

WSDOT Errata to FOP for AASHTO T 2

Sampling of Aggregates

WAQTC FOP for AASHTO T 2 has been adopted by WSDOT with the following changes:

Procedure – General

TABLE 1 Recommended Sample Sizes – *Shall conform to the following table and note.*

| 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) |

*One sieve larger than the first sieve to retain more than 10 percent of the material using an agency specified set of sieves based on cumulative percent retained. Where large gaps in specification sieves exist, intermediate sieve(s) may be inserted to determine nominal maximum size. Maximum size is one size larger than nominal maximum size.

Note: 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.

Procedure – Specific Situations

Roadways

Method A (Berm or Windrow) – *Method not recognized by WSDOT.*

Method B (In-Place) – *Method not recognized by WSDOT.*

FOP for AASHTO T 2

Sampling of Aggregates

Scope

This procedure covers sampling of coarse, fine, or a combination of coarse and fine aggregates (CA and FA) in accordance with AASHTO T 2-91. Sampling from conveyor belts, transport units, roadways, and stockpiles is covered.

Apparatus

- Shovels or scoops, or both
- Sampling tubes of acceptable dimensions
- Mechanical sampling systems: normally a permanently attached device that allows a sample container to pass perpendicularly through the entire stream of material or diverts the entire stream of material into the container by manual, hydraulic, or pneumatic operation
- Belt template
- Sampling containers

Procedure – General

Sampling is as important as testing. The technician shall use every precaution to obtain samples that are representative of the material. Determine the time or location for sampling in a random manner.

1. Wherever samples are taken, obtain multiple increments of approximately equal size.
2. Mix the increments thoroughly to form a field sample that meets or exceeds the minimum mass recommended in Table 1.

Table 1 Recommended Sample Sizes

| Nominal Maximum Size* mm (in) | | Minimum Mass g (lb) | |
|-------------------------------|---------|---------------------|-------|
| 90 | (3½) | 175,000 | (385) |
| 75 | (3) | 150,000 | (330) |
| 63 | (2½) | 125,000 | (275) |
| 50 | (2) | 100,000 | (220) |
| 37.5 | (1½) | 75,000 | (165) |
| 25.0 | (1) | 50,000 | (110) |
| 19.0 | (¾) | 25,000 | (55) |
| 12.5 | (½) | 15,000 | (35) |
| 9.5 | (⅜) | 10,000 | (25) |
| 4.75 | (No. 4) | 10,000 | (25) |
| 2.36 | (No. 8) | 10,000 | (25) |

*One sieve larger than the first sieve to retain more than 10 percent of the material using an agency specified set of sieves based on cumulative percent retained. Where large gaps in specification sieves exist, intermediate sieve(s) may be inserted to determine nominal maximum size. Maximum size is one size larger than nominal maximum size.

Note 1: Sample size is based upon the test(s) required. As a general rule, the field sample size should be such that, when split twice will provide a testing sample of proper size. For example, the sample size may be four times that shown in Table 2 of the FOP for AASHTO T 27/T 11, if that mass is more appropriate.

Procedure – Specific Situations

Conveyor Belts

Avoid sampling at the beginning or end of the aggregate run due to the potential for segregation. Be careful when sampling in the rain. Make sure to capture fines that may stick to the belt or that the rain tends to wash away.

Method A (From the Belt)

1. Stop the belt.
2. Set the sampling template in place on the belt, avoiding intrusion by adjacent material.
3. Remove the material from inside the template, including all fines.
4. Obtain at least three approximately equal increments.
5. Combine the increments to form a single sample.

Method B (From the Belt Discharge)

1. Pass a sampling device through the full stream of the material as it runs off the end of the conveyor belt. The sampling device may be manually, semi-automatic or automatically powered.
2. The sampling device shall pass through the stream at least twice, once in each direction, without overfilling while maintaining a constant speed during the sampling process.
3. When emptying the sampling device into the container, include all fines.
4. Combine the increments to form a single sample.

Transport Units

1. Visually divide the unit into four quadrants.
2. Identify one sampling location in each quadrant.
3. Dig down and remove approximately 0.3 m (1 ft) of material to avoid surface segregation. Obtain each increment from below this level.
4. Combine the increments to form a single sample.

Roadways

Method A (Berm or Windrow)

1. Obtain sample before spreading.
2. Take the increments from at least three random locations along the fully-formed windrow or berm. Do not take the increments from the beginning or the end of the windrow or berm.
3. Obtain full cross-section samples of approximately equal size at each location. Take care to exclude the underlying material.
4. Combine the increments to form a single sample.

Note 2: Obtaining samples from berms or windrows may yield extra-large samples and may not be the preferred sampling location.

Method B (In-Place)

1. Obtain sample after spreading and before compaction.
2. Take the increments from at least three random locations.
3. Obtain full-depth increments of approximately equal size from each location. Take care to exclude the underlying material.
4. Combine the increments to form a single sample.

Stockpiles**Method A- Loader sampling**

1. Direct the loader operator to enter the stockpile with the bucket at least 150 mm (6 in) above ground level without contaminating the stockpile.
2. Discard the first bucketful.
3. Have the loader re-enter the stockpile and obtain a full loader bucket of the material, tilt the bucket back and up.
4. Form a small sampling pile at the base of the stockpile by gently rolling the material out of the bucket with the bucket just high enough to permit free-flow of the material. (Repeat as necessary.)
5. Create a flat surface by having the loader back drag the small pile.
6. Visually divide the flat surface into four quadrants.
7. Collect an increment 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.

Method B - Stockpile Face Sampling

1. Create horizontal surfaces with vertical faces in the top, middle, and bottom third of the stockpile with a shovel or loader.
2. Prevent continued sloughing by shoving a flat board against the vertical face. Sloughed material will be discarded to create the horizontal surface.
3. Obtain sample from the horizontal surface as close to the intersection as possible of the horizontal and vertical faces.
4. Obtain at least one increment of equal size from each of the top, middle, and bottom thirds of the pile.
5. Combine the increments to form a single sample.

Method C - Alternate Tube Method (Fine Aggregate)

1. Remove the outer layer that may have become segregated.
2. Using a sampling tube, obtain one increment of equal size from a minimum of five random locations on the pile.
3. Combine the increments to form a single sample.

Note 3: Obtaining samples at stockpiles should be avoided whenever possible due to problems involved in obtaining a representative gradation of material.

Report

- On forms approved by the agency
- Date
- Time
- Sample ID
- Location
- Quantity represented

Performance Exam Checklist

**FOP for AASHTO T 2
Sampling of Aggregates**

Participant Name _____ Exam Date _____

Record the symbols "P" for passing or "F" for failing on each step of the checklist.

| Procedure Element | Trial 1 | Trial 2 |
|--|---------|---------|
| Conveyor Belts – Method A (From the Belt) | | |
| 1. Belt stopped? | _____ | _____ |
| 2. Sampling template set on belt, avoiding intrusion of adjacent material? | _____ | _____ |
| 3. Sample, including all fines, scooped off? | _____ | _____ |
| 4. Samples taken in at least three approximately equal increments? | _____ | _____ |
| Conveyor Belts – Method B (From the Belt Discharge) | | |
| 5. Sampling device passed through full stream of material twice (once in each direction) as it runs off end of belt? | _____ | _____ |
| Transport Units | | |
| 6. Unit divided into four quadrants? | _____ | _____ |
| 7. Increment obtained from each quadrant, 0.3 m (1 ft) below surface? | _____ | _____ |
| 8. Increments combined to make up the sample? | _____ | _____ |
| Roadways Method A (Berm or Windrow) | | |
| 9. Sample taken prior to spreading? | _____ | _____ |
| 10. Full depth of material taken? | _____ | _____ |
| 11. Underlying material excluded? | _____ | _____ |
| 12. Samples taken in at least three approximately equal increments? | _____ | _____ |
| Roadways Method B (In-place) | | |
| 13. Sample taken after spreading? | _____ | _____ |
| 14. Full depth of material taken? | _____ | _____ |
| 15. Underlying material excluded? | _____ | _____ |
| 16. Samples taken in at least three approximately equal increments? | _____ | _____ |

