# 1. SCOPE

## 1.1. Description of Test

The standard test procedure is used for collecting samples of asphalt concrete by coring methods.

## 1.2. Application of Test

Samples of asphalt concrete collected using the coring method may be used to evaluate various characteristics of an asphalt concrete pavement for construction quality control testing, quality assurance testing and product acceptance testing. Core samples may also be used for research testing purposes.

## 1.3. Units of Measure

The standard core sample diameter for purposes of this test procedure will be 101.6 mm or 152.4 mm. Generally, the maximum thickness of asphalt concrete pavement to be sampled will be 250 mm.

# 2. APPARATUS AND MATERIALS

## 2.1. Equipment

Portable Drilling Equipment - mounted on a trailer, truck or other similar equipment for transportation purposes. The drill shall be equipped with a source of power suitable for driving the core barrel. The drilling unit will be equipped with a source of air or water supply to cool the core barrel during drilling operations.

Core Barrels - which will provide cores as described in section 1.3. Generally thin walled core barrels with surface set diamond cutting edges provide the best samples.

Core Retrieval Tool - to extricate cores from the pavement when coring is completed, without causing damage to the cores.

Marshall hand held compaction hammer.

Gloves or mitts for handling dry ice.

An insulated container in which cores can be placed and maintained at a cold temperature.

Towels (if wet coring).

## 2.2. Materials

Dry ice or similar material for cooling asphalt concrete prior to coring. These materials may also be used in the insulated container which cores will be placed in to maintain a cold temperature during storage and transportation to laboratory testing facilities.

Hot asphalt mix will be used to backfill core holes. Alternate materials may be approved by the Engineer.

Marker crayons or tags.

## 2.3. Sample to be Tested

The material to be sampled will be an asphalt concrete pavement. Sampling locations will be determined by methods described in contract specifications or as directed by the Engineer.

## 2.4. Data Required

Data to be submitted with each core sample includes the following; Date Sampled, Time Sampled, Name of Person who did Sampling, Core collected using air cooled or water cooled core barrels, Contract Number if applicable, SHT Control Section Number, Chainage (km), Offset from centreline (left or right), Sample Number, On End Product Specification Contracts; Lot Number, Sublot Number, Lift Number.

## 3. PROCEDURE

### 3.1. Sample Preparation

Mark the core sample locations before positioning the coring equipment.

Asphalt concrete may have to be cooled before sampling to reduce the possibility of damage to the core. If the asphalt concrete is 25 mm or less in thickness, place a piece of dry ice 250 mm x 250 mm x 25 mm on the selected site for ten minutes before coring. For each additional 25 mm of asphalt concrete thickness, an additional 5 minutes of cooling time is required.

Alternative methods of cooling may be approved by the Engineer.

### 3.2. Test Procedure

Position the core drill with the core barrel perpendicular to the asphalt concrete surface at the specified sampling location.

Turn on the core barrel cooling equipment and lower the rotating barrel steadily with just sufficient pressure to start cutting. When the core barrel projects through the asphalt concrete, stop the barrel rotation and turn off the cooling equipment. Raise the core barrel and remove the core from the hole using core retrieval equipment.

If coring with water, wipe the cores immediately with a dry towel to minimize water absorption into the core.

Identify the core by sample number. All other sample documentation as described in 2.4 should be recorded and submitted with the core samples.

Immediately after cores are removed from the road surface and they have been marked for sample number, they will be placed in an insulated container which is equipped to maintain the temperature of the cores at $10^{o}$ C or colder until delivered to the specified laboratory for testing.

Backfill the core holes with hot asphalt mix and compact with hand held Marshall Compaction hammer. Core holes shall be dry and clean prior to backfilling.

A core hole must be backfilled before proceeding with the next core location.

For END PRODUCT SPECIFICATION CONTRACTS, the following will apply:

(a) If the layer to be sampled has a thickness of 60 mm or greater, density, aggregate gradation, and asphalt content testing shall be performed on the single acceptance core.

If the acceptance test results are appealed, the site of the referee core will be determined by measuring a distance of 100 mm from the edge of the original core location in the direction of paving at the same lateral offset from the centreline. Two other appeal cores will be obtained from randomly generated sites in the sublot. Test results of the three cores will be averaged and substituted for the acceptance test results.

(b) If the layer to be sampled has a thickness between 30 mm and 60 mm, the following shall apply:

i) If the core diameter is 101.6 mm, a second core will be collected for combination with the core from the randomly generated site for asphalt content and aggregate gradation determination. The site of the second core will be determined by measuring a distance of 100 mm from the edge of the original core location toward centreline. Density testing will be performed on the first core taken. Asphalt content and aggregate gradation testing will be performed on a single sample prepared by combining asphalt concrete from the two cores obtained.

If the acceptance test results are appealed, the site of the referee core for density will be determined as described in (a) above. An additional core shall be obtained for referee asphalt content and aggregate gradation determination. The site for the second referee core shall be determined by measuring a distance of 100 mm from the edge of the original referee core toward centre-line. Two other appeal cores will be obtained from randomly generated sites in the sublot. Test results of the three cores will be averaged and substituted for the acceptance test results.

ii) If the core diameter is 152.4 mm, proceed as in (a) above.

(c) If the layer to be sampled has a thickness less than 30 mm but greater than 1.5 times the maximum aggregate particle size, the following shall apply:

i) If the core diameter is 101.6 mm, two additional cores will be collected for combination with the core from the randomly generated site for asphalt content and aggregate gradation determination. The site for the second acceptance test core will be determined by measuring a distance of 100 mm from the edge of the first core hole toward centreline. The site for the third acceptance test core

will be determined by measuring a distance of 100 mm from the edge of the first core hole towards the shoulderline.

Density testing will be performed on the first core taken. Asphalt content and aggregate gradation testing will be performed on a single sample prepared by combining asphalt concrete from the three cores obtained.

If the acceptance test results are appealed, the asphalt content and aggregate gradation referee sample will be obtained from two additional cores obtained as described in this subsection. The density referee core will be determined as in (a) above. Two other appeal cores will be obtained from randomly generated sites in the sublot. Test results of the three cores will be averaged and substituted for the acceptance test results.

ii) If the core diameter is 152.4 mm, one additional acceptance core and one additional referee core will be collected and tested as described in (b) (i).

(d) If the asphalt concrete thickness is less than 1.5 times the specified maximum aggregate particle size, additional core samples shall be taken as required to obtain sufficient sample material to perform the density, aggregate gradation and asphalt content tests. Core locations shall be determined in accordance with the procedure in this section.

(e) Cores will be transported to the specified Department lab within the specified time requirements.

(f) Cores will be prepared and ready for testing when they are delivered to the specified Department laboratory.

(g) Each core will be representative of the lift from which it was taken. Trimming the sides of the cores is not permitted. Saw cutting the tops of cores is not permitted. If necessary, specimens may be separated from other pavement layers by sawing or other satisfactory means. No more than 6 mm will be allowed sawed off the depth of the core as measured by the engineer.

(h) Cores which cannot be tested for density the same day they are received will be maintained at a temperature of $10^{o}$ C or colder until tested.

(i) Referee cores will be packaged and transported to the referee laboratory in insulated containers that will maintain the cores at a temperature of $10^{o}$ C or colder and prevent the cores from being damaged.

## 4. RESULTS AND CALCULATIONS

### 4.1. Collection of Test Results

All sample documentation as specified in section 2.4 will be submitted with the cores.

## 5. CALIBRATIONS, CORRECTIONS, REPEATABILITY

### 5.1. Sources of Error

Core barrel not perpendicular to asphalt concrete surface.

Damaged cores caused by rough handling during extrication, storage or transport.

## 6. ADDITIONAL INFORMATION

### 6.1. Sample Retention

Referee Cores from End Product Specification Contracts will be retained by the Department until work on the lot has been completed and final acceptance for that lot is given to the Contractor.

## APPROVAL SHEET

New _ Revision X Date of Previous Document 92-03-05
Effective Date: 94-12-21
Description of Revision (Reason for Revision):

- Section 3.2 (a) (b) (c) (d), had aggregate gradation included in acceptance testing. Referee core will only be taken in the case of appeal. In appeal testing, additional cores will be taken randomly from the sublot and averaged to determine the acceptance test results.
- Section (g) of Section 3.2, Test Procedure has had the following added, "No more than 6 mm will be allowed sawed off the depth of the core as measured by the engineer."

Review/Implementation Process:
Reviewed by the Lab Supervisors, Construction Enginneers and T.S.A.P.

Other Manuals/Policies Affected:
Nil

Follow Up/Training Required:
Nil

Comments/Concerns/Implications (Budget/Environment/Stakeholders):

Prepared by Daryl MacLeod 94-12-09
Date

Recommended by Daryl MacLeod 94-12-09
Materials Standards Engineer Date

Approval Recommended by: R.A. Widger - -
Senior Materials Engineer Date

Approved by A.R. Gerbrandt 94-12-21
Dir.,Technical Standards & Policies Br. Date

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Update Mailed - -