

# WSDOT FOP for AASHTO T 2

## Standard Practice for Sampling Aggregates

### 1. Scope

- 1.1 This practice covers sampling of coarse and fine aggregates for the following purposes:
  - 1.1.1 Preliminary investigation of the potential source of supply.
  - 1.1.2 Control of the product at the source of supply.
  - 1.1.3 Control of the operations at the site of use.
  - 1.1.4 Acceptance or rejection of the materials.
- 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 248 – Reducing Samples of Aggregate to Testing Size
- 2.2 ASTM Standards
  - C 702 – Practice for Reducing Field Samples of Aggregate to Testing Size
  - D 2234 – Test Method for Collection of a Gross Sample of Coal
  - D 3665 – Practice for Random Sampling of Construction Materials
  - E 105 – Practice for Probability Sampling of Materials
  - E 122 – Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process
  - E 141 – Practice for Acceptance of Evidence Based on the Results of Probability Sampling

### 3. Significance and Use

- 3.1 Sampling is equally as important as the testing, and the sampler shall use every precaution to obtain samples that will show the nature and condition of the materials which they represent.
- 3.2 Samples taken for preliminary testing of aggregate sources must be witnessed or taken by a designated representative of the Regional Materials Engineer or the State Materials Laboratory. A qualified tester employed by the contracting agency or their designated qualified representative will take the acceptance samples.

**Note 1:** For more comprehensive guidance, on preliminary investigation and sampling of potential aggregate sources see the Appendix 1.

#### 4. General Procedures

- 4.1 Where practicable, samples to be tested for quality shall be obtained from the finished product.
- 4.2 Samples of the finished product taken for testing abrasion loss shall not be subject to further crushing or manual reduction in particle size in preparation for the abrasion test unless the size of the finished product is such that it requires further reduction for testing purposes.
- 4.3 Native soils within the contract limits used for embankment construction and/or backfill material do not require sampling by a qualified tester. For material that requires gradation testing, such as but not limited to manufactured aggregates and Gravel Borrow, a qualified tester shall be required for sampling.
- 4.4 The number of field samples required depends on the testing required.
- 4.5 Generally, the sample sizes specified in Table 1 will provide adequate material for routine grading and quality analysis.
- 4.6 Reduce the field sample to test size in accordance with T 248 or as required by other applicable test methods.

Nominal Maximum Size*in (mm)		Minimum Mass lb (kg)	
US No. 4	(4.75)	5	(2)
¼	(6.3)	10	(4)
⅜	(9.5)	10	(4)
½	(12.5)	20	(8)
⅝	(16.0)	20	(8)
¾	(19.0)	30	(12)
1	(25.0)	55	(25)
1¼	(31.5)	70	(30)
1½	(37.5)	80	(36)
2	(50)	90	(40)
2½	(63)	110	(50)
3	(75)	140	(60)
3½	(90)	180	(80)

\*For aggregate, the nominal maximum size sieve is the largest standard sieve opening listed in the applicable specification upon which more than 1 percent of the material is permitted to be retained. For concrete aggregate, the nominal maximum size sieve is the smallest standard sieve opening through which the entire amount of aggregate is permitted to pass.

**Size of Samples**  
**Table 1**

**Note 2:** For an aggregate specification having a generally unrestrictive gradation (i.e., wide range of permissible upper sizes), where the source consistently fully passes a screen substantially smaller than the maximum specified size, the nominal maximum size, for the purpose of defining sampling and test specimen size requirements may be adjusted to the screen, found by experience to retain no more than 5 percent of the materials.

