HIGHWAYS DEPARTMENT

GUIDANCE NOTES

BULK SAMPLING OF BITUMINOUS MATERIALS

Research & Development Division

RD/GN/002B
September 1994

HIGHWAYS DEPARTMENT

GUIDANCE NOTES NO. RD/GN/002B

Bulk Sampling

of

Bituminous Materials

Prepared by

Research & Development Division
Highways Department

Date

September 1994
(Revision B)

GUIDANCE NOTES
BULK SAMPLING OF BITUMINOUS MATERIALS

1.0 Scope

This document supersedes RD/GN/002A issued in 1993. It describes how bulk samples of bituminous materials are to be taken at a supplier's production plant, and at site if that is necessary, and sample preparation prior to testing.

2.0 Purpose

The objective of sampling is to obtain samples that will represent the true nature and condition of the materials produced at the point of manufacture. This objective is best met by sampling at the manufacturing plant to ensure that extraneous factors, such as workmanship or performance of paver, do not intrude.

If sampling at the job site is considered necessary, then this should be carried out in accordance with Section 3.2 of this Guidance Note.

Section 3.3 of this Guidance Note describes a procedure for investigative or confirmatory testing. The justifications for the use of this procedure are detailed in that Section.

3.0 Sampling Methods

Sampling methods shall be in accordance with ASTM D 979 or as in the following, as appropriate:

a) Section 3.1 From delivery truck at the production plant;

b) Section 3.2 From roadway prior to compaction;

c) Section 3.3 From roadway after compaction.

3.1 **From delivery truck at the production plant**

3.1.1 The Engineer shall have the minimum mass of bulk sample as stated in Table 1 provided to him for compliance testing. This mass constitutes sufficient material for two sub-samples, one for the initial tests and the other for confirmatory tests, if the initial tests do not comply.

Table 1 : Minimum mass of bulk sample for Engineer's compliance testing

Material (Nominal aggregate size)	Minimum Mass
≤ 20 mm > 20 mm	20 kg 30 kg

3.1.2 The bituminous material on a particular truck shall be divided into 3 equal sections. Across the width of each of these sections, at least one separate increment shall be taken, i.e. the bulk sample will be made up of at least 3 increments. The increments shall be taken from locations as widely spaced as practicable but not closer than 300 mm from the truck body.

3.1.3 At each location, the top 200 mm of the bituminous material shall be carefully removed, and the sample increment shall be taken below this level using a square mouth shovel. Any exposed face standing above this level should be properly retained or battered to prevent material from falling onto the sampling location. Special care shall be taken to remove the complete surface material including any coarse material which may have fallen into the hole after taking a shovel load of material. Each sample increment should be carefully placed in a bucket or bag. The total increments shall be combined to form one sample.

3.1.4 Throwing of material from the top of the truck to a barrow or similar equipment situated at ground level is not permitted.

3.2 **From roadway prior to compaction**

3.2.1 The Engineer shall have the minimum mass of bulk sample as stated in Table 1 provided to him for compliance testing. This mass constitutes sufficient material for two sub-samples, one for the initial tests and the other for the confirmatory tests if the initial tests fail to comply.

3.2.2 Select at least two sampling locations for roadbase and three for base course and wearing course. Sampling locations should be selected at random in an area of uncompacted material behind the paver screed in a diagonal pattern across the paving run and at least 500 mm from the outer edges. Sampling within 3 metres of the start or finish of a truck load should be avoided.

3.2.3 The size of each increment should be approximately 300 mm x 300 mm. Carefully excavate the material to the full depth of uncompacted layer ensuring that no surrounding material falls onto the sampling area and that the sample is not contaminated with underlying material. Each sample increment shall be carefully placed in a bucket or bag. The total increments shall be combined to form one sample.

3.3 **From roadway after compaction**

3.3.1 This method should only be used for investigative or confirmatory testing where the results of tests on the initial bulk sample have failed to comply with the specified requirements and it is suspected that non-compliance could have been due to errors in the initial sampling.

3.3.2 Three increments should be selected at random from the area to be sampled. In the case of confirmatory testing, the area should be representative of the initial test lot.

3.3.3 The size of each increment should be at least 400 mm x 400 mm. Carefully excavate the material to the full depth of the layer using a pneumatic chisel and hand tools. Care should be taken to exclude any underlying material. The material removed for each increment should be in one piece or two and kept in a sturdy bag.

3.3.4 The 3 increments are to be tested separately and the results averaged to determine compliance.

4.0 **Protection and Preservation of Samples**

4.1 Care should be taken to prevent samples from becoming contaminated or damaged prior to testing.

4.2 Friction course material is susceptible to bitumen drainage. Any bitumen which drains onto trays etc. should be recovered and added back to the sample prior to testing.

4.3 Samples should be sent to the testing laboratory not later than 2 working days after the material is supplied.

5.0 Preparation of Samples for Testing

5.1 Preparation of samples should only be carried out in a laboratory approved by the Engineer. Samples should be forwarded to the approved laboratory with a test request form duly completed by the Engineer. A standard Test Request Form is included as an Appendix to this document.

5.2 The responsibilty of sample reduction after the samples are delivered to the approved laboratory rests with the laboratory personnel.

5.3 Samples obtained from the roadway after compaction should be inspected and any foreign material removed. All cut edges shall be removed to ensure that the results will not be affected by fractured aggregate particles. This may require preliminary heating of the sample to soften the material sufficiently so that the edges can be easily removed.

5.4 The entire bulk sample should be put on a tray of suitable size and sample and tray placed into an oven at a temperature of 110 C for bituminous materials other than friction course material and 90 C for friction course material. The material should be heated until the sample is completely softened and can be separated into discrete particles. If the temperature specified is insufficient to bring the material to a suitably workable condition it may be increased but shall be kept as low as possible. In no case shall the temperature be increased beyond 130 C for bituminous materials other than friction course material and 105 C for friction course material.

5.5 The hot sample shall be prepared for testing as follows:

a) Thoroughly mix the sample in a large tray (at least 750 mm x 750 mm) with a square mouth shavel.

b) Split the sample into 2 sub-samples by riffling with a riffle box of slot size 1.5 times the maximum aggregate size of the material. The material should be poured from left to right alternately to avoid bias.

c) Obtain test specimens of suitable size from one of the sub-samples by riffling as described in b)

d) Keep the other sub-sample for any retest if it is later found to be necessary. Unless instructed by the Engineer, this sub-sample may be disposed of immediately if the initial test results show compliance with the specification.

6.0 Equipment for Sampling

Sampling tools e.g. shovels, barrows, buckets, trays shall be maintained in a clean and serviceable condition at all times. It is allowable to coat the tools lightly with diesel or similar oils. However, the tools should be wiped clean or drained for at least 30 seconds before use. The sample containers should be galvanized steel buckets or strong multi walled paper bags. Plastic containers or plastic lined paper bags are not suitable for hot materials.

7.0 Supervision

It is important that personnel responsible for sampling and supervision of sampling should be well trained, and understand fully the consequences of diverging from the sampling procedures described above.

8.0 Safety

8.1 Prior to any sampling, it is essential that the person carrying out the sampling inform the truck driver, plant operators and supervising staff of his intention.

8.2 The following items of protective clothing should be worn as a minimum requirement:

a) close fitting long sleeve overall,

b) heat resistant gloves,

c) safety boots offering protection from heat of the feet particularly the soles,

d) reflective jackets, and

e) safety helmet.

Appendix A

TEST REQUEST

From : Department : _____ Contract No.: _____

To : Testing Laboratory : _____ Demand order No. : _____

Test Request Form No.: _____ Works order No. : _____

Laying location : _____

1. Supplier : _____
2. Production Plant : _____
3. Type of Material : _____
4. Job Mix No. / (Specification) : _____
5. Sample No.: _____
6. Material Temp. (°C)/(Location) : _____
7. Lorry No.:_____
8. Quantity in truck : _____
9. Date of Sampling : _____
10. Time of sampling : _____
11. Date on arrival to laboratory : _____
12. Time on arrival to laboratory : _____
13. Sampling method:
    - i) On truck*
    - ii) Roadway before compaction*
    - iii) Roadway after compaction*
14. Tests requested:
    - i) Binder content* (ASTM D2172)
    - ii) Agg grading* (ASTM C117,C136)
    - iii) Rice's S.G.* (ASTM D2041)
    - iv) Others, please specify*
15. Remarks:_____
16. Insert in the box below the name and address to which the test certificate(s) should be sent to

Sampling by: _____
(Block Letters) (Signature) (Post)

Sampling witnessed by: _____
(Block Letters) (Signature) (Post)

Tests requested by : _____
(Block Letters) (Signature) (Post)

Original - To Public Works Laboratories * Delete if not applicable
Duplicate - To Engineer
Triplicate - Kept in Site Office