

ALDOT-430

**STANDARD TEST METHOD FOR DETERMINING THE BOND STRENGTH  
BETWEEN LAYERS OF AN ASPHALT PAVEMENT**

**1. SCOPE**

- 1.1 This test method covers the determination of the interface bond shear strength between pavement layers using core samples.
- 1.2 This test shall be performed on six-inch (150-mm) diameter cores or specimens of asphalt pavement.
- 1.3 This test is applicable if the asphalt overlay thickness as well as the thickness of the base concrete retrieved by coring are not less than two inches (50 mm) and not greater than six inches (150 mm), each.
- 1.4 This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

**2. REFERENCED DOCUMENTS**

- 2.1 AASHTO T-168, Standard Practice for Sampling Hot-Mix Asphalt Paving Mixtures
- 2.2 AASHTO T-245 Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

**3. OBTAINING ROADWAY CORE SPECIMENS**

- 3.1 Select at least three random test locations.
- 3.2 Allow the pavement to cool before coring. Ice may be used to accelerate cooling before coring. Mark the direction of traffic on the roadway surface before coring so that it can be identified on each core.
- 3.3 Cores shall be taken full depth so that no prying action is needed to extract the cores from the pavement. Care shall be taken to avoid stress or damage to the interface during coring, handling, or transporting. If a core separates at the interface of interest during the coring operation, make note of it on the coring report.
- 3.4 Label the core specimens with a paint pen or keel.

**4. APPARATUS**

- 4.1 Bond Test Device - The device used for the bond shear test shall be designed to accommodate a six-inch (150-mm) diameter test specimen. The device shall have a metal cylindrical specimen holder and a sliding metal loading head with a concave surface having a three-inch (75-mm) radius of curvature to apply load to the specimen.

The gap between the specimen holder and the sliding loading head shall be  $1/4$  inch  $\pm$   $1/32$  inch. The bond test device is illustrated in Figure 1.

- 4.2 Loading Machine - The loading machine shall produce a uniform vertical movement of two inches per minute (50.8 mm per minute). The Marshall Stability test apparatus or other mechanical or hydraulic testing machine may be used provided the rate of movement is maintained at two inches per minute (50.8 mm per minute) while the load is being applied.
- 4.3 Wet masonry saw.

## 5. PREPARATION OF TEST SPECIMENS

- 5.1 Number of Test Specimens – a single test procedure shall consist of at least three specimens.
- 5.2 Each roadway core specimen shall be six inches (150 mm) in diameter with the entire surface of the perimeter perpendicular to the top surface of the core within  $1/4$  inch (seven mm). If the height of the core above or below the interface being tested is greater than three inches (75 mm), it shall be trimmed with a wet masonry saw to a height of approximately three inches (75 mm).
- 5.3 Identify the location of the interface layer with white or silver paint with three equally spaced marks approximately one inch long around the perimeter of each core.

## 6. PROCEDURE

- 6.1 Specimen dimensions – Measure the diameter of the core and the thickness of the overlay to the nearest 0.05 inch (one mm). Measure the diameter in at least three locations and average the readings.
- 6.2 Specimen conditioning – Allow the specimens to stabilize at the test temperature of  $77\pm 2^{\circ}\text{F}$  ( $25\pm 1^{\circ}\text{C}$ ) for a minimum of 2 hours in an air bath, or 40 minutes in a water bath in an enclosed leak-proof bag to protect it from getting wet.
- 6.3 Specimen positioning – Orient the core in the bond strength device so that the direction of traffic marked on the core is vertically pointing upward and the marked interface is centered between the edge of the loading block and the edge of the loading head.
  - 6.3.1 Align the loading head adjacent to the bonded interface. The loading head shall rest parallel to the bonded interface on the asphalt overlay portion of the specimen. Sample positioning and loading is shown in Figure 1.
- 6.4 Rate of displacement – Apply the displacement continuously and without shock at a constant strain rate of two inches per minute (50.8 mm per minute) until failure occurs. Record the maximum load in pounds,  $P_{\text{MAX}}$ , carried by the specimen during the test.