## 5. Procedure

- 5.1 Sampling From A Flowing Aggregate Stream (Bins or Belt Discharge) – A mechanical, automatic, or semi-automatic sampling device is required for processed materials.
  - 5.1.1 Obtain a field sample with a mass equal to or greater than the minimum recommended mass in Table 1.
  - 5.1.2 Take the sample from the entire cross section of the flowing stream.
  - 5.1.3 Avoid sampling from the beginning or end of the aggregate run due to the potential for segregation.
- 5.2 Sampling From the Conveyor Belt (Stopped) – Avoid sampling at the beginning or end of the aggregate run due to the potential for segregation.
  - 5.2.1 Select sample by a random method.
  - 5.2.2 Stop the conveyor belt.
  - 5.2.3 Set the sampling template(s) on the belt. The template(s) must have enough space between the sides such that, the material contained between the sides will yield an increment of the required weight.
  - 5.2.4 Carefully scoop all material between the sides of the template(s) into a suitable container being sure to include all fines.
  - 5.2.5 Obtain a minimum of 3 approximately equal increments
  - 5.2.6 Combine increments to form a single sample.
- 5.3 Sampling From Transportation Units
  - 5.3.1 Visually divide the unit into four quadrants.
  - 5.3.2 Identify one sampling location in each quadrant.
  - 5.3.3 Dig down and remove approximately 0.3 m (1 ft.) of material to avoid surface segregation. Obtain each increment from below this level.
  - 5.3.4 Combine the increments to form a single sample.
- 5.4 Sampling From Stockpile – Method A – Coarse, Fine, or a Combination of Coarse and Fine Aggregates:
  - 5.4.1 Sampling From a Flat Surface Created by a Loader
    - 5.4.1.1 With a loader form a small sampling pile at the base of the stockpile
    - 5.4.1.2 Create a flat surface by having the loader back drag the small pile.
    - 5.4.1.3 Divide the flat surface into four quadrants.
    - 5.4.1.4 Collect a representative sample from each quadrant by fully inserting the shovel into the flat pile as vertically as possible, take care to exclude the underlying material, roll back the shovel and lift the material slowly out of the pile to avoid material rolling off the shovel.
    - 5.4.1.5 Combine the increments to form a single sample.

- 5.4.2 Sampling From a Horizontal Surface on The Stockpile Face
  - 5.4.2.1 Create, with a loader if one is available, horizontal surfaces with vertical faces in the top, middle, and bottom third of the stockpile. When no equipment is available a shovel may be used to create the horizontal surfaces with vertical faces.
  - 5.4.2.2 Prevent continued sloughing by shoving a flat board in against the vertical face. Discard sloughed material to create a horizontal surface.
  - 5.4.2.3 Obtain sample from the horizontal surface as close to the intersection as possible of the horizontal and vertical faces.
  - 5.4.2.4 Obtain at least one increment of equal size from each of the top, middle, and bottom thirds of the pile.
  - 5.4.2.5 Combine the increments to form a single sample.
- 5.5 Sampling From Stockpiles – Method B – Fine Aggregate (Alternate Tube Method):
  - 5.5.1 Remove the outer layer to avoid potential segregation.
  - 5.5.2 Use a sampling tube to obtain one increment of equal size from a minimum of five random locations on the pile.
  - 5.5.3 Combine the increments to form a single sample.
- 5.6 Sampling From Roadway (Bases and Subbases) – WSDOT has deleted this section.

## 6. Shipping Samples

- 6.1 Transport aggregates in bags or other containers that prevent loss, contamination or damage from mishandling during shipment. The weight limit for each bag of aggregate is 30 pounds maximum.
- 6.2 Shipping containers for aggregate samples shall have a transmittal or suitable individual identification attached and enclosed so that the sample can be identified when it reaches the laboratory.
- 6.3 All samples submitted for testing to the Regional or State Materials Laboratories shall be accompanied by a completed sample information report from the Materials Testing System (MATS).

**Note 4:** Agencies that do not have access to MATS may submit a completed DOT Form 350-056.

## Appendices

### X1. Exploration of Potential Aggregate Sources

#### X1.1 Scope

X1.1.1 Sampling for evaluation of potential aggregate sources should be performed by a responsible trained and experienced person. Because of the wide variety of conditions under which sampling may have to be done, it is not possible to describe detailed procedures applicable to all circumstances. This appendix is intended to provide general guidance and list more comprehensive references.

#### X1.2 Sampling Stone From Quarries of Ledges

X1.2.1 Inspection – The ledge or quarry face should be inspected to determine discernible variations or strata. Differences in color and structure should be recorded.

X1.2.2 Sampling and Size of Sample – Separate samples having a mass of at least 55 lbs (25 kg) should be obtained from each discernible stratum. The sample should not include material weathered to such an extent that it is no longer suitable for the purpose intended. One or more pieces in each sample should be at least 6 × 6 × 4 in (150 × 150 × 100 mm) in size with the bedding plane plainly marked, and this piece should be free of seams or fractures.

X1.2.3 Record – In addition to the general information accompanying all samples, the following information should accompany samples taken from ledges or quarry faces:

X1.2.3.1 Approximate quantity available. (If quantities is very large, this may be recorded as practically unlimited.)

X1.2.3.2 Quantity and character of overburden.

X1.2.3.3 A detailed record showing boundaries and location of material represented by each sample.

**Note X1.1:** A sketch, plan, and elevation showing the thickness and location of the different layers is recommended for this purpose.

#### X1.3 Sampling Roadside or Bank Run Sand and Gravel Deposits

X1.3.1 Inspection – Potential sources of bank run sand and gravel may include previously worked pits from which there is an exposed face or potential deposits discovered through air-photo interpretation, geophysical exploration, or other types of terrain investigation.

- X1.3.2 Sampling – Samples should be so chosen from each different stratum in the deposit discernible to the sampler. An estimate of the quantity of the different materials should be made. If the deposit is worked as an open-face bank or pit, samples should be taken by channeling the face vertically, bottom to top, so as to represent the materials proposed for use. Overburdened or disturbed material should not be included in the sample. Test holes should be excavated or drilled at numerous locations in the deposit to determine the quality of the material and the extent of the deposit beyond the exposed face, if any. The number and depth of test holes will depend upon the quantity of the material needed, topography of the area, nature of the deposit, character of the material, and potential value of the material in the deposit. If visual inspection indicates that there is considerable variation in the material, individual samples should be selected from the material in each well defined stratum. Each sample should be thoroughly mixed and quartered if necessary so that the field sample thus obtained will be at least 25 lb (12 kg) for sand and 75 lb (35 kg) if the deposit contains an appreciable amount of coarse aggregate.
- X1.3.3 Record – In addition to the general information accompanying all samples, the following information should accompany samples of bank run sand and gravel:
- X1.3.3.1 Location of supply.
  - X1.3.3.2 Estimate of approximate quantity available.
  - X1.3.3.3 Quantity and character of overburden.
  - X1.3.3.4 Length of haul to proposed site of work.
  - X1.3.3.5 Character of haul (kind of road, maximum grades, etc.).
  - X1.3.3.6 Details as to extent and location of material represented by each sample.

## Performance Exam Checklist

### Sampling of Aggregates FOP for AASHTO T 2

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

#### Procedure Element

##### *Preparation*

Yes No

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

##### *Conveyor Belts – Stopped*

2. Belt stopped?  
3. Sampling device set on belt, avoiding intrusion of adjacent material?  
4. Sample, including all fines, scooped off?

##### *Flowing Aggregate Sampler*

5. Container passed through full stream of material as it runs off end of belt?  
(Mechanical, Automatic, or Semi Automatic Sampler Only)

##### *Transport Units*

6. Transport Unit divided into 4 quadrants?  
7. 1 foot of material removed each sampling site and sample taken?  
8. Four incremental samples into one combined sample?

##### *Stockpiles*

9. Create vertical face, if one does not exist, or use mechanical equipment to build a small sampling pile?  
10. At least three increments taken, at various locations?

##### *Procedure Element*

11. When sampling sand, outer layer removed and increments taken from a least five locations?  
12. Correct sample size?

First Attempt: Pass Fail                      Second Attempt: Pass Fail

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

Comments:

