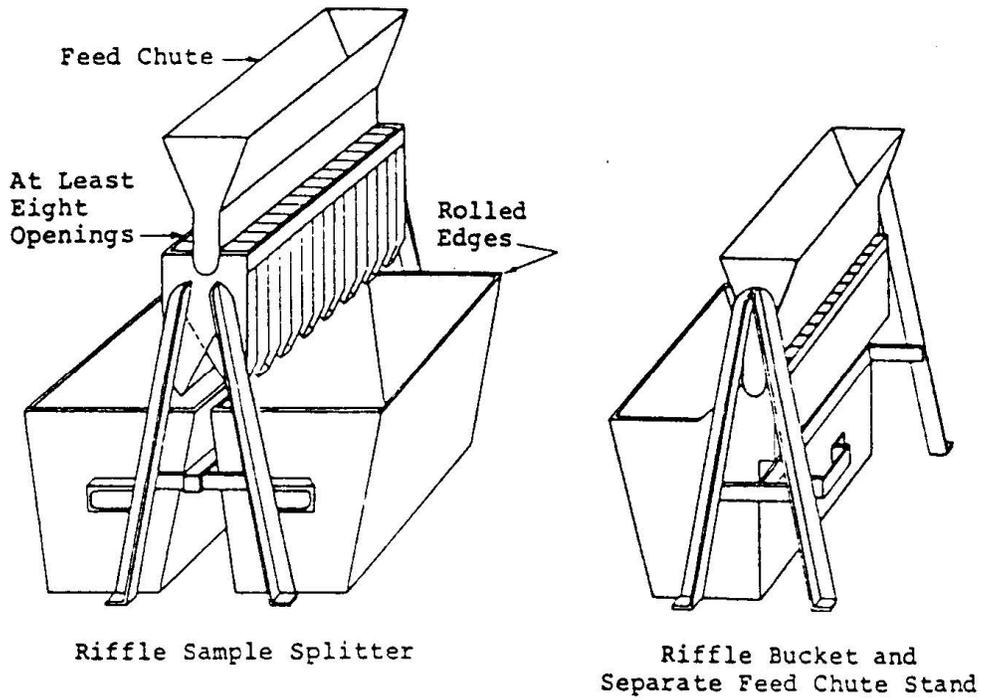
- 5.3 Coarse Aggregates – Reduce the sample using a mechanical splitter in accordance with Method A (preferred method) or by quartering in accordance with Method B. The miniature stockpile Method C is not permitted for coarse aggregates.

- 5.4 Untreated materials shall be prepared for testing using this procedure. Treated materials (i.e., Hot Mix Asphalt or Asphalt Treated Base) shall be prepared for testing using WSDOT Test Method No. T 712 for reduction of size of samples of Asphalt treated materials.

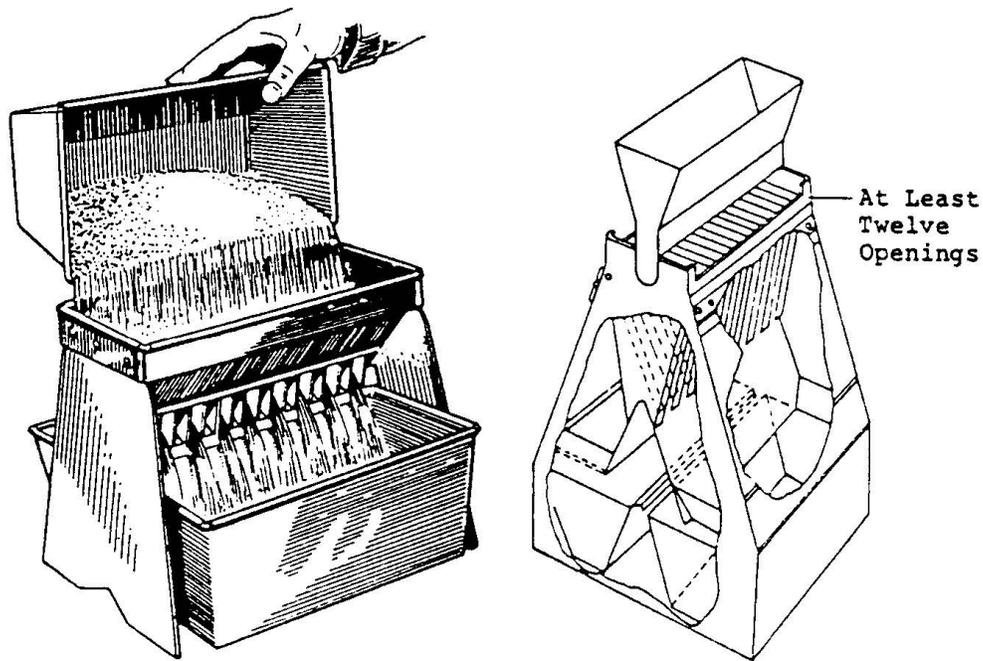
## 6. Sampling

- 6.1 The samples of aggregate obtained in the field shall be taken in accordance with T 2, or as required by individual test methods. When tests for sieve analysis only are contemplated, the size of field sample listed in T 2 is usually adequate. When additional tests are to be

conducted, the user shall determine that the initial size of the field sample is adequate to accomplish all intended tests. Similar procedures shall be used for aggregate production in the laboratory.



(a) Large Riffle Samplers for Coarse Aggregate.



NOTE—May be constructed as either closed or open type. Closed type is preferred.  
(b) Small Riffle Sampler for Fine Aggregate.

**Sample Dividers (Riffles)**  
*Figure 1*

## Method A – Mechanical Splitter

### 7. Apparatus

- 7.1 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 12 for fine aggregate, which discharge alternately to each side of the splitter. For coarse aggregate and mixed aggregate, the minimum width of the individual chutes shall be approximately 50 percent larger than the largest particles in the sample to be split (Note 2). For dry fine aggregate in which the entire sample will pass the  $\frac{3}{8}$  in (9.5 mm) sieve, the minimum width of the individual chutes shall be at least 50 percent larger than the largest particles in the sample and the maximum width shall be  $\frac{3}{4}$  in (19 mm). 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 edge 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 (Figure 1).

### 8. Procedure

- 8.1 Place the original 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. 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.

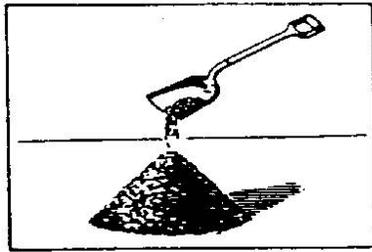
## Method B – Quartering

### 9. Apparatus

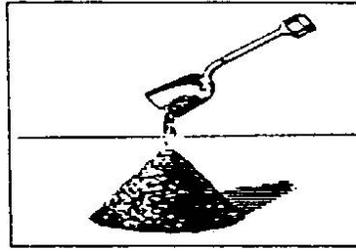
- 9.1 Apparatus shall consist of a straightedge, scoop, shovel, or trowel; a broom or brush; and a canvas blanket or tear-resistant tarp approximately 6 by 8 ft (2 by 2.5 m).

### 10. Procedure

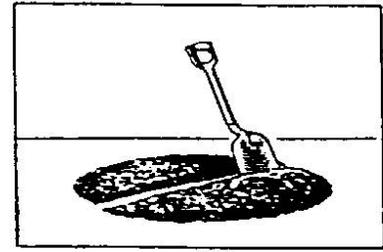
- 10.1 Use either the procedure described in 10.1.1 or 10.1.2 or a combination of both.
- 10.1.1 Place the original sample on a hard clean, level surface where there will be neither loss of material nor the accidental addition of foreign material. Mix the material by turning the entire sample over at least three times until the material is thoroughly mixed. With the last turning, form the entire sample into a conical pile by depositing individual lifts on top of the preceding lift. Carefully flatten the conical pile to a uniform thickness and diameter by pressing down the apex with a shovel or trowel 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. The two unused quarters may be set aside for later use or testing, if desired. Successively mix and quarter the remaining material until the sample is reduced to the desired size (Figure 2).



