

## ATT-32/95, VISUAL INSPECTION OF ASPHALT CONCRETE FORMED SPECIMENS

### 1.0 SCOPE

This method describes the procedure for evaluating the appearance of freshly formed field Marshall specimens<sup>1</sup>.

### 2.0 APPLICATION

A visual inspection on a field formed Marshall briquette may prevent the placement of over or under-asphalted mix. Extremes are evident after the specimen is formed and immediate action is usually required.

### 3.0 PROCEDURE

#### 3.1 Bleeding Specimens

Bleeding results from an excess of asphalt in the volume of voids in the mineral aggregate. It can be caused by:

- a) An increase in asphalt content, whereby more asphalt is introduced into the mix than the volume of VMA can accommodate, or
- b) A change in aggregate gradation, whereby the available volume of VMA is decreased.
- c) An increase in compaction caused by imparting to the specimen more than the required number of blows.

The formed specimen will look extremely rich. Asphalt should be visibly oozing from the specimen. There could be, depending on the grading of aggregate, a marked increase in the density. The specimen may be softer than normal, sticky, and difficult to remove from the mold. The end papers will be discoloured and very hard to remove from the specimen. The specimen will stick to a hard flat surface.

Freshly formed specimens appear richer than old ones. Clean uniform materials may appear to be bleeding but are not.

**NOTE:** The Marshall briquette compaction of 75 blows per face, when applied at the proper compaction temperature represents the maximum compactability of the mix; in other words, it represents the compaction of normal construction plus the compactive effort of several years of truck traffic. Therefore, a bleeding condition noticed in a specimen may not be apparent in the freshly laid mats until they have been travelled on for some time.

<sup>1</sup>

<sup>1</sup> ATT-13, FORMING MARSHALL SPECIMENS, Field Method

Excessive **bleeding** in the **specimen** will most certainly lead to eventual bleeding and loss of stability in the **pavement** itself.

Compaction forces the asphalt coated aggregate particles closer together. As the air voids content of the mix is reduced, the asphalt is visibly forced out of the pavement. This is shown in Figure 1.

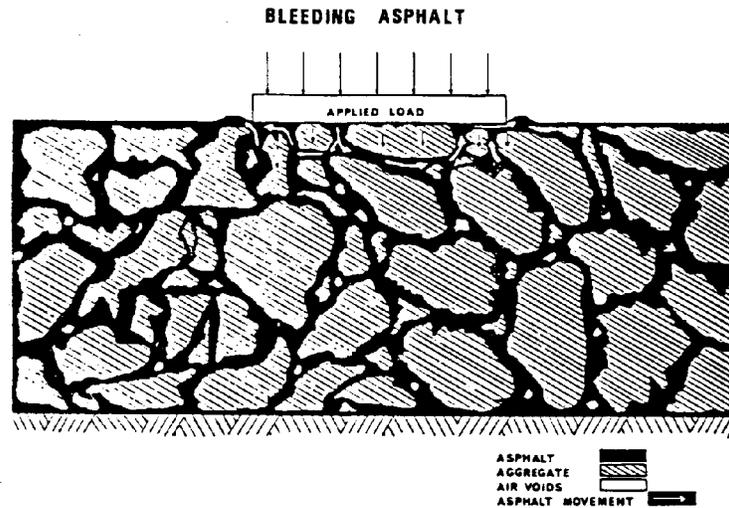


FIGURE 1

When performing quality control testing and bleeding or near bleeding specimens are noted, corrective action as described in Section 3.3 must be taken immediately.

### 3.2 Dry Specimens

Dry mixes result when there is insufficient asphalt to adequately coat the aggregate particles. The dry mix may be caused by:

- a) A decrease in asphalt content, whereby not enough asphalt is introduced into the volume of VMA, or
- b) A change in aggregate gradation, whereby the available VMA is greatly increased.
- c) A decrease in compaction caused by imparting to the specimen less than the required number of blows.

This condition may lead to a pavement high in air voids, which would be subject to frost and water damage, resulting in rapid aging of the pavement due to raveling and cracking.

After forming, the specimens will appear very dull and feel dry. There should be, barring any change in the aggregate gradation, a marked decrease from the expected density. Close inspection of the coarse aggregate particles will often reveal improper coatings. Also, the sample may be brittle, not displaying the normal plastic properties.

**NOTE:** The presence of clay binder may mask the presence of adequate asphalt making the specimen appear dry. Dry appearance may also be caused by overheating.

### 3.3 Corrective Action

When performing quality control testing the following corrective measures must be performed **immediately** after the visual inspection of the bleeding or dry specimen.

#### 3.3.1 Excessive Bleeding or Excessively Dry Specimens

1. Check the plant settings and ensure that they have not changed.
2. Obtain another mix sample and form 1 Marshall briquette to verify the first set.
3. If the new briquette is bleeding, inform the Contractor of the problem.
4. The Contractor should determine the cause of the problem and correct it immediately.
5. If the problem cannot be identified, the Contractor must re-calibrate the plant.

#### 3.3.2 Near or Slight Bleeding or Slightly Dry Specimens

When this condition is noted, the Contractor may be **temporarily** allowed to produce mix during and after the adjustments to the asphalt content setting have been made. However, the Contractor must try to locate and correct the cause of the problem immediately.

This asphalt content setting adjustment during mix production is **not** intended to compensate for poor plant control and should only be made **occasionally**. If the problem re-occurs or its cause cannot be found, the Contractor must recalibrate the plant.

When near or slight bleeding or slightly dry specimens are noted:

1. Repeat steps 1 to 3 of Section 3.3.1.
2. The Contractor should adjust the asphalt content setting by  $\pm 0.5\%$  while investigating the cause of the problem.
3. Wait until the mix at the adjusted asphalt content is available at the sampling location, then obtain a mix sample and form a Marshall briquette to verify the asphalt content change.
4. Determine the ignition oven or nuclear asphalt content of the mix and the specimen's dry density (using an assumed mix moisture content).
5. Use the density and asphalt content to determine the air voids content of the Marshall specimen.
6. If the specimen's % air voids does not match the % air voids ( $\pm 0.5\%$ ) recommended in the mix design, have the Contractor make a finer adjustment to the asphalt content setting.
7. Repeat steps 3 to 6 above until the specimen's air voids content matches the design value.

### 3.4 Verifying the Inspection

The reason for the decrease or increase in asphalt content setting when a bleeding or a dry specimen is formed, is to prevent the placement of mix on the road which is totally unacceptable. The cause of the condition, whether due to a change in grading or a change in asphalt content must be determined as soon as possible by performing an asphalt content test and a sieve analysis on the original mix. When the cause has been determined, immediate corrective measures, e.g., recalibration or repair of the asphalt pump, recalibration or reportioning of the aggregate bins, etc., must be taken.

Where a gradation change occurs, use the % air voids of the test series Marshall specimens to control the asphalt content of the mix. Figure 2 describes the appearance of mixes with various gradations throughout a range of asphalt contents.

A change in aggregate grading may or may not be reflected in the appearance of the specimen. Where a marked change in density is noted, although the asphalt content appears normal, a gradation change may be suspected. However, a routine sieve analysis will be necessary to verify the condition. **A change in gradation usually requires a new mix design.**

ASPHALT CONTENT	AGGREGATE GRADATION		
	COARSE GRADED	WELL GRADED	FINE GRADED
LOW	LOOKS RICH	NORMAL TO RICH	DRY
MEDIUM	VERY LITTLE	RICH TO NORMAL	LEAN TO NORMAL
	CHANGE IN APPEARANCE	RICH	NORMAL
HIGH	LOOKS RICH BUT VOIDS NOT FILLED	SLIGHT BLEEDING	NORMAL TO RICH  RICH ( APPEARS DULL RIGHT UP TO BLEEDING CONDITION )

FIGURE 2

Specimens displaying any unusual condition in the mix should be kept for comparison purposes. Also, ideal briquettes should be preserved as the appearance of a freshly formed specimen may vary from that of an older briquette. These specimens can be used for possible future testing.

#### 4.0 HINTS AND PRECAUTIONS

The visual appearance of formed specimens should not be used to make plant adjustments. Unless the appearance shows very conclusively that the asphalt content and/or the gradation is incorrect, air voids content of the Marshall specimen must be used to verify and control mix production, and provide the basis for altering the plant settings. These density and asphalt content tests must be conducted immediately, whenever any doubt exists as to the suitability of any mix sample, so that the production of out of specification materials can be prevented and corrected.