## 7. CALCULATION

Calculate the bond shear strength,  $S_B$ , as follows:

$$S_B = P_{MAX} / A$$

where:

$S_B$  = bond shear strength, pounds per square inch (psi)

$P_{MAX}$  = maximum load applied to specimen, pounds-force (lbf)

$A$  = cross-sectional area of test specimen, square inches (in)<sup>2</sup>

and:

$$A = \frac{\pi D^2}{4}$$

where:

$A$  = cross-sectional area of test specimen, square inches (in)<sup>2</sup>

$D$  = average diameter of test specimen, inches (in)

## 8. REPORT

- 8.1 Record each core number or identification, sampling date, and test date.
- 8.2 Failure surface. Identify if failures occurred at the interface, in the existing layer, or in the overlay for each core.
- 8.3 Note the appearance of the interface including any contaminants, milling striations, stripping, tack coat streaks, or other observations.
- 8.4 Record the test results for each core.
  - 8.4.1 Specimen dimensions – including thickness of the overlay asphalt, thickness of existing layer, the average diameter, and the cross-section area.
  - 8.4.2 Maximum load applied, rounded to the nearest 50 lbf.
  - 8.4.3 Bond shear strength, rounded to the nearest psi.
- 8.5 Calculate and record the mean and standard deviation of the bond strength for the set of cores.

## 9. PRECISION AND BIAS

- 9.1 No precision and bias statements are available at this time.

## 10. KEYWORDS

- 10.1 Bond Strength, Asphalt Overlay, Tack Coat, Shear Strength, Slippage Failure

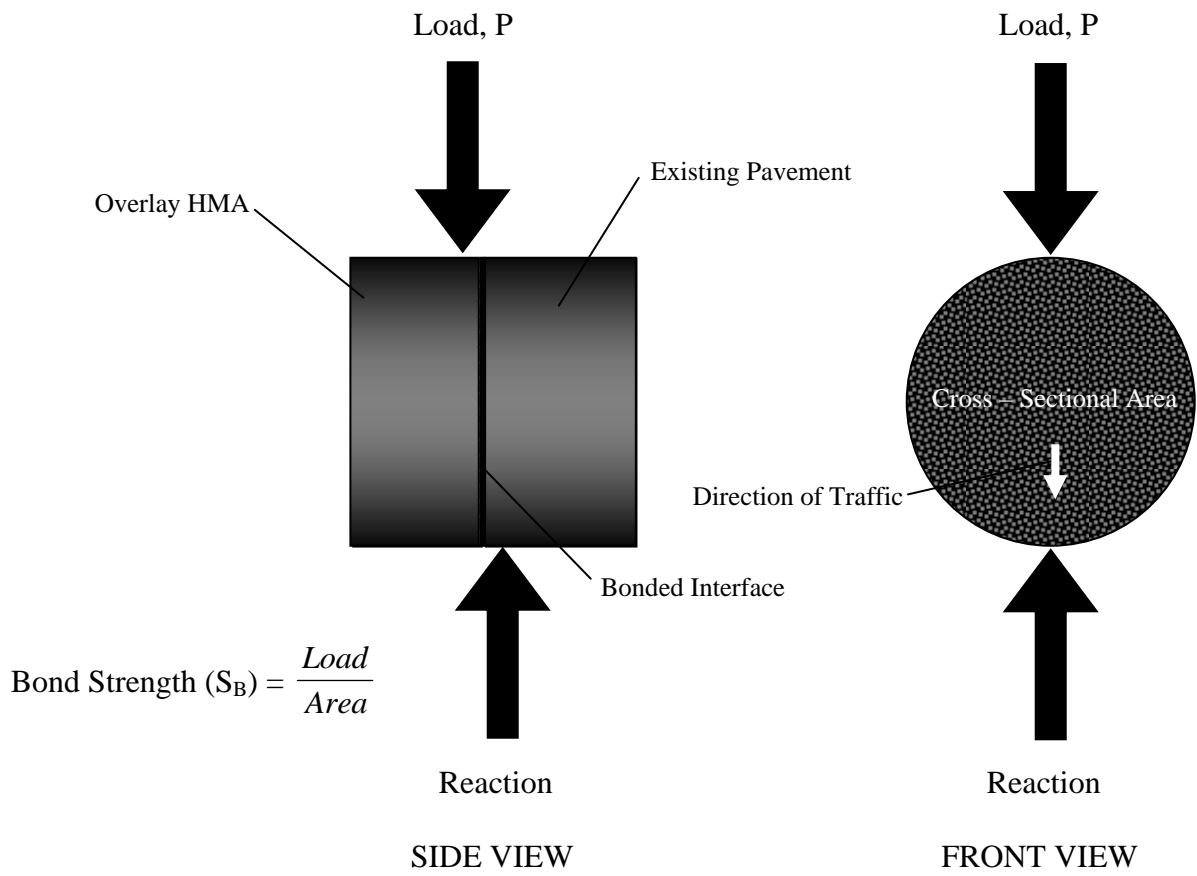


Figure 1. Loading Scheme Used for the Bond Strength Test