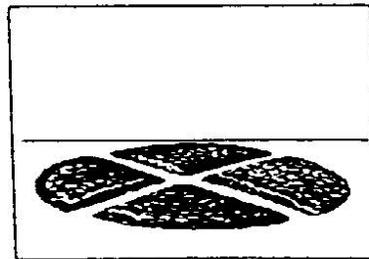
Cone Sample on Hard Clean Surface



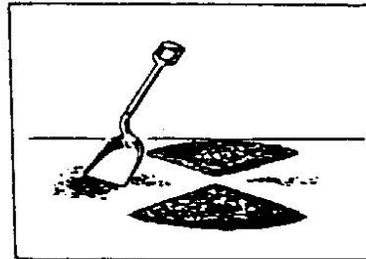
Mix by Forming New Cone



Quarter After Flattening Cone



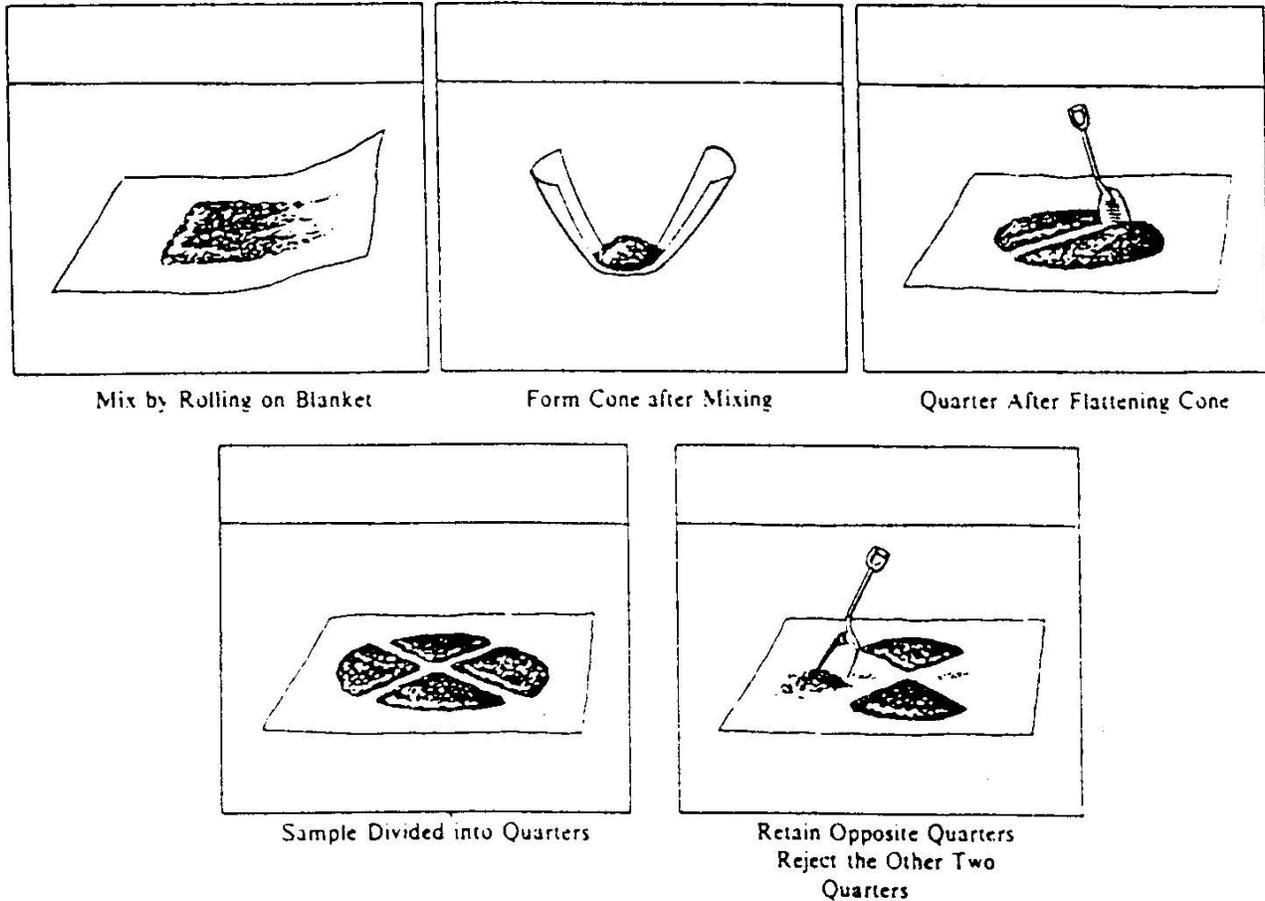
Sample Divided into Quarters

Retain Opposite Quarters  
Reject the Other Two Quarters

### Quartering on a Hard, Clean Level Surface

Figure 2

10.1.2 As an alternative to the procedure in 10.1.1 when the floor surface is uneven, the field sample may be placed on a canvas blanket or tear-resistant tarp and mixed with a shovel or trowel as described in 10.1.1, leaving the sample in a conical pile. As an alternative to mixing with a shovel or trowel, lift each corner of the blanket or tarp and pulling it over the sample toward the diagonally opposite corner causing the material to be rolled. After the material has been rolled a sufficient number of times so that it is thoroughly mixed, pull each corner of the blanket or tarp toward the center of the pile so the material will be left in a conical pile. Flatten the pile as described in 10.1.1. Divide the sample as described in 10.1.1 or insert a stick or pipe beneath the blanket or tarp 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 or tarp. Successively mix and quarter the remaining material until the sample is reduced to the desired size (Figure 3).



**Quartering on a Canvas Blanket or Tear-Resistant Tarp**  
Figure 3

### Method C – Miniature Stockpile Sampling (Damp Fine Aggregate Only)

#### 11. Apparatus

- 11.1 Apparatus shall consist of a straight-edged scoop, shovel, or trowel for mixing the aggregate, and either a small sampling thief, small scoop, or spoon for sampling.

#### 12. Procedure

- 12.1 Place the original sample of damp fine aggregate on a hard clean, level surface where there will be neither loss of material nor the accidental addition of foreign material. Mix the material by turning the entire sample over at least three times until the material is thoroughly mixed. With the last turning, form the entire sample into a conical pile by depositing individual lifts on top of the preceding lifts. If desired, the conical pile may be flattened to a uniform thickness and diameter by pressing the apex with a shovel or trowel so that each quarter sector of the resulting pile will contain the material originally in it. 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 sampling devices described in 11.1.

# Performance Exam Checklist

## Reducing Samples of Aggregates to Testing Size FOP for AASHTO T 248

Participant Name \_\_\_\_\_ Exam Date \_\_\_\_\_

### Procedure Element

#### *Preparation*

Yes No

1. The tester has a copy of the current procedure on hand?

#### *Selection of Method*

1. Fine Aggregate or Mixture of Fine and Coarse Aggregates
- a. Saturated surface dry or drier: Method A (Splitter) used?
  - b. Free moisture present: Method B (Quartering) used?
2. Coarse Aggregate
- a. Method A used (preferred)?
  - b. Method B used?

#### *Method A – Splitting*

1. Material spread uniformly on feeder?
2. Rate of feed slow enough so that sample flows freely through chutes?
3. Material in one pan re-split until desired mass is obtained?
4. Chutes are set correctly for material being split?

#### *Method B – Quartering*

1. Sample placed on clean, hard, and level surface?
2. Mixed by turning over three times with shovel or by raising canvas and pulling over pile?
3. Conical pile formed?
4. Diameter equal to about 4 to 8 times thickness?
5. Pile flattened to uniform thickness and diameter?
6. Divided into 4 equal portions with shovel or trowel?
7. Two diagonally opposite quarters, including all fine material, removed?
8. Cleared space between quarters brushed clean?
9. Process continued until desired sample size is obtained when two opposite quarters combined?

*The sample may be placed upon a blanket and a stick or pipe may be placed under the blanket to divide the pile into quarters.*

First Attempt: Pass  Fail

Second Attempt: Pass  Fail

Signature of Examiner \_\_\_\_\_

Comments: