



BUREAU OF MATERIALS MATERIALS PROCEDURES

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FIELD SAMPLING FOR THE APPROVAL OF STORAGE SILOS AT HOT MIXED ASPHALT PLANTS

PURPOSE:

To establish standard procedures for the approval of surge or storage bins at HMA plants for storage up to 24 hours.

SUPERSEDES:

None

REFERENCES:

N.J.D.O.T. Special Provisions, Supplemental Specifications and Standard Specifications, Addenda and Attachments.

AASHTO M156

AASHTO T170

ASTM D1856

Report 74-007-7733 Division of Research and Development (October 1973)

FORMS:

LB-88	Sample envelope
LB-400	Ignition oven test
LB-325	HMA mix design
LB-14	Miscellaneous material
LB-295	Extraction
LB-16	Analysis of asphalt cement

I. APPARATUS:

- Containers of sufficient capacity to transport the required specimens.
- Calibrated dial asphalt thermometer.
- Bituminous sample boxes.
- Stopwatch.
- Non-absorbent table (minimum one square yard in size).
- Shovel.
- Trowel.
- State seals.

II. PROCEDURE:

Two (2) sets of plans for the storage systems will be required; one (1) set will be kept on file at the Bureau of Materials, the other kept at the respective Regional Materials Office.

Prior to performing an evaluation; an inspection of the installation will be made to ensure plan conformity.

It is recommended that a 19mm or larger mixture be used for the evaluation of the surge or storage bins.

Material used during the evaluation process will not be used for NJDOT projects.

A. General Criteria

1. Retention Time
 - a. The term surge will be construed to mean a retention time of one to seven hours or limited to same day use.
 - b. The term storage will be construed to mean a retention time of overnight or an interval thereafter.
 - c. The retention time for the evaluation will be the maximum storage time proposed by the producer.
2. Sampling

Samples will be taken from both the plant (plant samples) and storage bin (bin samples). These samples are to be coincident on a weight basis. A pre-planned schedule will be necessary in order to achieve coincident sampling. Bin to be evaluated shall be filled to ninety (90) percent of capacity.

B. Specific Requirements

1. Number of samples
 - a. Five (5) plant samples will be taken from the pugmill or drum mixer during production of the mix.
 - b. Bin samples as discharged from the storage shall be coincident with the plant samples plus one additional sample for a total of six (6) samples. The additional sample will be taken by sampling the last truck twice; once at approximately the mid point of the payload and then again from the last material out.
2. Method of sampling
 - a. The plant samples shall be taken from the conveying system at a point between the plant and the storage bin. Samples shall be representative of the material being produced. Plant samples shall be prepared and taken coincident with the bin sample schedule list below.
 - b. The bin samples will be obtained in the following manner. From the Pre-determined conical pile of mixture within the truck, two furrows 180° from each other will be dug three (3) to six (6) inches in depth extending from the top to the periphery of the pile. The furrows will follow the slope of the pile and be formed as near its center as possible. A scoop of approximately equal volume of material will be dug from each furrowing representing, the top, middle and bottom third of the pile and placed in a bucket to form one sample. The weight of the sample shall be minimum of twenty eight (28) pounds.
 - c. A dial type asphalt thermometer shall be inserted in the center of the composite sample and the temperature recorded.
 - d. After recording the temperature, the sample will be dumped onto a thirty six (36) inch square melamine laminated faced plywood base. Two (2) 8 x 8 x 2 inch specimens will be prepared from the sample in the following manner. Carefully flatten the conical pile to a uniform thickness and diameter. Divide the flatten mass into four (4) equal parts with a shovel or trowel. Select and remove one of the quarters of the flatten pile to be the "A" sample. Remove the quarter diagonally opposite of the selected "A" and label it as the "B" sample. Discard the remaining two quarters.
 - e. Sample will be placed in 8 x 8 x 2 inch cardboard boxes. Samples will be identified with mix ID number and location sample was taken. (Plant or bin) followed by a number and a letter A or B. The number will signify the sampling sequence; the letter A for (extraction or ignition oven), the letter B for recovery.

3. Sample Schedule

Five (5) samples will be taken from the plant (batch or drum mix) while loading the storage bin. Six (6) bin samples shall be taken from material discharged from the storage bin.

Samples will be taken by the following schedule:

- Sample 1 from the first 3-5 tons
- Sample 2 from the first 8-10 tons

Sample 3 from the first 18-20 tons
Sample 4 taken at approximately 50% of storage bin capacity
Sample 5 taken from the last 10 tons in storage bin
Sample 6 taken from the last of the material in storage bin

Note: Bin samples 1, 2 and 3 shall be taken from the first truck.
Bin samples 5 & 6 shall be taken from the last truck.
Plant samples taken from pugmill or drum mixer while loading the storage bin; shall coincide with the schedule list above for the storage bin samples, with the exception of sample 5 which is not needed.

4. Cooling and Storage

- a. Samples shall be transported within twenty-four (24) hours. Samples shall be protected from damage during transit to NJDOT Central Laboratory in Trenton.
- b. The "B" samples shall be stored in the freezer at the Central Laboratory at zero $\pm 10^{\circ}$ F until scheduled for recovery. Arrangements shall be made in advance with the appropriate laboratory staff to receive, store and test the samples.
- c. All the "A" samples from both the plant and bin will be tested for composition (gradation). The "B" samples will be tested for recovery.

C. Guide for Bin Acceptance

1. Criteria Limits

a. Temperature

The mix shall be produced within $\pm 20^{\circ}$ F of the specified temperature. The temperature of the mixture as discharged from the bin shall not be more than 20° F below the average of the plant samples.

b. Penetration

The penetration of the recovered asphalt of the bin samples shall not be less than 85 percent of the average of the plant samples.

c. Segregation

The gradation (sieve analysis) of all the bin samples must be within reasonable conformity with the average gradation of the plant samples. When noticeable differences are observed in the sieve analysis, the gradation of each questionable sample shall be analyzed to determine if segregation has occurred.

If segregation has occurred, it will be noted when it occurred (by tonnage). The segregated mix shall not be used for NJDOT projects. Segregation has been known to occur during the first and last 10-15 tons material discharged from the bin.

D. Approval of Surge and Storage Bins at HMA Plants

An evaluation of a storage unit will be conducted by the Department on written request by the plant owner. The evaluation will determine the degree of composition uniformity, temperature characteristics, and degree of asphalt binder hardening of mixture processed through storage unit.

A plant shall be permitted to store hot mixture in a storage bin provided the bin has received approval by the Department. Use of the bin is to be in conformance with all the limitations on retention time, type of mixture, heater operation, bin atmosphere, bin level or other characteristic set forth in the Department's letter of approval.

The Department of Transportation shall be notified if the approved storage bin has been altered or radically changed. The Department will determine if system is still in compliance or a reevaluation is necessary.