

days, the ME will use the initial core results to determine the PPA. If the additional cores are taken, the ME will recalculate the PPA using the combined results from the 10 cores.

- f. **Removal and Replacement.** If the final lot PD  $\geq 75$  (based on the combined set of 10 cores or 5 cores if the Contractor does not take additional cores), remove and replace, or mill and overlay, the lot. The replacement work is subject to the same requirements as the initial work.

- 2. **Surface Course Thickness.** The ME will evaluate the surface course solely to determine whether a remove-and-replace or an overlay condition exists, not for pay adjustment. The ME will calculate the percent defective (PD) as the percentage of the lot that is less than the allowable thickness for the nominal maximum aggregate used in the surface course. The ME will accept pavement lots with PD  $\leq 10$  and will reject pavement lots with PD  $> 10$ .

The ME will base surface thickness acceptance on the percentage of the lot estimated to fall below the allowable thickness as follows:

- a. **Sample Mean ( $\bar{X}$ ) and Standard Deviation (S) of the N Test Results ( $X_1, X_2, \dots, X_N$ ).** Calculate using the formula as specified in 401.03.03.H.1.

- b. **Quality Index (Q).**

$$Q_L = (\bar{X} - T_{all})/S, \text{ where } T_{all} \text{ is the minimum allowable thickness.}$$

Table 401.03.03-6 Surface Course Thickness Requirements	
HMA Mix Design Size Designation	Minimum Allowable Compacted Lift Thickness ( $T_{all}$ )
9.5 MM	1.00 inch
12.5 MM	1.25 inches
19 MM	2.00 inches

- c. **Percent Defective.** Using NJDOT ST for the appropriate sample size, determine the percentage of material (PD) falling below the allowable thickness associated with  $Q_L$  (lower limit).
- d. **Retest.** If the initial series of 5 cores produces a percent defective value of PD  $> 10$ , the Contractor may take an additional 5 cores at random locations determined 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 the 15 days, the ME will use the initial core results to determine the PPA. When the additional cores are taken, the ME will recalculate the PPA using the combined results from the 10 cores to obtain the total PD.
- e. **Removal and Replacement.** If the surface course fails to meet the acceptance requirement, the Department will require removal and replacement of the lot. The replacement work is subject to the same requirements as the initial work.

- J. **Ride Quality Requirements.** The Department will evaluate the HMA surface course using the International Roughness Index (IRI) according to ASTM E 1926. The Department will use the measured IRI to compute the appropriate pay adjustment (PA). The PA may be positive for superior quality work or negative for defective work.

The Department will calculate the PA as specified in Table 401.03.03-7 and will base PA on lots of 0.01 mile length for each lane, ramp, and shoulder.

- 1. **Smoothness Measurement.** The Department will test the longitudinal profile of the HMA surface course for ride quality with a Class 1 Inertial Profiling System according to AASHTO MP 11 approved according to AASHTO PP 49.

The Department will test the full extent of the pavement in the direction of travel in each wheel path. The single IRI value reported for each 0.01-mile lot of pavement is the average of 3 runs.

- 2. **Control Testing.** Perform control testing during HMA placement to ensure compliance with the ride quality requirements specified in Table 401.03.03-7.
- 3. **Preparation for IRI Testing.** Provide the necessary traffic control when the Department performs IRI testing. Perform required mechanical sweeping of the surface course before IRI testing. To facilitate auto triggering on laser profilers, place a single line of preformed traffic marking tape perpendicular to the

roadway baseline at the beginning and end of each lane, shoulder, and ramp to be tested. Submit the actual stationing for each traffic marking tape location to the RE.

4. **Acceptance.** The Department will determine acceptance and make payment adjustments based on the following:

a. **Pay Adjustment.** The pay equations in Table 401.03.03-7 express the pay adjustment in dollars per lot of 0.01 mile. For lots of any other length, the Department will scale the pay adjustment up or down in proportion to the actual length of the lot. IRI numbers are in inches per mile.

	<b>More than one lift</b>	
<b>Freeways / Limited Access Highways</b>	IRI < 45	PA = \$100
	$45 \leq \text{IRI} < 63$	$\text{PA} = \$350 - (\$5.5556 \times \text{IRI})$
	IRI = 63	PA = \$0
	$63 < \text{IRI} \leq 125$	$\text{PA} = (\text{IRI} - 63) \times (-\$16.1290)$
	IRI > 125	Remove & Replace
	<b>One lift</b>	
	IRI < 60	PA = \$50
	$60 \leq \text{IRI} < 75$	$\text{PA} = \$250 - (\$3.3333 \times \text{IRI})$
	IRI = 75	PA = \$0
	$75 < \text{IRI} \leq 145$	$\text{PA} = (\text{IRI} - 75) \times (-\$7.1429)$
IRI > 145	Remove & Replace	
<b>Highways Other Than Freeways/Limited Access</b>	<b>More than one lift</b>	
	IRI < 60	PA = \$50
	$60 \leq \text{IRI} < 80$	$\text{PA} = \$200 - (\$2.50 \times \text{IRI})$
	IRI = 80	PA = \$0
	$80 < \text{IRI} \leq 140$	$\text{PA} = (\text{IRI} - 80) \times (-\$8.3333)$
	IRI > 140	Remove & Replace
	<b>One lift</b>	
	IRI < 70	PA = \$50
	$70 \leq \text{IRI} < 85$	$\text{PA} = \$283.33 - (\$3.333 \times \text{IRI})$
	IRI = 85	PA = \$0
$85 < \text{IRI} \leq 160$	$\text{PA} = (\text{IRI} - 85) \times (-\$6.6667)$	
IRI > 160	Remove & Replace	
<b>Other Roadways</b>	IRI < 80	PA = \$50
	$80 \leq \text{IRI} < 100$	$\text{PA} = \$250 - (\$2.50 \times \text{IRI})$
	IRI = 100	PA = \$0
	$100 < \text{IRI} \leq 170$	$\text{PA} = (\text{IRI} - 100) \times (-\$7.1429)$
	IRI > 170	Remove & Replace
<b>Ramps and Shoulders</b>	IRI = 120	PA = \$0
	$120 < \text{IRI} \leq 170$	$\text{PA} = (\text{IRI} - 120) \times (-\$10.00)$
	IRI > 170	Remove & Replace

b. **Retest provision.** After testing, if the IRI exceeds the Remove and Replace value (RRV) in Table 401.03.03-7, the Department will retest the lot. The Department will average the IRI values from the initial test and the retest to determine the final result.

If there is definitive evidence that the initial test is invalid, the Department will disregard the initial test and will consider the retest as the initial test. If there is no evidence that the original test was invalid, the Department will average the IRI values from the initial test and the retest to determine the final result.

- c. **Removal and Replacement.** If the average IRI is greater than the RRV after a retest is performed, remove and replace the lot. Any replacement work is subject to the same requirements as the initial work.

On contracts where only a small percentage (less than 8 percent) of paving lots falls under the RRV, the Department may allow the Contractor to submit a plan for corrective action. If the Contractor’s plan for corrective action is not approved, the Department may require removal and replacement, or may allow the lot to remain in place and the lot will be subject to the pay adjustment as computed in Table 401.03.03-7. If the Contractor’s plan for corrective action is approved and the lot is reworked, the Department will test and evaluate it as a new lot that must meet the same requirements as the initial work. Corrective action locations are not eligible for bonus payments.

**401.03.04 Sawcutting and Sealing of Joints in HMA Overlays**

Before paving over concrete pavement, identify joint locations and maintain references throughout paving operations. Ensure that the HMA overlay is sawcut directly over the existing concrete pavement joints. Make sawcuts between 1 and 5 days after placement of the overlay.

Existing transverse joints that are offset at the longitudinal joint by more than 1 inch, measured between the centers of the joints, require separate sawcuts terminating at the longitudinal joint. For full-depth HMA replacement of an underlying concrete slab, sawcut the overlay directly over the HMA/slab interfaces.

Sawcut as specified in Table 401.03.04-1:

<b>Table 401.03.04-1 Sawcuts in HMA Overlays</b>		
<b>Total Overlay Thickness (t), inches</b>	<b>Width of cut, inches</b>	<b>Depth of cut, inches</b>
t < 6	1/4 to 3/8	2
t ≥ 6	1/4 to 3/8	4

Sawcut the transverse joints the full width of the traveled way and 3 feet into the shoulder.

If the surface course is not to be constructed within 30 days of placing the base or intermediate course, within 5 days, make a 1/8-inch wide sawcut 2 inches deep over the joints. The RE will not require sealing or cleaning of these sawcuts. When placing the surface course, make a 1/4 to 3/8-inch sawcut the full depth of the surface course. If cracks appear in a base or intermediate course before placing the surface course, sawcut the surface course directly over the crack, rather than directly over the joint.

After sawcutting, immediately collect the slurry from the sawcut cavity and surrounding pavement surface and dispose of as specified 201.03.09. Clean sawcuts with a 150-pounds-per-square-inch water blast to remove remaining debris in the sawcut cavity, and then blow sawcuts with a hot-air lance to provide a dry surface. Immediately after blowing, seal sawcuts.

Seal joints with hot-poured joint sealer prepared according to the manufacturer’s recommendations. Do not heat joint sealer at the pouring temperature for more than 6 hours and do not reheat. Fill the sawcuts so that after cooling the level of the sealer is not more than 1/4 inch above, or less than 1/8 inch below, the surface. Do not spread sand or other fine material on the sealed joints. Before opening to traffic, allow joint sealer to cure to prevent pickup.

**401.03.05 Core Samples**

Upon completion of an HMA lot, drill cores at random locations determined by the RE at least 12 hours after paving. Take cores in the presence of the RE.

Use drilling equipment with a water-cooled, diamond-tipped, masonry drill bit that shall produce 6-inch nominal diameter cores for the full depth of the pavement. Remove the core from the pavement without damaging it. After removing the core, remove all water from the hole. Fill the hole with HMA or cold patching material, and compact the material so that it is 1/4 inch above the surrounding pavement surface.

For test strip lots and the first traveled way lot, deliver cores within 48 hours of completing the lot. Deliver all other acceptance cores within 7 days of completing the lot.