New Jersey Department of Transportation
1035 Parkway Avenue, PO Box 600, Trenton, New Jersey 08625-0600

Baseline Document Change Announcement

ANNOUNCEMENT: BDC23S-15

DATE: November 22, 2023

SUBJECT: Shear Test Requirement
- **Revisions to Subpart 401.03.07 and 401.03.08, and the addition of Test Method B-14 to the 2019 Standard Specifications for Road and Bridge Construction and Standard Inputs.**

A shear test requirement has been added to the 2019 Standard Specifications for Road and Bridge Construction and the Standard Inputs to ensure Contractors properly clean and tack pavement surfaces prior to overlaying.

The following revisions have been incorporated into the 2019 Standard Specifications via 2019 Standard Inputs, SI2019:

PROVIDE THE FOLLOWING FOR CONTRACTS THAT CONTAIN A MINIMUM OF 2500 TONS OF MILL 2 PAVE 2 CONSTRUCTION

THE FOLLOWING IS ADDED TO THE END OF THE SUBPART:

K. Shear Strength of Pavement Layers. The Department will test the shear strength between pavement layers on the project according to NJDOT B-14. Take cores within the following locations as specified in 401.03.08:

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REVISE THE TABLE TO PROVIDE LANE STATION TO STATION LOCATIONS FOR CORING OF MILL 2 PAVE 2 AREAS IN THE TABLE. EACH LOCATION MUST BE AT LEAST 2500 SY. DO NOT INCLUDE TRANSITION AREAS.

Lane #	Station	To	Station
1	0+00	to	25+50
2	0+00	to	15+85

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A lot is defined as the mainline area covered by a day's paving production. The RE may combine daily production areas less than 1,000 tons with previous or subsequent production areas. If a day's production is greater than 4,000 tons, the RE may divide the area of HMA placed on the mainline into 2 lots with approximately equal areas.

The ME will determine the shear strength from 5 cores taken from each lot in random locations. Ensure that the first lot sample is taken during the first day's production. Thereafter, sample every third lot or as directed by the ME. Take cores as specified in 401.03.08.

The required minimum Average Shear Strength of the 5 cores taken is 50 psi. Any core taken that becomes un-bonded during the coring, handling, or transport is considered not testable and will receive a shear strength of 0 psi. The unbonded core will be averaged with the remaining cores. If the initial series of cores has an Average Shear Strength of less than 50 psi, the Contractor has the option of witnessing the retest upon request.

1. **Retest.** If the initial series of 5 cores produces a remove and replace result, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Take the additional cores within 15 days of receipt of the initial core results. If the additional cores are not taken within 15 days, the ME will use the initial core results. If the additional cores are taken, the ME will recalculate using the combined average of the 10 cores.

2. **Remove and Replacement**. If the final lot Average Shear Strength is less than 50 psi based on the combined average of the set of 10 cores (or the average of the initial 5 cores if the Contractor does not take additional cores), remove and replace the lot. The replacement work is subject to the same requirements as the initial work.

401.03.08 Core Samples
THE FOLLOWING IS ADDED AFTER THE FOURTH PARAGRAPH:

For shear strength cores, mark the direction of traffic on the roadway surface before coring so that it can be identified on each core. Drill cores for the full depth of the bound portion of the pavement structure. Take care to avoid stress and damage to the interface during coring, handling, and transporting. If a core separates at the interface of interest during the coring operation, make note of it on the coring report.

THE FOLLOWING IS ADDED TO NJDOT TEST METHODS:

NJDOT B-14 – DETERMINING THE SHEAR STRENGTH BETWEEN PAVEMENT LAYERS

A. Scope. This test method is used to determine the shear strength of the interface between pavement layers.

B. Apparatus. Use the following apparatus:

1. Bond Test Device. The device used for the bond shear test shall be designed to accommodate a 6 inch diameter test specimen. The device shall have a metal cylindrical specimen holder and a sliding metal loading head with a concave surface having a 3 inch 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 ± 1/32 inch.
2. Loading Machine. The loading machine shall produce a uniform vertical movement of 2 inches 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 2 inches per minute while the load is being applied.
3. Wet masonry saw.

C. Procedure. Perform the following steps:

1. **Sample Preparation.**
    a. Each roadway core specimen shall be 6 inches in diameter with the entire surface of the perimeter perpendicular to the top surface of the core within ¼ inch. If the height of the core above or below the interface being tested is greater than 3 inches, it shall be trimmed with a wet masonry saw to a height of approximately 3 inches.
    b. 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.
2. **Specimen Dimensions.** Measure the diameter of the core and the thickness of the overlay to the nearest 0.05 inch. Measure the diameter in at least three locations and average the readings.

3. **Specimen Conditioning.** Allow the specimens to stabilize at the test temperature of 77±2°F (25±1°C) for a minimum of 2 hours in an oven, or 40 minutes in a water bath in an enclosed leak-proof bag to protect it from getting wet.
4. **Specimen Positioning.** Orient the core in the bond strength device so that the direction of traffic marked on the core is vertically pointing downward and the marked interface is centered between the edge of the loading block and the edge of the loading head.
5. **Bond Test Device Positioning.** 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.
6. **Rate of Displacement.** Apply the displacement continuously and without shock at a constant strain rate of 2 inches per minute until failure occurs. Record the maximum load in pounds, P_{MAX}, carried by the specimen during the test.

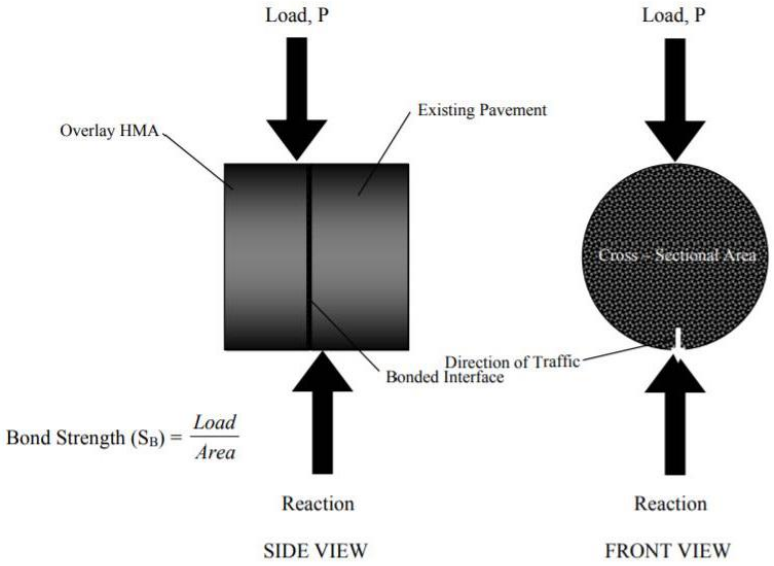
D. Calculation. Calculate the bond shear strength, S_B, as follows:

$$A = \frac{\pi \times D^2}{4} \qquad S_B = \frac{P_{MAX}}{A}$$

Where:
S_B = shear strength, pounds per square inch (psi)
P_{MAX} = maximum load applied to specimen, pounds-force (lbf)
D = average diameter of test specimen, inches (in)
A = cross-sectional area of test specimen, square inches $(in)^2$

E. Report.

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



Implementation Code R (ROUTINE)

Changes must be implemented in all applicable Department projects scheduled for Final Design Submission at least one month after the date of the BDC announcement. This will allow designers to make necessary plan, specifications, and estimate/proposal changes without requiring the need for an addenda or postponement of advertisement or receipt of bids.

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