| Procedure Element | Trial 1 | Trial 2 |
|--|---------|---------|
| Stockpile Method A- (Loader sampling) | | |
| 17. Loader operator directed to enter the stockpile with the bucket at least 150 mm (6 in) above ground level without contaminating the stockpile? | _____ | _____ |
| 18. First bucketful discarded? | _____ | _____ |
| 19. The loader re-entered the stockpile and obtained a full loader bucket of the material with the bucket tilted back and up? | _____ | _____ |
| 20. A small sampling pile formed at the base of the stockpile by gently rolling the material out of the bucket with the bucket just high enough to permit free-flow of the material? | _____ | _____ |
| 21. A flat surface created by the loader back dragging the small pile? | _____ | _____ |
| 22. Increment sampled from each quadrant by fully inserting the shovel into the flat pile as vertically as possible, care taken to exclude the underlying material? | _____ | _____ |
| Stockpile Method B (Stockpile Face) | | |
| 23. Created horizontal surfaces with vertical faces? | _____ | _____ |
| 24. At least one increment taken from each of the top, middle, and bottom thirds of the stockpile. | _____ | _____ |
| Stockpile Method C - Alternate Tube Method (Fine Aggregate) | | |
| 25. Outer layer removed? | _____ | _____ |
| 26. Increments taken from at least five locations with a sampling tube? | _____ | _____ |
| General | | |
| 27. Increments mixed thoroughly to form sample? | _____ | _____ |

First Attempt: Pass Fail Second Attempt: Pass Fail

Signature of Examiner _____ WAQTC #: _____

Comments:

Performance Exam Checklist (Oral)

**FOP for AASHTO T 2
Sampling of Aggregates**

Participant Name _____ Exam Date _____

Record the symbols “P” for passing or “F” for failing on each step of the checklist.

| Procedure Element | Trial 1 | Trial 2 |
|---|----------------|----------------|
| 1. How is a sample obtained from a conveyor belt using Method A? | _____ | _____ |
| a) Stop the belt. | _____ | _____ |
| b) Set the sampling template on belt, avoiding intrusion of adjacent material. | _____ | _____ |
| c) All the material is removed from belt including all fines. | _____ | _____ |
| d) Take at least approximately three equal increments. | _____ | _____ |
| 2. How is a sample obtained from a conveyor belt using Method B? | _____ | _____ |
| a) Pass the sampling device through a full stream of material as it runs off the end of the belt. | _____ | _____ |
| b) The device must be passed through at least twice (once in each direction). | _____ | _____ |
| 3. How is a sample obtained from a Transport Unit? | _____ | _____ |
| a) Divide the unit into four quadrants. | _____ | _____ |
| b) Dig 0.3 m (1 ft.) below surface. | _____ | _____ |
| c) Obtain an increment from each quadrant. | _____ | _____ |
| 4. Describe the procedure for sampling from roadways Method A (Berm or Windrow). | _____ | _____ |
| a) Sample prior to spreading | _____ | _____ |
| b) Sample the material full depth without obtaining underlying material. | _____ | _____ |
| c) Take at least three approximately equal increments. | _____ | _____ |
| 5. Describe the procedure for sampling from roadway Method B (In-place). | _____ | _____ |
| a) Sample after spreading, prior to compaction. | _____ | _____ |
| b) Sample the material full depth without obtaining underlying material. | _____ | _____ |
| c) Take at least three approximately equal increments. | _____ | _____ |
| 6. Describe the procedure for sampling a stockpile Method A (Loader Sampling). | _____ | _____ |
| a) Loader creates sampling pile with a flat surface. | _____ | _____ |
| b) Divide the flat surface into four quadrants. | _____ | _____ |
| c) Take an approximately equal increment from each quadrant, excluding the underlying material. | _____ | _____ |

| Procedure Element | Trial 1 | Trial 2 |
|--|---------|---------|
| 7. Describe the procedure for sampling a stockpile Method B (Stockpile Face Sampling). | _____ | _____ |
| a) Create horizontal surfaces with vertical faces and at least one increment taken from each of the top, middle, and bottom thirds of the stockpile. | _____ | _____ |
| 8. Describe the procedure for sampling a stockpile Method C - Alternate Tube Method (Fine Aggregate). | _____ | _____ |
| a) Remove the outer layer and increments taken from at least five locations. | _____ | _____ |
| 9. After obtaining the increments what should you do before performing R 76? | _____ | _____ |
| a) Increments mixed thoroughly to form sample. | _____ | _____ |

First Attempt: Pass Fail

Second Attempt: Pass Fail

Signature of Examiner _____

WAQTC #: _____

Comments: