ALDOT-389-98
EVALUATION OF SEGREGATED AREAS IN HOT-MIX ASPHALT PAVEMENT

1. Scope

1.1 The objective of this procedure is to identify areas of unacceptable segregation in hot-mix (HMA) pavements and to determine the segregation acceptability parameters. Segregation in HMA pavement is the non-uniform distribution of coarse and fine aggregates within the finished HMA mat. Close visual inspection of the mat is critical in order to detect and locate areas of segregation.

1.2 This procedure evaluates segregation of HMA pavements by testing the asphalt content and the gradation analysis of 6 in (150 mm) diameter cores taken as a result of visual determination of suspected segregated areas. The asphalt content and gradation analysis of the core will be used in determining deviations from the Job Mix Formula (JMF) and specification tolerances.

2. Referenced Documents

2.1. Alabama Department of Transportation Standard Specifications for Highway Construction.

2.1.1. Section 410, Hot-Mix Asphalt Pavements.

2.1.2. Section 327, Plant Mix Bituminous Base and PATB

2.1.3. Section 420, Polymer Modified Open Graded Friction Course

2.1.4. Section 423, Stone Matrix Asphalt (SMA)

2.1.5. Section 424, Superpave Bituminous Concrete Base, Binder, and Wearing Surface Layers

2.2. Alabama Department of Transportation Testing Manual.

2.2.1. ALDOT-258, Mechanical Analysis of Extracted Aggregates.

2.3. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing

2.3.1. AASHTO T 30, Standard Method of Test for Mechanical Analysis of Extracted Aggregate.

2.3.2. AASHTO T 308, Standard Method of Test for Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method.

3. Determination of Segregated Test Location and Core Cutting

3.1. **S**egregation may be present in isolated areas or may be in continuous longitudinal strips along the roadway. All areas either suspected of having segregation or obviously segregated shall be marked and referred for testing. Coarse and fine areas shall be marked separately. No random number will be used for test site location for segregation due to segregation being a visual observance.

3.2. The Contractor shall core as soon as possible after mat compaction, as directed by the Engineer, but prior to covering with an overlying layer, or, in the case of the wearing surface layer, upon completion of the hot-mix pay items. Two cores shall be taken at each chosen location for further testing.

3.3. For isolated marked areas, select the two most segregated spots (points), which are at no less than 20 in (0.5m) apart, and extract one core at each point.

3.4. For continuous longitudinal strips, select the two most segregated spots (points) within an area no longer than 150ft (50 m) section, and extract one core at each point.

3.5. Cores shall be taken through the entire layer to be tested. The layer to be tested shall be separated from other layers by sawing or other suitable means. The Department will take immediate possession of the segregated cores for further testing.

3.6. Allow the pavement to cool before coring. Ice may be used to accelerate cooling before coring. Care shall be taken to avoid stress or damage to the core interface during coring, handling, or transporting. Identify each core specimen with a paint pen or keel.

3.7. The Department's certified technician will determine the core location.

4. Evaluation Process

4.1. Segregated areas will be evaluated by comparing the percent asphalt content and gradation analysis of two cores to the design criteria found on the JMF.

4.2. All testing of the cores shall be performed by certified Department technicians in the division laboratory using an ignition oven, sieves and sieve shaker. Department testing may be witnessed by the Contractor's certified technicians.

4.3. The percent asphalt content of the two cores shall be determined in accordance with AASHTO T 308. Once the asphalt content has been determined, obtain a gradation analysis of the extracted aggregates as per ALDOT 258 and AASHTO T 30. Aggregates from both cores shall be combined before performing the gradation analysis.

4.4. Compute the deviation between the percent asphalt content of the cores to the design percent asphalt content from the JMF. Average the two deviations. If the average deviation is in excess of ± 0.50 percent from the design amount, then the area is considered to be segregated.

4.5. Determine the maximum size aggregate used in the mix from the JMF. Refer to Table I to determine the sieves to use in the evaluation process.

Table I

Determination of Sieves Utilized In Segregation Evaluation	
Maximum Size Aggregate	**Sieves Utilized**
1.5 in (37.5 mm)	½ in and No. 4 (12.5 mm and 4.75 mm)
1.0 in (25.0 mm)	3/8 in and No. 4 (9.5 mm and 4.75 mm)
¾ in (19.0 mm)	No. 4 and No. 8 (4.75 mm and 2.36 mm)
½ in (12.5 mm)	No. 8 (2.36 mm)
3/8 in (9.5 mm)*	No. 8(2.36 mm)

*with up to 5% retained on the 1/2" {12.5 mm}

4.6. Compare the gradation of the selected sieves to the design gradation from the JMF. If the deviation for either sieve is in excess of ±10 percent from the design gradation, the area is considered segregated.

4.7. If either asphalt content or gradation analysis of any selected sieves are determined to exceed the allowable tolerances, the area will be considered segregated.

5.0 REPORT

5.1 The following information shall be included on a report for each segregated area or section. See figure 1 for a sample report form.

5.1.1 Project Number and County

5.1.2 Production lot and date produced

5.1.3 Location of cores (station and offset) and description of area (including pictures)

5.1.4 Copy of Approved JMF

5.1.5 Percent Asphalt Content from JMF (A)

5.1.6 Percent Asphalt Content as determined by the Ignition Oven Testing (B)

5.1.7 Average Deviation of Core Percent Asphalt Content to Percent Asphalt Content from JMF

5.1.8 Maximum Aggregate Size and Selected Sieves Utilized

5.1.9 Gradation Analysis of Combined Cores on Select Sieves

5.1.10 JMF Percent Passing Selected Sieves

5.1.11 Deviation of the combined Gradation Analysis of the two Cores on Selected Sieves to the Percent Passing from JMF

5.1.12 Signatures of Certified Technicians performing the tests

Figure 1

Segregation Evaluation Report

Copies:
District Engineer
Project Engineer
File

Project Number: _____
County: _____
Date: _____

Layer Tested: _____ Layer Thickness: _____ Date Placed: _____

Evaluation Site Information	
Production Lot Number	
Location of Evaluation Site (Station)	
Location of Evaluation Site (Offset)	

Detailed description of area: (include pictures of area) _____

_____

_____

_____

Figure 1

Asphalt Content Evaluation		
Design % AC [A]		
% AC of Core 1 / Core 2		
Average % AC of Cores [B]		
Absolute Difference between Average % AC of Cores and Design % AC* [A-B]		

* Allowable Tolerance = ±0.50% Maximum

Gradation Analysis Information		
Input the Selected Sieve Sizes	mm	mm
Design Percent Passing (JMF)		
Sample Gradation % Passing		
Deviation between Sample and Design % Passing**		

** Allowable Tolerance = ±10% Maximum (Each Sieve)

Contractor Certified Technician Signature & Expiration Date of Certification

ALDOT Certified Technician Signature & Expiration Date of Certification