ATT-37/22, SAMPLING MIXES

1.0 SCOPE

This method describes the procedures for obtaining representative samples of asphalt concrete and cement stabilized mixtures for routine testing for quality assurance or quality control of materials as they are produced in the field to determine the average characteristics of the mix, or the periodic variations in mix characteristics.

2.0 EQUIPMENT

Mixes
Cores

Sample containers: large sample bags, metal pails, or insulated coolers (lined with a paper bag to prevent the hot mix from melting the sides of the cooler)

square nosed shovel
twist ties
board (stockpile sampling)
heat-resistant gloves
large mixing pan
plastic bags
grocer scoop (for mixing)
sample tags
coring unit

If shipping an ACP or ASBC mix sample, the following additional equipment is required: Pre-cut unassembled cardboard box

3.0 PROCEDURE

3.1 General

All samples are obtained by or supervised by a certified Technologist. Inexperienced or junior personnel shall be fully familiar with the correct sampling procedures before they are allowed to obtain samples without supervision.

Sampling is as important as testing, and the technologist must use every precaution to obtain samples that show the true nature and condition of the materials which they represent. Tests on non-representative samples are useless. Care must be taken to prevent contamination by dust or other foreign matter.

Immediately after filling, sealing and cleaning the sample container, mark the containers for identification with a suitable permanent marking pen on the container itself, not on the lid which can be separated and mixed up from the original container. Tags may also be used for identification if they can be securely fastened to the container in such a way that they will not come off, or be lost in transit. Do not attach tags to the containers with elastic bands or other removeable devices.

Discharge, or truck, samples must be taken after the plant has been running **consistently** for at least 10 minutes. This is roughly the time the material would take from the moment it is introduced to the plant to the time this material is discharged. If the plant resumes production after an interruption, ensure the material in the silo (produced before the interruption) is used, before taking the mix sample.

The 10 minute waiting period is not applicable:

a) If performing quality assurance testing on ACP End Product Specification projects, or

b) If trying to determine periodic variations in the mix.

3.2 Un-compacted Mix Samples

Uncompacted mix samples may be obtained at the plant site from the haul truck using a sampling stand, or from behind the paver or spreader. Cutback asphalt mix samples may also be obtained from the stockpile, or from the windrow.

3.2.1 Sample Size and Frequency

Uncompacted mix samples are used for quality assurance or quality control testing. The required sample size per ACP test series or ASBC unit is approximately 20 kg. This is accomplished by filling a metal pail ¾-full (or plastic pail or insulated cooler).

When performing quality assurance on ACP EPS contracts, the mix is used to form two Marshall specimens (except for ASBC mixes) and for one moisture content sample. An uncompacted mix sample may also be used for determining the asphalt content, by extraction or ignition oven, only when cores are not obtained for density, e.g. levelling course material.

When performing quality control testing, the mix is used for one extraction or ignition oven asphalt content sample.

If sampling asphalt mix for submission to a Laboratory for two Marshall specimens (for density-voids analysis), **or** one extraction (or ignition oven) test for asphalt content including the sieve analysis and a moisture content test, the required sample size is one tightly sealed double plastic bag or approximately 6 kg of mix. When requiring several Marshall specimens **and** one asphalt content test, submit two double plastic bags, or approximately 10 kg of mix.

If sampling plant mixed cement stabilized mixtures for quality control, the required sample size per unit of production is one metal (or plastic) pail ¾-full. This mix is used for one 3-point moisture-density relation test including the mix moisture content, and one titration test.

Refer to the "Standard Specifications for Highway Construction" for the frequency, size and required tests for each sample type.

3.2.2 Sampling from Trucks

Use a sampling stand and obtain a representative mix sample from a haul truck as follows:

1. Dig a trench a 50 mm deep and 300 mm wide, across the box from the top of the mound to the side of the box at a point that appears on the surface to be representative of the material.

2. Take a shovelful of mix from the bottom of the trench, as shown in Figure 2.

3. Place the mix in the metal pail, avoiding the loss of material.

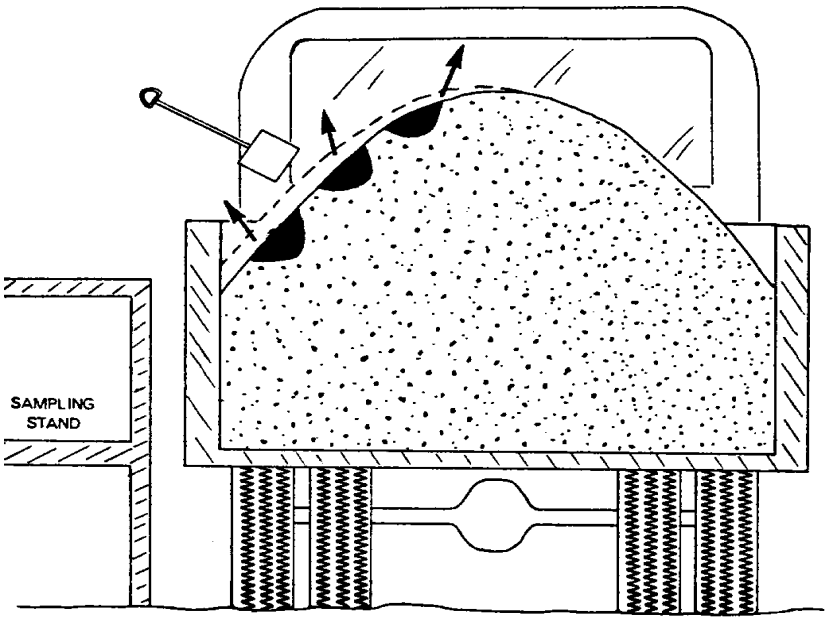

FIGURE 2

4. Repeat the procedure until three equally spaced points have been sampled, obtaining equal portions of mix from each location. The truck sample is the total material from the three locations and must meet the sample size requirement.

3.2.3 Sampling from Stockpiles

Samples from stockpiles are taken at or near the base of the pile, at or near the middle of the pile, and at or near the top of the pile, at several areas about the pile, as shown in Figure 3. Obtain one shovelful of mix from each location as follows:

1. Insert a board into the pile just above the point of sampling. This will prevent segregation during sampling.

2. Dig a step into the pile, discarding the material.

3. Dig into the step and place one shovelful of mix in the metal pail.

4. Repeat steps 1 to 3 at each location, at several areas about the pile, obtaining equal quantities of material from each hole. The mix sample is the total material from all the holes combined and must meet the minimum original sample size requirement.

SAMPLING FROM A STOCKPILE

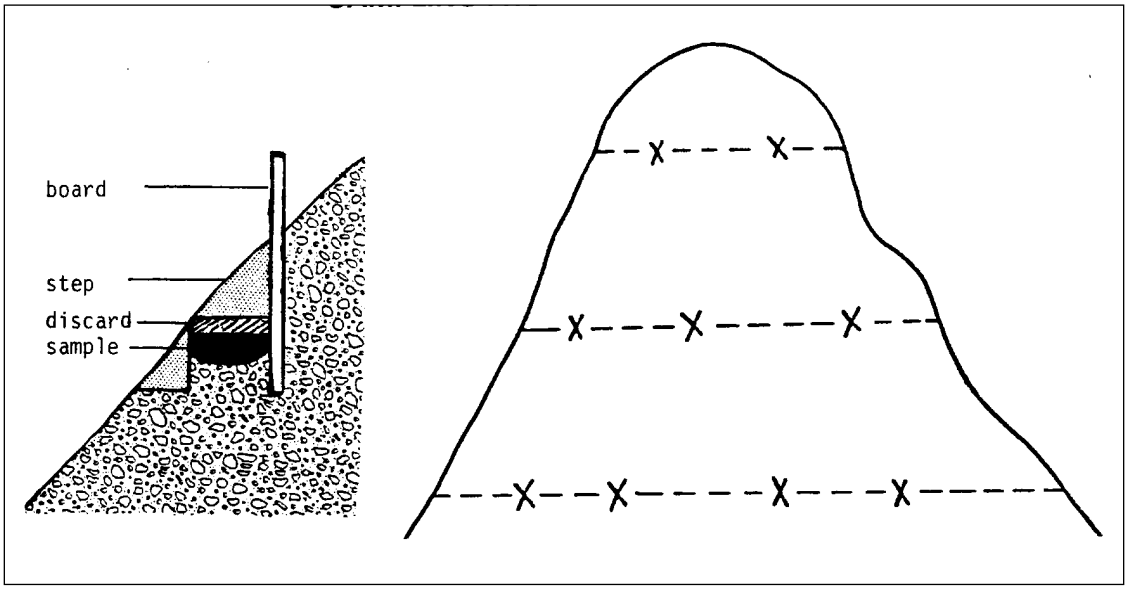

FIGURE 3

3.2.4 Sampling from Windrows

If the material to be sampled is in windrows, obtain a representative sample of the windrow as shown in Figure 4, at intervals of not more than 150 metres. Sample as follows:

1. Use the shovel to flatten a 2 m length of the windrow top, approximately 0.3 m wide, discarding the material to either side.

2. Dig into the windrow's top at three or more equally distributed points along its 2 m flattened portion. Do not include material from the subgrade or base. The sample is the total mix from three or more holes.

SAMPLING FROM A WINDROW

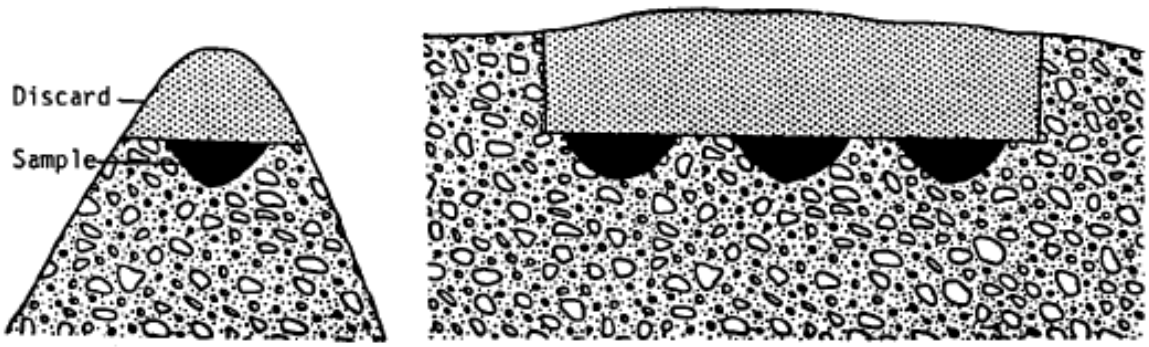

FIGURE 4

3.2.5 Sampling Mix Behind The Paver

1. Select a non-segregated area of unrolled mix behind the paver.

2. Use the square-nosed shovel to obtain one shovelful of mix from three locations across the mat, for the full depth of the lift, as shown in Figure 5. Avoid contamination with underlying materials, such as tack or lower lifts.

3. The sample is the total mix from the sampled locations and must be at least 20 kg, usually equating to one metal, or plastic pail, or insulated cooler that is ¾ full.

4. When using behind the paver mix samples for Asphalt Content and Gradation acceptance testing on 20 mm or less lifts, the following method shall be used to select additional core tests, when the required minimum 5 tests per Lot are not obtained.

   If sufficient numbers of mix samples cannot be obtained in this manner, stratified random core samples shall be taken by the Contractor, as determined by the Consultant, in order to perform the minimum five tests per Lot.

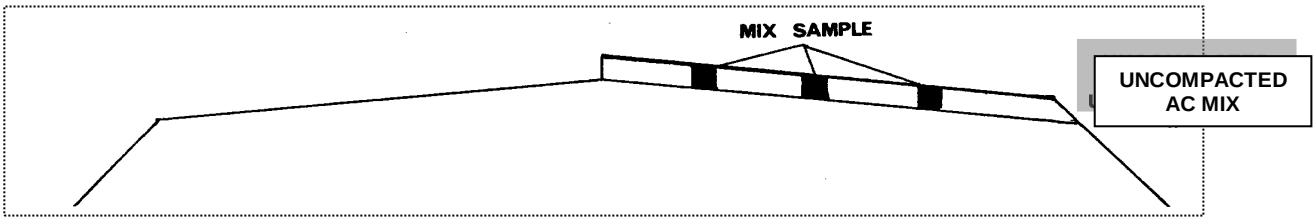

FIGURE 5

3.2.6 Mixing Samples

1. Once the asphalt mix sample is obtained, dump the entire sample into a large mixing pan and mix it thoroughly using a large grocer scoop.

   The ACP mix may be reheated in the oven to aid in remixing. However, do not overheat the sample beyond the compaction temperature, only use sufficient heat to permit satisfactory mixing.

2. Use the large grocer scoop to obtain the required size of loose mix samples for testing of Moisture Content, Asphalt Content and Gradation, MTD, and Marshall Briquettes.

3.3 ACP Cores

Cores are obtained as directed in test method ATT-5.

3.3.1 Sample Frequency and Location

Quality Assurance testing of the finished pavement is conducted in segments. A Lot is a portion of the work being considered for acceptance and is defined in the contract specifications. Generally, for each project and each aggregate class, a Lot is one day's plant production of more than 4 hours, where approved changes to the following have not occurred:

a) Job Mix Formula
b) Pavement Density Requirement
c) Project

A change in any one of the above may require a new Lot designation.

A Lot is divided into five (or more) segments of approximately equal lengths or equal quantities.

One (or more) ACP core is taken for each segment. A minimum of 5 cores are required for each Lot. Core locations are selected, by the Consultant, before coring begins as directed in ATT-56, Part II, Stratified Random Test Site Method. Cores are obtained at least 24 hours after completion of construction of the Lot.

Dry ice may be used when the pavement is still warm, e.g. coring on a hot summer day, or when coring thin lifts, or if the coring location is on an extremely heavy traffic area and setting up traffic control on the following morning is not workable so coring is need to be done directly after the finish roller has completed rolling while the plant mix is still hot.

To speed the cooling process, and enable coring to proceed right after paving and compaction has been completed, contractors use dry ice.

3.3.2 Purpose and Sample Size

When performing quality assurance testing, the 150 mm cores are used for acceptance and payment for density, asphalt content, and gradation.

For a QC Acceptance Lot in which acceptance testing for asphalt content and gradation is based upon the Contractor's quality control test results, and for which no corresponding quality assurance test results are available, the core is used for density specification compliance only, and only one core is obtained at each segment for each required density test.

If using the core for asphalt content and gradation specification compliance, obtain enough cores for each sample to have a minimum weight of 2000 g. In most cases, one 150-mm diameter core is sufficient.

The following table shows the minimum required core thickness for the top and lower lifts.

LIFT	DESIGN LIFT THICKNESS	AGGREGATE TOPSIZE µm	MINIMUM CORE THICKINESS mm
top lift	all	all	30 *
lower lifts	> 35 mm	all	30 *
lower lifts	< 35 mm	16 000	25 **
		12 500	20 **
		10 000	20 **

* If core thickness is < 30mm, randomly select another core site.

** If requirements are not met, select another core location closer to the wheelpath.

3.4 Cement Stabilized Mix Cores

3.4.1 Sample Size and Frequency

If coring cement stabilized mixtures, obtain one core for each required compressive strength. When requested, take one unit and one random core per unit of production.

3.4.2 CSBC Core Location

CSBC cores are obtained using a coring unit as directed in ATT-5, CORING. CSBC cores are taken at the following locations:

1. Take a unit core from the area represented by the mix from the truck carrying the unit flag. Randomly choose a station and location on the corresponding mat at about the unit flag as shown in Figure 6.

2. Take a random core at a randomly chosen station and location. A random station is generally located between the unit mix and the next unit flag on the corresponding mat with the exception of:

    a) For the first unit of the day, a random station may be located before the unit flag, and

    b) For the last unit of the day, a random station only includes the mix laid to the end of the day's production, **not** to the next day's first unit flag.

UNIT AND RANDOM STATIONS

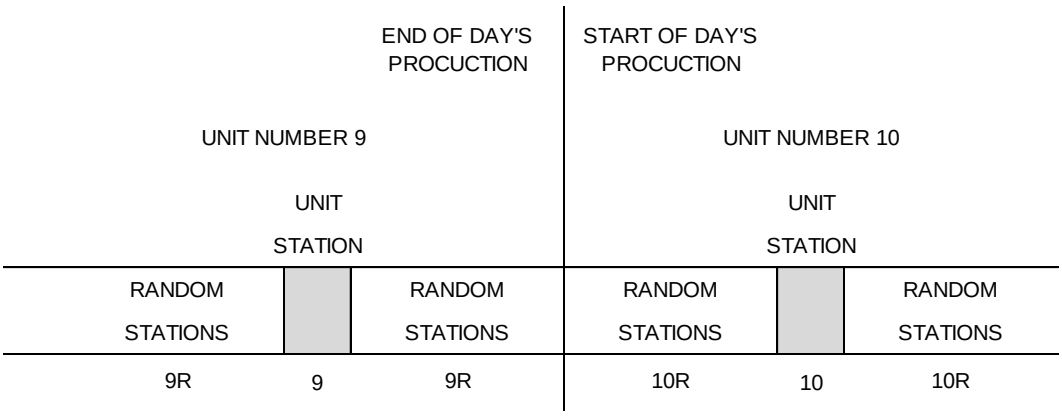

FIGURE 6

4.0 SAMPLE IDENTIFICATION AND SHIPPING

4.1 Asphalt Mix Samples

When asphalt mix samples are submitted to a Laboratory for confirmation testing of duplicate samples:

1. Insert a plastic bag into another.

2. Assemble a shipping box, using an appropriately sized cardboard box.

3. Insert the double plastic bag into the shipping box.

4. If submitting an asphalt cement mix sample, fill the double plastic bag with approximately 6 kg of mix, once the sample has cooled. If submitting a liquid asphalt mix sample, fill the bag immediately after mixing.

5. Repeat steps 1 to 4 until at least the minimum sample size is obtained.

6. Tightly seal each inside bag. A string, rope or bag tie may be used.

7. If shipping more than one sample, record on a tag the section or lot and test number (or sample number) of each bag, and insert the tag in the outside plastic bag of the corresponding sample.

8. Printout the Asphalt Mix Sample Identification on a sheet of paper, then insert the information sheet in the outside bag. Any bag may be used, if submitting more than one sample.

9. Tightly seal each outside bag and close the top of each box.

10. Print a shipping label to fit the size of the box. The return address, with the Project Managers name included, should be in the upper left corner and the delivery address should be in the lower right corner as you look at the package. They should both be on the same side of the package and be clearly legible.

11. Affix the shipping label to the box.

4.2 Compacted Asphalt Mix Specimens

1. For each ACP core, or Marshall specimen, proceed as follows:

    a) Mark the specimen with an arrow on the side indicating the top of the specimen.

    b) Record on a tag the section or lot and test number, or number of specimen.

    c) Place the specimen and identification tag in a plastic bag and seal the bag.

    d) Place the bag with specimen in a box and securely pack it with paper or other packing material.

2. For each box being submitted:

    a) Complete an Asphalt Mix Sample Identification form, fold the form, and insert it in the box, then close and seal the top of the box.

    b) Print a shipping label to fit the size of the box. The return address, with the Project Managers name included, should be in the upper left corner and the delivery address should be in the lower right corner as you look at the package. They should both be on the same side of the package and be clearly legible.

    c) Affix the shipping label to the box.

4.3 Compacted Cement Stabilized Mix Specimens

1. After the core or formed specimen has cured for at least 3 days, repeat Section 4.2, steps 1(a) to (d).

2. For each box being submitted:

    a) Complete a Sample Identification form. Include the specimen's cement content, dry density, moisture content and date that the specimen must be broken. Also include the reason for submitting the sample.

    b) Fold the form, insert it in the box, close and seal the lid of the box.

    c) Repeat steps 10 to 11 of Section 4.1.

    NOTE: Samples ***must not be allowed to freeze*** during transit.

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