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

Baseline Document Change Announcement

ANNOUNCEMENT: **BDC17S-19**

DATE: **February 15, 2018**

SUBJECT: **Pavements, Materials, Equipment and NJDOT Test Method.**
- Revision to Divisions 400, 420, 450, Subsection 902.08, Section 1008 & NJDOT R-1 Test Method, and addition of new Section 407 and Subsection 902.11 of the *2007 Standard Specifications for Road and Bridge Construction*

Divisions 400, 420, 450, Subsection 902.08, Section 1008 & NJDOT R-1 Test Method of the 2007 Standard Specifications for Road and Bridge Construction have been revised as a result of significant work performed by the Pavement and Drainage Management and Technology (PDMT) unit in order to improve HMA paving and ride quality requirements. Significant revisions have been made to Section 406 "High Performance Thin Overlay (HPTO)". Also, a new Section 407 "Binder Rich Intermediate Course" along with corresponding Subsection 902.11 have been added.

The proposed changes to the Standard Inputs (SI2007) are attached.

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.

Recommended By:

Paul F. Schneider
Director
Capital Program Support

Approved By:

Eli D. Lambert III, P.E.
Assistant Commissioner
Capital Program Management
and State Transportation Engineer

Attachment: Division 400, 420, 450, Subsection 902.08, Section 1008 & NJDOT R-1 Test Method, and addition of new Section 407 and Subsection 902.11 of the *2007 Standard Specifications for Road and Bridge Construction.*
PS:YK

SECTION 401 – HOT MIX ASPHALT (HMA) COURSES

401.03.01 Preparing Existing Pavement

A. Milling of HMA.

THE FOLLOWING IS ADDED TO THE THIRD PARAGRAPH:

If unbound aggregate material is encountered within the specified milling depth, mill unbound aggregate material without damaging the underlying material.

B. Milling of Concrete

THE FOLLOWING IS ADDED TO THE FIRST PARAGRAPH:

If reinforcement steel becomes exposed or dislodged, cut off the exposed reinforcement at the concrete surface as directed by the RE.

THE FOLLOWING IS ADDED TO THE FIFTH PARAGRAPH:

Ensure that no reinforcement steel is protruding from the surface.

D. Repairing HMA Pavement

THE ENTIRE TEXT IS CHANGED TO:

Arrange a meeting with the RE at the project site to establish the limits of HMA pavement repair. Additional repairs, not delineated on the plans or by the RE during the project site meeting, may be required if the need is established by the RE.

If potholes are discovered, notify the RE immediately. The RE may immediately direct repairs of small areas. The RE may require further evaluation of a large area to determine the need for additional milling and paving.

Perform HMA repairs as a separate operation before milling, paving and other surface treatments. The Contractor may request approval of the RE to perform the repair work as one operation with the paving or surface treatment.

HMA repairs may be performed on full depth HMA pavement or on composite pavement (HMA over concrete pavement). For full depth HMA pavement, sawcut existing HMA pavement to a depth of 8 inches. For composite pavement sawcut existing HMA to a depth of 8 inches or up to the top of concrete, whichever is less. Sawcut lines parallel and perpendicular to the roadway baseline and 3 inches away, at the closest point, from the damaged area to be repaired.

Remove damaged and loose material within the boundary of the sawcuts to form rectangular openings with vertical sides to a depth of 8 inches for HMA pavement, or to the top of concrete for composite pavement. A milling machine may be used to remove damaged pavement and form the repair areas if approved by the RE.

After the existing damaged HMA and loose material has been removed, the RE will examine underlying material to determine its condition.

If the base of the repair area is unbound material then shape and compact the unbound material to produce a firm and level base.

If water exists in the area, remove the underlying material to the depth specified by the RE. Place geotextile, then place and compact coarse aggregate to required grade to provide for a minimum 8 inch thick HMA pavement repair. Compact coarse aggregate as specified in 203.03.02.C. If the base of the repair is HMA or concrete pavement then ensure that the remaining pavement is cleaned and dry prior to applying tack coat.

Apply tack coat at an application rate of 0.15 gallons per square yard to the vertical surfaces and base of the opening. Spread and grade HMA surface course mix in the opening as specified for the roadway surface or a HMA surface course mix approved by the RE. Ensure that the temperature of the HMA when placed is at least 250 °F, and compact as specified in 401.03.03.F. Compact areas not accessible to rollers with a flat face compactor. Compact until the top of the patch is flush with, or 1/8 inch higher than, the adjacent pavement surface.

Reuse removed material as specified in 202.03.07.A.

THE FOLLOWING PART IS ADDED:

E. Micro-Milling. Ensure that pavement repairs are performed prior to micro-milling. Ensure that joint and crack sealing is performed after micro-milling.

Micro-mill pavement surfaces to the required depth, profile, and cross slope. The micro milling depth is not to exceed 1 1/2 inch depth. Operate the micro-milling machine at a speed recommended by the manufacturer, not greater than 50 feet per minute. Use automatic grade controls to control the line and grade of the milling machine. Use either a stringline or ski reference system. Replace teeth in the milling drum that become dislodged, broken, or unevenly worn. Perform the work in a manner that prevents dust and other particulate matter from escaping into the air.

Ensure positive drainage is maintained. When micro-milling to improve the profile, ensure that at least 95 percent of the surface is micro-milled and textured. Ensure that the micro-milled area is free from gouges, continuous grooves, ridges, and delaminated areas and has a uniform texture consisting of discontinuous longitudinal striations. If during micro-milling the pavement surface becomes damaged, then correct the damaged areas as approved by the RE. Ensure that the micro-milling produces a final surface texture with a mean texture depth of not greater than 4mm when tested according to ASTM E 965.

Ensure that the vertical differential in the surfaces across transverse joints and cracks is less than 1/4 inch after micro-milling. The RE will use a 10 feet long straight edge to evaluate the vertical differential at transverse joints and cracks by centering the straightedge perpendicular to and across the transverse joints or cracks. If the vertical differential exceeds 1/4 inch as measured from the bottom of the straight edge to the top of the pavement surface at any point, perform corrective action until the differential is 1/4 inch or less.

When micro-milling to correct profile and cross slope, ensure the cutting depth is sufficient to remove ruts and corrugations and to scarify the remaining surface. If the depth required to remove ruts and corrugations exceeds a depth of 1 1/2 inches, then notify the RE. The RE may direct additional milling to correct these areas.

Using a mechanical sweeper, clean the area before opening to traffic and before subsequent construction or resurfacing. Reuse millings and sweepings as specified in 202.03.07.A.

The RE will visually inspect the micro-milled surface. The RE may reject micro-milled areas that are unsatisfactory based on visual inspection. Improper micro-milling that produces excess surface damage or a surface which does not meet the requirements of this specification may be rendered unsatisfactory as determined by the RE. Correct areas of the micro-milling that the RE rejects. Visual inspection by the RE is considered sufficient grounds for such rejection.

401.03.02 Tack Coat and Prime Coat

THE PART 4 AS APPEARS IN THE SI IS CHANGED TO:

4. Prime Coat. Clean the surface of foreign and loose material where the HMA is to be placed. Immediately before beginning paving operations, ensure that the surface is dry. Do not place prime coat unless the weather restrictions, as specified in 401.03.03.B are met.

Do not apply prime coat to asphalt-stabilized drainage course.

For curbs, gutters, manholes, and other similar structures, do not apply prime coat. Clean the exposed surfaces of these structures and apply a uniform coating of polymerized joint adhesive to contact surfaces before paving.

In areas inaccessible to distributor spray bars, use hand spraying equipment for. Do not allow traffic on prime coated surfaces. Treat surfaces as follows:

Apply prime coat of cut-back asphalt on unpaved surfaces as follows:

Table 401.03.02-2 Prime Coat Application

Cut-Back Asphalt	Spraying Temp, °F	Gallons per Square Yard	Season
MC-30	85 to 150	0.1 to 0.5	Oct 15 to Apr 15
MC-70	120 to 190	0.1 to 0.5	Oct 15 to Apr 15
Emulsified Asphalt:			
CSS-1	70 to 140	0.1 to 0.50	All year

Apply prime coat at least 12 hours before placement of the HMA and when the base courses are not saturated or frozen. Unless the prime coat is under asphalt-stabilized drainage course, the RE may waive the application of prime coat if more than 5 inches of HMA is placed on the unbound aggregate course before the

roadway is opened to traffic. Take measures to prevent prime coat from entering into the drainage system or extending beyond the area to be paved.

401.03.03 HMA Courses

A. Paving Plan

THE PARTS 3, 5 & 9 ARE CHANGED TO:

3. Number, type, and model of equipment. Innovative equipment features to be utilized such as but not limited to intelligent compaction rollers, paver mounted infrared thermal profile system, and other Global Position System (GPS) located construction equipment.
5. Longitudinal joint layout plan, quality control and construction practices.
9. Paving sequence and paver automation use plan. Ensure that the HMA surface course is constructed for the full width of the traveled way, shoulder, and auxiliary lanes as a single paving operation.

C. Test Strip.

THE FIRST SENTENCE IN THE FIRST PARAGRAPH IS CHANGED TO:

Construct a test strip for each HMA mix for contracts with more than a total of 5500 tons of HMA.

THE LAST SENTENCE IN THE SECOND PARAGRAPH IS CHANGED TO:

If the Contractor does not continue paving, the Department will accept the test strip as the first lot regardless of size.

THE FOLLOWING IS ADDED TO THE END OF THE FOURTH PARAGRAPH:

If any changes are made to the paving plan after the beginning of the paving operation, construct an additional test strip.

D. Transportation and Delivery of HMA.

THE ENTIRE TEXT IS CHANGED TO:

Deliver HMA using HMA trucks in sufficient quantities and at such intervals to allow continuous placement of the material. Do not allow trucks to leave the plant within 1 hour of sunset unless nighttime lighting is provided as specified in 108.06. The RE will reject HMA if the HMA trucks do not meet the requirements specified in 1009.02. The RE will suspend construction operations if the Contractor fails to maintain a continuous paving operation. Before the truck leaves the plant, obtain a weigh ticket from a fully automatic scale. Before unloading, submit for each truckload a legible weigh ticket that includes the following:

1. Name and location of the HMA plant.
2. Contractor
3. Project title.
4. Load time and date.
5. Truck number.
6. Mix designation.
7. Item name and number
8. Plant lot number.
9. Tare, gross, and net weight.

Ensure that weigh tickets are signed and sealed by a certified weighmaster.

In the event of breakdown of an automatic printer system, the RE will accept weigh tickets showing the tare, gross, and net weight of each truck, as entered and certified by a weighmaster for a period not exceeding the necessary repair time as certified by a licensed repairman.

When using an automated batching plant, obtain weigh tickets from the printer used in conjunction with an automated batching and mixing system. Ensure the printed ticket shows the individual weights of the various components of the HMA in a batch, the total weight of each batch, and the sum of all batch weights in the truckload. At the completion of each day's work provide certification from the weighmaster that the total net weight supplied was correct.

E. Spreading and Grading.

THE ENTIRE TEXT IS CHANGED TO:

Use a stringline or other linear reference system to ensure proper line and grade when spreading material. Ensure that the system is in place and approved by the RE before placing HMA. Ensure that the underlying surface meets line and grade as specified in 202.03.03.C. Before placing HMA, ensure that the tack coat or prime coat has been placed as specified in 401.03.02 to the full width of the HMA. Obtain RE approval of the underlying surface far enough in advance of spreading HMA to allow 1 day's paving operations.

Ensure that the certified APCT is present during paving operations.

Ensure that an MTV independently delivers HMA from the HMA trucks to the HMA paver.

Before beginning, ensure that the temperature of the screed on the HMA paver is heated to at least the laydown temperature of the HMA. Using the MTVs and HMA pavers, construct paving courses in lifts of at least 4 times the nominal maximum aggregate size of the HMA being constructed. Ensure the paver vibratory screed is on when paving and that the paver automation is used as per the paving plan. Ensure the paver and auger speed are coordinated and operated at the proper speed to allow for a uniform head of material across the entire width of the paver. Ensure that the proper paver and auger speed are maintained. Ensure that the grade and profile are maintained.

Use HMA having a nominal maximum aggregate size of 3/8 inch or less in transition (run out) areas. On areas where irregularities or unavoidable obstacles make use of a paver impractical, spread, rake, and lute HMA with hand tools. For these areas, dump, spread, and screed the HMA to obtain the required compacted thickness.

Construct joints as follows:

1. **Longitudinal Joints.** Perform paving with the spring-loaded end plates of the paver in the "down" position and ensure that they are firmly seated on the pavement surface. Ensure augers and tunnels are extended to within 12 to 18 inches of the end plates and that a continual supply of hot material flows out to the end plates and the material is not segregating. Ensure the longitudinal joint in 1 lift offsets that in the lift immediately below by approximately 6 inches. Offset the joint in the surface course from the lane lines by 6 inches. When constructing a joint between lanes of opposing traffic, offset the joint by 6 inches into either lane.

    a. **Echelon Paving.** If a single paver does not spread the HMA the entire width of the roadway, use 2 or more pavers in echelon. Ensure that the trailing paver follows within 300 feet of the lead paver. Extend the screed and end gate of the trailing paver 1 inch over the uncompacted HMA placed by the lead paver. Ensure that the uncompacted HMA elevation from the trailing paver is equal to that from the lead paver at the joint. The Contractor may construct either a butt joint or a wedge joint. Do not rake the joint.

    b. **Cold Joint Paving.** If echelon paving is not possible, construct the pavement using cold longitudinal joints. When constructing the first lane, compact so the line and grade of the edges of the HMA are not displaced. Construct longitudinal joints parallel to the centerlines within a tolerance of ±1 inches per 100 linear feet. If this tolerance is not met, trim or mill the edge of the HMA mat as necessary. Before paving the abutting lane, ensure longitudinal joints are straight, and free from dust and debris.

    For surface course only, uniformly apply polymerized joint adhesive to longitudinal cold joint. Apply a 1/8 inch thick coating of polymerized joint adhesive over the entire joint face. Apply slowly to ensure an even coating thickness. Apply polymerized joint adhesive to the vertical faces, curb and utility structures.

    When maintaining traffic with a lift thickness greater than 2 inches, construct a wedge joint. The RE will permit a butt joint for lift thickness 2 inches or less when maintaining traffic, or for lift thickness greater than 2 inches when maintaining traffic is not required. Maintain a uniform width and depth of overlapped material at all times. Position the paver so that the HMA overlaps the edge of the lane previously placed by 1/2 to 1 inch. Leave the material sufficiently high to allow for compaction. Do not lute the HMA material. Do not broadcast HMA material at the joint across the new HMA mat..

    When compacted, ensure that the new mat at the joint is even or slightly higher (maximum 1/8 inch) than the previously placed adjoining mat. If the newly compacted mat results in a depression at the joint of more than1/8 inch, suspend paving operations until corrective action is taken to prevent reoccurrence.

2. **Transverse Joints.** Construct transverse joints to provide a smooth riding surface. When using a bulkhead to form the joint, ensure that the bulkhead forms a straight line and vertical face. If a bulkhead is not used to form the joint, make the joint by sawing the compacted HMA for a sufficient distance behind the end of the placement to ensure full thickness and a smooth surface at the joint. Remove the full lift thickness of HMA ahead of the sawed joint. In either case, paint the joint face with polymerized joint adhesive before the fresh

material is placed against it. Unless prohibited by field conditions, cross roll to obtain thorough compaction of these joints.

F. Compacting.

THE FOURTH SENTENCE OF THE LAST PARAGRAPH IS CHANGED TO:

On a daily basis, provide results of both the nuclear density and core testing to the RE.

G. Opening to Traffic.

THE ENTIRE TEXT IS CHANGED TO:

Remove loose material from the traveled way, shoulder, and auxiliary lanes before opening to traffic. Open HMA courses to traffic or construction equipment, including paving equipment, only after the surface temperature has cooled to less than 140 °F.

When using Warm Mix Asphalt, do not allow traffic or construction equipment on the HMA course until the surface temperature is less than 120 °F.

H. Air Void Requirements.

THE FIRST PARAGRAPH IS CHANGED TO:

Mainline lots are defined as the area covered by a day's paving production of the same job mix formula for the traveled way and auxiliary lanes. The RE may combine daily production areas less than 1000 tons with previous or subsequent production areas. If a day's production is greater than 4000 tons, the RE may divide the area of HMA placed into 2 lots with approximately equal areas.

THE FOLLOWING IS ADDED TO THE THIRD PARAGRAPH:

Inside shoulders less than 6 feet in width will not be included in other lots unless requested by the RE.

THE SECOND PARAGRAPH IN PART 5 AS APPEARS IN THE SI IS CHANGED TO:

If an outlier is detected for N = 5 and no retest is warranted, the contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station. If an outlier is detected and a retest is justified, take a replacement core for the outlier at the same time as the 5 additional retest cores are taken. If the outlier replacement core is not taken within 15 days, the ME will use the initial core results to determine PPA.

THE ENTIRE TEXT IN PART 6 IS CHANGED TO:

6. Retest. If the initial series of 5 cores produces a percent defective value of PD ≥ 30 for mainline or ramp lots, or PD ≥ 50 for other pavement lots, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified within the 15 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.

I. Thickness Requirements.

1. Total Thickness.

THE ENTIRE TEXT IN PART E IS CHANGED TO:

e. Retest. If the initial series of 5 cores produces a percent defective value of PD ≥ 30, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the RE. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified within the 15 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.

2. Surface Course Thickness.

THE ENTIRE TEXT IN PART D IS CHANGED TO:

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. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified 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.

J. Ride Quality Requirements.

THE ENTIRE TEXT IS CHANGED TO

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project using the International Roughness Index (IRI) according to ASTM E 1926. The final riding surface is defined as the last lift of the pavement structure where traffic will be allowed. The pavement will be evaluated using the target IRI (T) determined from Table 401.03.03-8.

For projects paving on mainline travel lanes equal to or greater than 2,500 feet length and any lane within the project of at least 1,000 feet length, the Department will evaluate the ride quality of the final riding surface of the mainline travel lanes using IRI. The Department will use the measured IRI to calculate the pay adjustment (PA) using pay adjustment equation (PAE) type PA1 as specified in Table 401.03.03-7. PA will be based on lots of 0.01 mile length. The PA will be positive for superior quality work or negative for inferior quality work.

For projects paving on mainline travel lanes of less than 2,500 feet length, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the PA using pay equation type PA1 as specified in Table 401.03.03-7.

For paving on ramps and shoulders, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the pay adjustment using pay equation type PA2 as specified in Table 401.03.03-7.

When paving over bridge structures, the Department will use the measured IRI to calculate the pay adjustment using pay equation type PA3 as specified in Table 401.03.03-7.

1. **Smoothness Measurement.** The Department will test the longitudinal profile of the final riding surface for ride quality with a Class 1 Inertial Profiling System according to NJDOT R-1. If project conditions preclude the use of the Class 1 Inertial Profiling System, the Department will use a Class 1 Walking Profiler or lightweight profiler.

2. **Quality Control Testing.** Perform quality control testing during lift placement to ensure compliance with the ride quality requirements specified in Table 401.03.03-8.

3. **Preparation for IRI Testing.** Notify the RE when all paving is complete and the RE will request IRI testing by Pavement & Drainage Management & Technology (PDMT) unit. Provide traffic control when the Department performs IRI testing. Perform mechanical sweeping of the surface before IRI testing. To facilitate auto triggering on laser profilers, place a single line of temporary pavement marking tape perpendicular to the roadway baseline at the beginning and end of each lane, shoulder, and ramp to be tested or at the direction of the Department. Submit the actual stationing for each temporary pavement marking tape location to the RE.

4. **Quality Acceptance.** The Department will determine acceptance and provide PA based on the following:

   a. **Pay Adjustment.** The acceptable IRI for the roadway pavement will be the target IRI (T) from Table 401.03.03-8 for which full payment will be made and will be determined using the latest available existing current average IRI (C) data of the right most travel lane specified in 102.04 or from PDMT. The number of lots for final pay adjustment will be reduced by the number of lots excluded for each segment shown in Table 401.03.03-7. Lots excluded from final PA will be those with the highest recorded IRI numbers for respective roadway and bridge deck segments. A single average IRI value and the corresponding PA for each 0.01 mile lot will be reported. IRI units are in inches per mile.

Table 401.03.03-7 Pay Adjustment Equations (PAE) for Ride Quality

Pay Equation Type	Exclusions		Pay Equations
PA1	As shown in the Special Provisions Table 401.03.03-9	IRI≤170	PA1=PAE
		IRI>170	PA1= -A or Corrective action
PA2	Will include, if tested	IRI ≤ 120	PA2 =$0
		120 < IRI ≤ 170	PA2 = (IRI − 120) x (−$10.00)
		IRI>170	Maximum Negative Pay or Corrective action
PA3	Will include, if tested	IRI<T	PA3=PAE

T≤IRI≤120	PA3=0
120<IRI≤170	PA3=PAE
IRI>170	PA3= -A or Corrective action

$$PAE = \frac{A}{-37.75347 \times \log_e(T) + 194.87} - \frac{A}{-37.75347 \times \log_e(IRI) + 194.87}$$

$$A = 1267.2\left[\frac{M}{9} + \frac{PD}{150}\right]$$

P= Bid price of last lift of the pavement structure to be evaluated, per Ton
D= Design thickness of last lift to be evaluated, Inch
M= Bid price of Milling, per Square Yard
T= Target IRI

Table 401.03.03-8 Target IRI for Resurfacing or Reconstruction (T)[3]

Roadway Type	Current average IRI (C)	New Construction or Reconstruction	Number of Operation for other than New Construction or Reconstruction[5]			
			One[4]	Two[4]	Three[4]	Four or More[4]
			Target IRI (T)			
Freeways or Limited Access Highways	≤ 60	50	50	50	50	50
	61 to ≤95		53	50	50	50
	96 to ≤170		55	53	50	50
	171 to≤200			55	53	50
	201 to ≤285		0.64C[7]	58	55	50
	>286[8]			60	58	53
Other than Freeways or Limited Access Highways with speed limit > 35 MPH	≤ 60	60	60	60	60	60
	61 to ≤95		63	60	60	60
	96 to ≤170		66	63	60	60
	171 to≤200			66	63	60
	201 to ≤285		0.64C[7]	69	66	60
	>286[8]			72	69	63
Other than Freeways or Limited Access Highways with speed limit ≤ 35 MPH	≤ 60	70	70	70	70	70
	61 to ≤95		74	70	70	70
	96 to ≤170		77	74	70	70
	171 to≤200			77	74	70
	201 to ≤285		0.64C[7]	81	77	70
	>286[8]			84	81	74

1. The Department will determine target IRI (T) of roadways containing multiple speed limits of greater than 35 MPH and less than or equal to 35 MPH based on the following equation:

$$\text{Target IRI of a roadway consists of N Roadway type (T)} = \frac{T_1L_1 + T_2L_2 + \cdots \ldots T_NL_N}{L_{1+}L_{2+}L_{3+} \ldots . L_N}$$

   Where TN is the Target IRI of N section and LN is the length of N section in miles to the nearest 0.01 mile
2. Current average IRI (C) is the average of the latest available preconstruction network level IRI data of right most travel lane from PDMT.
3. Target IRI (T) is the lowest of Current average IRI (C) and T determined from the table.
4. Multiply T with 1.05 for HMA over Concrete, if total HMA after proposed treatment is less than 8 inch thick.
5. Milling is one operation. Paving each layer of asphalt mix is an individual operation unless plans specify paving a mix in two lifts. In such case, each lift is considered as an operation.
6. Construction or reconstruction of full pavement box on subgrade is new construction or reconstruction.
7. Use Pay Equation as below:

   IRI≤T PA=0

   IRI>T PA=PAE
8. For paving over rubblized concrete, use C >286 to determine target IRI, then multiply T with 1.05 if total HMA after proposed treatment is less than 8-inch thick.

2**********2

SME CONTACT – SEND EMAIL TO PAVEMENT & DRAINAGE MANAGEMENT & TECHNOLOGY UNIT TO PROVIDE THE EXCLUSIONS IN TABLE 401.03.03-9 FOR ROADWAYS WITHIN THE PROJECT

Following Table is added

Table 401.03.03-9 Exclusions for Resurfacing or Reconstruction		
Roadway	**Lane Number**	**Exclusions**

Lane designation is by increasing numbers from left to right in the direction of traffic with left lane being Lane 1.

2**********2

b. Corrective Action. If the average IRI is greater than 170 inches per mile after testing is performed, the Department may require corrective action or assess the maximum negative pay adjustment as computed in Table 401.03.03-7. If the Department requires corrective action submit a plan for corrective action. If the plan for corrective action is approved and the lot is corrected, the Department will retest and evaluate the corrected area as a new lot that must meet the same requirements as the initial work. If the plan for corrective action is not approved, the Department may require removal and replacement. The replacement work is subject to the same requirements as the initial work.

401.04 MEASUREMENT AND PAYMENT
THE FOLLOWING ITEM IS ADDED:

Item	*Pay Unit*
MICRO-MILLING	SQUARE YARD

SECTION 402 – HMA FRICTION COURSE

402.03.01 Installing OGFC and MOGFC

I. Ride Quality Requirements.
THE ENTIRE TEXT IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 401.03.03.J.

402.03.02 AR-OGFC

I. Ride Quality Requirements.
THE ENTIRE TEXT IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 401.03.03.J.

402.04 MEASUREMENT AND PAYMENT
THE ENTIRE SUSPART IS CHANGED TO:

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
OPEN-GRADED ___ FRICTION COURSE	TON
MODIFIED OPEN-GRADED ___ FRICTION COURSE	TON
ASPHALT-RUBBER OPEN-GRADED FRICTION COURSE	TON

The Department will measure Open-Graded ___ Friction Course, Modified Open-Graded Friction ___ Course and ASPHALT-RUBBER OPEN-GRADED FRICTION COURSE by the ton as indicated on the certified weigh tickets, excluding unused material.

The Department will not include payment for tack coat, tack coat 64-22 and HMA core samples in the various Items of this Section.

The Department will make payment for tack coat as specified in 401.04.

The Department will make payment for TACK COAT 64-22 as specified in 401.04.

The Department will make payment for Core Samples, Hot Mix Asphalt as specified in 401.04.

The Department will make a payment adjustment for HMA thickness quality by the following formula:

Pay Adjustment = Q x BP x PPA

Where:
BP = Bid Price
Q= Thickness Lot Quantity
PPA= thickness PPA as specified in 401.03.03.I

The Department will make a payment adjustment for HMA ride quality, as specified in 401.03.03.J.

SECTION 403 – ULTRA-THIN FRICTION COURSE

403.03.01 Ultra-Thin Friction Course

I. Ride Quality Requirements.
THE ENTIRE TEXT IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 401.03.03.J.

SECTION 404 – STONE MATRIX ASPHALT (SMA)

404.03.01 SMA

H. Air Void Requirements.
THE SECOND PARAGRAPH IN PART 5 AS APPEARS IN THE SI IS CHANGED TO:

If an outlier is detected for N = 5 and no retest is warranted, the contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station. If an outlier is detected and a retest is justified, take a replacement core for the outlier at the same time as the 5 additional retest cores are taken. If the outlier replacement core is not taken within 15 days, the ME will use the initial core results to determine PPA.

THE ENTIRE PART 6 AS APPEARS IN THE SI IS CHANGED TO:

6. **Retest.** If the initial series of 5 cores produces a percent defective value of PD ≥ 30 for mainline or ramp lots, or PD ≥ 50 for other pavement lots, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified within the 15 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.

J. Ride Quality Requirements.
THE ENTIRE TEXT IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 401.03.03.J.

SECTION 405 – CONCRETE SURFACE COURSE

405.03.02 Concrete Surface Course

J. Ride Quality Requirements.
THE ENTIRE TEXT IS CHANGED TO:

Ensure that diamond grinding is completed before testing ride quality.

The Department will evaluate the ride quality of the concrete surface course on the project using the International Roughness Index (IRI) according to ASTM E 1926. The concrete surface course will be evaluated using the target IRI (T) determined from Table 405.03.02-2.

The Department will evaluate the ride quality of the final riding surface of the mainline travel lanes. The Department will use the measured IRI to calculate the pay adjustment (PA) using pay adjustment equation (PAE) type PA1 as specified in Table 405.03.02-1. PA will be based on lots of 0.01 mile length. The PA will be positive for superior quality work or negative for inferior quality work.

For paving on ramps and shoulders, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the PA using pay equation type PA2 as specified in Table 405.03.02-1

1. **Smoothness Measurement.** The Department will test the longitudinal profile of the final riding surface for ride quality with a Class 1 Inertial Profiling System according to NJDOT R-1. If project conditions preclude the use of the Class 1 Inertial Profiling System, the Department will use a Class 1 Walking Profiler or lightweight profiler.

2. **Quality Control Testing.** Perform quality control testing during lift placement to ensure compliance with the ride quality requirements specified in Table 405.03.02-2.

3. **Preparation for IRI Testing.** Notify the RE when all paving is complete and the RE will request IRI testing by Pavement & Drainage Management & Technology (PDMT) unit. Provide traffic control when the Department performs IRI testing. Perform mechanical sweeping of the surface before IRI testing. To facilitate auto triggering on laser profilers, place a single line of temporary pavement marking tape perpendicular to the roadway baseline at the beginning and end of each lane, shoulder, and ramp to be tested or at the direction of the Department. Submit the actual stationing for each temporary pavement marking tape location to the RE.

4. **Quality Acceptance.** The Department will determine acceptance and provide PA based on the following:

   a. **Pay Adjustment.** The acceptable IRI for the roadway pavement will be the target IRI (T) from Table 405.03.02-2 for which full payment will be made and will be determined using the latest available existing current average IRI (C) data of the right most travel lane specified in 102.04 or from PDMT. The number of lots for final pay adjustment will be reduced by the number of lots excluded for each segment shown in Table 405.03.02-1. Lots excluded from final PA will be those with the highest recorded IRI numbers for respective roadway and bridge deck segments. A single average IRI value and the corresponding PA for each 0.01 mile lot will be reported. IRI units are in inches per mile.

Table 405.03.02-1 Pay Equations for Ride Quality

Pay Equation Type	Excluded Lots	Pay Equation(s)	
PA1	As shown in the Special Provisions Table 405.03.02-3	IRI<(T-25)	PA1= $50
		(T-25)≤IRI<(T-5)	PA1=(T-IRI-5) x 2.5
		(T-5)≤IRI≤(T+5)	PA1=0
		(T+5)<IRI≤(T+75)	PA1=-(IRI-T-5)x7.1429
		IRI>(T+75)	PA=-$500
PA2	Will include, if tested	IRI ≤ 120	PA2=$0
		120 < IRI ≤ 170	PA2 = (IRI − 120) x (−$10.00)
		IRI>170	Maximum Negative Pay or Corrective action

Table 405.03.02-2 Target IRI for Concrete Surface Course (T)

Roadway Type	Target IRI (T)
Freeways or Limited Access Highways	50
Other than Freeways or Limited Access Highways with speed limit > 35 MPH	60
Other than Freeways or Limited Access Highways with speed limit ≤ 35 MPH	70

2**********2

SME CONTACT – SEND EMAIL TO PAVEMENT & DRAINAGE MANAGEMENT & TECHNOLOGY UNIT TO PROVIDE THE EXCLUSIONS IN TABLE 405.03.02-3 FOR ROADWAYS WITHIN THE PROJECT

Following Table is added

Table 405.03.02-3 Exclusions for Concrete Surface Course		
Roadway	**Lane Number**	**Exclusions**

Lane designation is by increasing numbers from left to right in the direction of traffic with left lane being Lane 1.

2**********2

b. Corrective Action. If the average IRI is greater than T+75 inches per mile after testing is performed, the Department may require corrective action or assess the maximum negative pay adjustment as computed in Table 405.03.02-1. If the Department requires corrective action submit a plan for corrective action. If the plan for corrective action is approved and the lot is corrected, the Department will retest and evaluate the corrected area as a new lot that must meet the same requirements as the initial work. If the plan for corrective action is not approved, the Department may require removal and replacement. The replacement work is subject to the same requirements as the initial work.

SECTION 406 – HIGH PERFORMANCE THIN OVERLAY (HPTO)

406.03.01 High Performance Thin Overlay (HPTO)

C. Test Strip.

THE SECOND PARAGRAPH AS APPEARS IN THE SI IS DELETED.

E. Spreading and Grading.

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

Use of a MTV is required for the construction of HPTO. If HPTO is only for bridge deck paving, the use of a MTV is optional. Ensure that the surface where the HPTO is placed is clean of foreign and loose material. Clean the surface of existing pavement using a self-propelled power broom equipped with a vacuum collection system before placement. Ensure that the surface is dry before paving begins. Do not start paving of the HPTO until the RE has approved the underlying surface. In areas where the existing pavement is not being milled, remove traffic stripes and traffic markings as specified in 610.03.08. Apply tack coat as specified in 401.03.02. Place HPTO at the laydown temperature recommended by the supplier of the asphalt binder or the supplier of the asphalt modifier without exceeding 330 ºF maximum discharge temperature. Spread and grade HPTO as specified in 401.03.03.E.

F. Compacting.

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

Compact as specified in 401.03.03.F. If vibratory compaction causes aggregate breakdown, or forces liquid asphalt to the surface or both, operate rollers in static mode only. If compacting HPTO on a bridge deck, operate rollers in static mode only.

H. Air Void Requirements on Roadway.

THE SECOND PARAGRAPH IN PART 5 AS APPEARS IN THE SI IS CHANGED TO:

If an outlier is detected for N = 5 and no retest is warranted, the contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station. If an outlier is detected and a retest is justified, take a replacement core for the outlier at the same time as the 5 additional retest cores are taken. If the outlier replacement core is not taken within 15 days, the ME will use the initial core results to determine PPA.

THE ENTIRE PART 6 AS APPEARS IN THE SI IS CHANGED TO:

6. Retest. If the initial series of 5 cores produces a percent defective value of PD ≥ 30 for mainline or ramp lots, or PD ≥ 50 for other pavement lots, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified within the 15 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.

J. Ride Quality Requirements.

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 401.03.03.J.

THE FOLLOWING SECTION IS ADDED:

SECTION 407 - BINDER RICH INTERMEDIATE COURSE

407.01 DESCRIPTION

This Section describes the requirements for constructing binder rich intermediate course (BRIC).

407.02 MATERIALS

407.02.01 Materials

Provide materials as specified:

Tack Coat:
Emulsified Asphalt, Grade RS-1, SS-1, SS-1h, Grade CSS-1 or CSS-1h 902.01.03
Binder Rich Intermediate Course 902.11

Use an approved HMA surface course to fill core holes, maintaining the material hot enough to compact. The Contractor may use a commercial type of cold mixture as patching material for filling core holes if HMA surface course is not being produced when coring.

407.02.02 Equipment

Provide equipment as specified:

Materials Transfer Vehicle (MTV) 1003.01
HMA Paver 1003.03
HMA Compactor 1003.05
Bituminous Material Distributor 1003.07
HMA Plant 1009.01
HMA Trucks 1009.02

Provide a thin-lift nuclear density gauge according to ASTM D 2950.

Install a paver hopper insert with a minimum capacity of 14 tons in the hopper of the HMA Paver.

407.03 CONSTRUCTION

407.03.01 BRIC

A. Paving Plan. At least 20 days before the start of placing the BRIC, submit to the RE for approval a detailed plan of operation as specified in 401.03.03.A. Include in the paving plan a proposed location for the test strip.

B. Weather Limitations. If within 12 hours before paving the National Weather Service locally forecasts a 40 percent chance or greater of precipitation during the scheduled placement, postpone the placement of BRIC. Do not place BRIC if it is precipitating and do not allow trucks to leave the plant when precipitation is imminent. Do not resume paving operations until the chance of precipitation is less than 40 percent and the surface is dry.

Do not pave if the base temperature is below 50 °F.

C. Test Strip. At least two weeks prior to production of BRIC, construct a test strip as specified in 401.03.03.C except for the allowance to continue paving. Ensure that the test strip is at least 100 tons. Submit test strip results to the RE. The RE will analyze the test strip results in conjunction with the ME's results from the HMA plant to approve the test strip. Do not proceed with production paving until receiving written permission from the RE. The Contractor may need to construct multiple test strips in order to produce material that meets both the plant production requirements and the field density requirements as directed by the RE.

D. Transportation and Delivery of HMA. Transport and deliver BRIC as specified in 401.03.03.D.

E. Spreading and Grading. Do not start paving of the BRIC until the RE has approved the underlying surface. Place BRIC at the laydown temperature recommended by the supplier of the asphalt binder or the supplier of the asphalt modifier without exceeding 330ºF maximum discharge temperature at the HMA plant. Spread and grade BRIC as specified in 401.03.03.E.

F. Compacting. Compact as specified in 401.03.03.F. If vibratory compaction causes aggregate breakdown, forces liquid asphalt to the surface or creates a surface with undesirable ride quality, then operate rollers in static mode only.

G. Opening to Traffic. Remove loose material from the traveled way, shoulder, and auxiliary lanes before opening to traffic. Do not allow traffic or construction equipment on the BRIC until the surface temperature is less than 120 °F. Ensure that traffic is not allowed on the BRIC for more than 7 days.

H. Air Void Requirements. Drill Cores as specified in 401.03.04.

Mainline lots are defined as the area covered by a day's paving production of the same job mix formula for the traveled way and auxiliary lanes. The RE may combine daily production areas less than 500 tons with previous or subsequent production areas. If a day's production is greater than 2000 tons, the RE may divide the area of HMA placed into 2 lots with approximately equal areas.

Ramp pavement lots are defined as approximately 10,000 square yards of pavement in ramps. The RE may combine ramps with less than the minimum area into a single lot. If 2 or more ramps are included in a single lot, the RE will require additional cores to ensure that at least 1 core is taken from each ramp.

Other pavement lots are defined as approximately 10,000 square yards of pavement in shoulders and other undefined areas.

The ME will calculate the percent defective (PD) as the percentage of the lot outside the acceptable range of 0 percent air voids to 6 percent air voids. The acceptable quality limit is 10 percent defective. For lots in which PD < 10, the Department will award a positive pay adjustment. For lots in which PD > 10, the Department will assess a negative pay adjustment.

The ME will determine air voids from 5 cores taken from each lot in random locations. The ME will determine air voids of cores from the values for the maximum specific gravity of the mix and the bulk specific gravity of the core. The ME will determine the maximum specific gravity of the mix according to NJDOT B3 and AASHTO T 209, except that minimum sample size may be waived in order to use a 6 inch diameter core sample. The ME will determine the bulk specific gravity of the compacted mixture by testing each core according to AASHTO T 166.

The ME will calculate pay adjustments based on the following:

1. Sample Mean ($\overline{X}$) and Standard Deviation (S) of the N Test Results (X_1, X_2,..., X_N).

$$\overline{X} = \frac{(X_1 + X_2 + \ldots + X_N)}{N}$$

$$S = \sqrt{\frac{(X_1 - \overline{X})^2 + (X_2 - \overline{X})^2 + \ldots + (X_N - \overline{X})^2}{N - 1}}$$

2. Quality Index (Q).

$$Q_L = \frac{(\overline{X} - 0)}{S}$$

$$Q_U = \frac{(6.0 - \overline{X})}{S}$$

3. Percent Defective (PD). Using NJDOT ST for the appropriate sample size, the Department will determine PD_L and PD_U associated with Q_L and Q_U, respectively. $PD = PD_L + PD_U$

4. Percent Pay Adjustment (PPA). Calculate the PPA for traveled way and ramp lots as specified in Table 407.03.01-1.

Table 407.03.01-1 PPA for BRIC Lots

Quality	PPA

BRIC	PD < 30	PPA = 1 − (0.1 PD)
	PD ≥ 30	PPA = 40 − (1.4 PD)

Calculate the PPA for other pavement lots as specified in Table 401.03.03-4.

5. Outlier Detection. If PD < 10, the ME will not screen for outliers. If PD ≥ 10, the ME will screen all acceptance cores for outliers using a statistically valid procedure. The following procedure applies only for a sample size of 5 or 10.

1. The ME will arrange the core results in ascending order, in which X_1 represents the smallest value and X_N represents the largest value.
2. If X_N is suspected of being an outlier, the ME will calculate:

$$R = \frac{X_N - X_{(N-1)}}{X_N - X_1}$$

3. If X_1 is suspected of being an outlier, the ME will calculate:

$$R = \frac{X_2 - X_1}{X_N - X_1}$$

4. For N = 5 if R > 0.642, the value is judged to be statistically significant and the core is excluded. For N = 10 if R > 0.412, the value is judged to be statistically significant and the core is excluded.

If an outlier is detected for N=5 and no retest is warranted, the Contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station as directed by the RE. If an outlier is detected and a retest is justified, take a replacement core for the outlier at the same time as the 5 additional retest cores are taken. If the outlier replacement core is not taken within 15 days, the ME will use the initial core results to determine PPA.

If an outlier is detected for N = 10, the Contractor may replace that core by taking an additional core at the same offset and within 5 feet of the original station as directed by the RE. If the outlier replacement core is not taken within 15 days, the ME will use the initial core results to determine PPA.

6. Retest. If the initial series of 5 cores produces a percent defective value of PD ≥ 30 for mainline or ramp lots, or PD ≥ 50 for other pavement lots, the Contractor may elect to take an additional set of 5 cores at random locations chosen by the ME. Notify the RE within 15 days of receipt of the initial core results to take the additional cores. If the RE is not notified within the 15 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.

7. Removal and Replacement. If the final lot PD ≥ 75 (based on the combined set of 10 cores or 5 cores if the Contractor does not take additional cores), remove and replace the lot and all overlying work. The replacement work is subject to the same requirements as the initial work.

I. Thickness Requirements. When required for thickness determination, drill core holes as specified in 401.03.05. The Department will evaluate thickness as specified in 401.03.03.I.

407.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
BINDER RICH INTERMEDIATE COURSE, 4.75MM	TON

The Department will measure BINDER RICH INTERMEDIATE COURSE, 4.75MM by the ton as indicated on the certified weigh tickets, excluding unused material.

The Department will make payment for CORE SAMPLES, HOT MIX ASPHALT as specified in 401.04

The Department will make payment for TACK COAT as specified in 401.04.

DIVISION 420 – PAVEMENT PRESERVATION TREATMENTS

SECTION 421 – MICRO SURFACING AND SLURRY SEAL

421.03.03 Micro Surfacing

J. Ride Quality Requirements.

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project using the International Roughness Index (IRI) according to ASTM E 1926. The final riding surface is defined as the last lift of the pavement structure where traffic will be allowed. The pavement will be evaluated using the target IRI (T) determined from Table 421.03.03-3.

For projects paving on mainline travel lanes equal to or greater than 2,500 feet length and any lane within the project of at least 1,000 feet length, the Department will evaluate the ride quality of the final riding surface of the mainline travel lanes using IRI. The Department will use the measured IRI to calculate the pay adjustment (PA) using pay adjustment equation (PAE) type PA1 as specified in Table 421.03.03-2. PA will be based on lots of 0.01 mile length. The PA will be positive for superior quality work or negative for inferior quality work.

For projects paving on mainline travel lanes of less than 2,500 feet length, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the PA using pay adjustment equation (PAE) type PA1 as specified in Table 421.03.03-2.

For paving on ramps and shoulders, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the pay adjustment using pay equation type PA2 as specified in Table 421.03.03-2.

1. **Smoothness Measurement.** The Department will test the longitudinal profile of the final riding surface for ride quality with a Class 1 Inertial Profiling System according to NJDOT R-1. If project conditions preclude the use of the Class 1 Inertial Profiling System, the Department will use a Class 1 Walking Profiler or lightweight profiler.

2. **Quality Control Testing.** Perform quality control testing during lift placement to ensure compliance with the ride quality requirements specified in Table 421.03.03-3.

3. **Preparation for IRI Testing.** Notify the RE when all paving is complete and the RE will request IRI testing by Pavement & Drainage Management & Technology (PDMT) unit. Provide traffic control when the Department performs IRI testing. Perform mechanical sweeping of the surface before IRI testing. To facilitate auto triggering on laser profilers, place a single line of temporary pavement marking tape perpendicular to the roadway baseline at the beginning and end of each lane, shoulder, and ramp to be tested or at the direction of the Department. Submit the actual stationing for each temporary pavement marking tape location to the RE.

4. **Quality Acceptance.** The Department will determine acceptance and provide PA based on the following:

   a. **Pay Adjustment.** The acceptable IRI for the roadway pavement will be the target IRI (T) from Table 421.03.03-3 for which full payment will be made and will be determined using the latest available existing current average IRI (C) data of the right most travel lane specified in 102.04 or from PDMT. The number of lots for final pay adjustment will be reduced by the number of lots excluded for each segment shown in Table 421.03.03-2. Lots excluded from final PA will be those with the highest recorded IRI numbers for respective roadway and bridge deck segments. A single average IRI value and the corresponding PA for each 0.01 mile lot will be reported. IRI units are in inches per mile.

Table 421.03.03-2 Pay Equations for Ride Quality

Pay Equation Type	Excluded Lots	Pay Equation(s)	
PA1	As shown in the Special Provision	IRI<(T-25)	PA1= $10
		(T-25)≤IRI<(T-5)	PA1=$(T-IRI-5) x0.5

	Table 421.03.03-4	(T-5)≤IRI≤(T+5) (T+5)<IRI≤(T+75) IRI>(T+75)	PA1=0 PA1=-$(IRI-T-5)x1.4286 PA=-$100
PA2	Will include, if tested	IRI ≤ 120 120 < IRI ≤ 170 IRI>170	PA2=$0 PA2 = (IRI − 120) x (−$10.00) Maximum Negative Pay or Corrective action

Table 421.03.03-3 Target IRI for Microsurfacing or Slurry Seal (T)[1]

Roadway Type	Excluded Lots	Current average IRI (C)	Target IRI (T)
Freeways or Limited Access Highways	As shown in the Special Provisions Table 421.03.03-9	≤ 50	50
		>50	C[1]
Other than Freeways or Limited Access Highways with speed limit > 35 MPH		≤ 60	60
		>60	C[1]
Other than Freeways or Limited Access Highways with speed limit ≤ 35 MPH		≤ 70	70
		>70	C[1]

1. Current average IRI (C) is the average of the latest available preconstruction network level IRI data of right most travel lane from PDMT.

2**********2

SME CONTACT – SEND EMAIL TO PAVEMENT & DRAINAGE MANAGEMENT & TECHNOLOGY UNIT TO PROVIDE THE EXCLUSIONS IN TABLE 421.03.03-4 FOR ROADWAYS WITHIN THE PROJECT

Following Table is added

Table 421.03.03-4 Exclusions for Microsurfacing or Slurry Seal

Roadway	Lane Number	Exclusions

Lane designation is by increasing numbers from left to right in the direction of traffic with left lane being Lane 1.

2**********2

b. Corrective Action. If the average IRI is greater than T+75 inches per mile after testing is performed, the Department may require corrective action or assess the maximum negative pay adjustment as computed in Table 421.03.03-2. If the Department requires corrective action submit a plan for corrective action. If the plan for corrective action is approved and the lot is corrected, the Department will retest and evaluate the corrected area as a new lot that must meet the same requirements as the initial work. If the plan for corrective action is not approved, the Department may require removal and replacement. The replacement work is subject to the same requirements as the initial work.

421.03.04 Slurry Seal

J. Ride Quality Requirements.

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

The Department will evaluate the ride quality of the final riding surface of all constructed pavement on the project as specified in 421.03.03.J.

421.04 MEASUREMENT AND PAYMENT

THE FOLLOWING AS APPEARS IN THE SI IS ADDED AFTER SECOND PARAGRAPH:

The Department will not include payment for removal of traffic stripes, removal of traffic markings, epoxy traffic stripes, epoxy traffic marking, lines, epoxy traffic markings, symbols and epoxy traffic markings, route symbols in the various Items of this Section. The Department will pay for removal of traffic stripes, removal of traffic markings, epoxy traffic stripes, epoxy traffic marking, lines, epoxy traffic markings, symbols and epoxy traffic markings, route symbols under REMOVAL OF TRAFFIC STRIPES, REMOVAL OF TRAFFIC MARKINGS, TRAFFIC STRIPES EPOXY, TRAFFIC MARKINGS LINES, EPOXY, TRAFFIC MARKINGS SYMBOLS, EPOXY and TRAFFIC MARKINGS ROUTE SYMBOLS, EPOXY as specified in 610.04 respectively.

The Department will not include payment for latex traffic stripes, latex traffic markings lines and latex traffic markings symbols in the various Items of this Section. The Department will pay for latex traffic stripes, latex traffic markings

lines and latex traffic markings symbols under TRAFFIC STRIPES, LATEX, TRAFFIC MARKINGS LINES, LATEX and TRAFFIC MARKINGS SYMBOLS, LATEX as specified in 159.04 respectively.

THE THIRD PARAGRAPH AS APPEARS IN THE SI IS DELETED.

SECTION 422 – FOG SEAL

422.04 MEASUREMENT AND PAYMENT
THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

The Department will measure and make payment for Items as follows:

Item	*Pay Unit*
FOG SEAL SURFACE TREATMENT	GALLON
FOG SEAL STRIP	LINEAR FOOT

The Department will not include payment for removal of traffic stripes, removal of traffic makings, epoxy traffic stripes, epoxy traffic marking, lines, epoxy traffic markings, symbols and epoxy traffic markings, route symbols in FOG SEAL SURFACE TREATMENT and FOG SEAL STRIP. The Department will pay for removal of traffic stripes, removal of traffic makings, epoxy traffic stripes, epoxy traffic marking, lines, epoxy traffic markings, symbols and epoxy traffic markings, route symbols under REMOVAL OF TRAFFIC STRIPES, REMOVAL OF TRAFFIC MARKINGS, TRAFFIC STRIPES EPOXY, TRAFFIC MARKINGS LINES, EPOXY, TRAFFIC MARKINGS SYMBOLS, EPOXY and TRAFFIC MARKINGS ROUTE SYMBOLS, EPOXY as specified in 610.04 respectively.

The Department will not include payment for latex traffic stripes, latex traffic markings lines and latex traffic markings symbols in FOG SEALSURFACE TREATMENT and FOG SEAL STRIP. The Department will pay for latex traffic stripes, latex traffic markings lines and latex traffic markings symbols under TRAFFIC STRIPES, LATEX, TRAFFIC MARKINGS LINES, LATEX and TRAFFIC MARKINGS SYMBOLS, LATEX as specified in 159.04 respectively.

The Department will measure FOG SEAL SURFACE TREATMENT by volume of residual asphalt by converting the quantity of emulsion to the number of gallons at 60 °F as calculated by the temperature-volume correction factors specified in 902.01 and then multiplying by the percent residual asphalt in the emulsion from the certificate of compliance from the manufacturer.

DIVISION 450 – CONCRETE PAVEMENT REHABILITATION

SECTION 452 – PARTIAL DEPTH CONCRETE PAVEMENT REPAIR

452.02.01 Materials
THE FOLLOWING IS ADDED:

Preformed Joint Filler 914.01

452.03.01 Partial Depth Concrete Pavement Repair

A. Preparation.
THE FOLLOWING PARAGRAPH IS ADDED:

Maintain existing joints by placing a 3/8 inch to 1 inch thick preformed joint filler along the joint when constructing partial depth repairs along an existing joint. Multiple layers of preformed joint filler may be required for joints wider than 1 inch.

B. Concrete Placement.
THE FOLLOWING PARAGRAPH IS ADDED:

Do not pave over partial depth repairs until the concrete cures for 7 days.

SECTION 453 – FULL DEPTH CONCRETE PAVEMENT REPAIR

453.03.02 Full Depth Repair Using HMA

C. HMA Placement.
THE ENTIRE TEXT IS CHANGED TO:

Apply tack coat at an application rate of 0.15 gallons per square yard to the vertical surfaces and base of the opening. Spread, and grade HMA surface course mix in the opening as specified for the roadway surface or a HMA surface course mix approved by the RE. Ensure that the temperature of the HMA when placed is at least 250 °F, and compact as specified in 401.03.03.F. Compact areas not accessible to rollers with a flat face compactor. Compact until the top of the repair is flush with, or 1/8 inch higher than, the adjacent pavement surface.

SECTION 455 – DIAMOND GRINDING EXISTING CONCRETE PAVEMENT

455.03.01 Diamond Grinding Existing Concrete Pavement
THE SIXTH PARAGRAPH IS CHANGED TO:

Ensure that the surface, after grinding, meets ride quality requirements.

The Department will evaluate the ride quality of the diamond grinding on the project using the International Roughness Index (IRI) according to ASTM E 1926. The diamond grinding will be evaluated using the target IRI (T) determined from Table 455.03.01-2.

The Department will evaluate the ride quality of the final riding surface of the mainline travel lanes. The Department will use the measured IRI to calculate the pay adjustment (PA) using pay adjustment equation (PAE) type PA1 as specified in Table 455.03.01-1. PA will be based on lots of 0.01 mile length. The PA will be positive for superior quality work or negative for inferior quality work.

For diamond grinding on ramps and shoulders, the RE will visually inspect the final riding surface. Based on visual inspection, if the RE determines that the work may not conform to the ride quality requirements, then the Department will evaluate the ride quality of the final riding surface using IRI. Visual inspection by the RE is considered sufficient grounds for such evaluation. The Department will use the measured IRI to calculate the PA using pay equation type PA2 as specified in Table 455.03.01-1.

1. **Smoothness Measurement.** The Department will test the longitudinal profile of the final riding surface for ride quality with a Class 1 Inertial Profiling System according to NJDOT R-1. If project conditions preclude the use of the Class 1 Inertial Profiling System, the Department will use a Class 1 Walking Profiler or lightweight profiler.

2. **Quality Control Testing**. Perform quality control to ensure compliance with the ride quality requirements specified in Table 455.03.01-2.

3. **Preparation for IRI Testing.** Notify the RE when all diamond grinding is complete and the RE will request IRI testing by Pavement & Drainage Management & Technology (PDMT). Provide traffic control when the Department performs IRI testing. Perform mechanical sweeping of the surface before IRI testing. To facilitate auto triggering on laser profilers, place a single line of temporary pavement marking tape perpendicular to the roadway baseline at the beginning and end of each lane, shoulder, and ramp to be tested or at the direction of the Department. Submit the actual stationing for each temporary pavement marking tape location to the RE.

4. **Quality Acceptance**. The Department will determine acceptance and provide PA based on the following:

   a. **Pay Adjustment.** The acceptable IRI for the roadway pavement will be the target IRI (T) from Table 454.03.02-2 for which full payment will be made and will be determined using the latest available existing current average IRI (C) data of the right most travel lane specified in 102.04 or from PDMT. The number of lots for final pay adjustment will be reduced by the number of lots excluded for each segment shown in Table 455.03.01-1. Lots excluded from final PA will be those with the highest recorded IRI numbers for respective roadway and bridge deck segments. A single average IRI value and the corresponding PA for each 0.01 mile lot will be reported. IRI units are in inches per mile.

Table 455.03.01-1 Pay Equations for Ride Quality

Pay Equation Type	Excluded Lots	Pay Equation(s)	
PA1	As shown in the Special Provisions Table 455.03.01-3	IRI<(T-25) (T-25)≤IRI<(T-5) (T-5)≤IRI≤(T+5) (T+5)<IRI≤(T+75) IRI>(T+75)	PA1= $10 $ (T-IRI-5) x 0.50 PA1=0 -$(IRI-T-5)x1.4286 PA=-$100
PA2	Will include, if tested	IRI ≤ 120 120 < IRI ≤ 170 IRI>170	PA2=$0 PA2 = (IRI − 120) x (−$10.00) Maximum Negative Pay or Corrective action

Table 455.03.01-2 Target IRI for Diamond Grinding

Roadway Type	Target IRI (T)
Freeways or Limited Access Highway	0.45C[1] or 50 whichever is higher
Other than Freeways or Limited Access Highways with speed limit ≥ 35 MPH	0.50C[1] or 60 whichever is higher
Other than Freeways or Limited Access Highways with speed limit < 35 MPH	0.60C[1] or 70 whichever is higher

1. Current average IRI (C) is the average of the latest available preconstruction network level IRI data of right most travel lane from PDMT.

2**********2

SME CONTACT – SEND EMAIL TO PAVEMENT & DRAINAGE MANAGEMENT & TECHNOLOGY UNIT TO PROVIDE THE EXCLUSIONS IN TABLE 455.03.01-3 FOR ROADWAYS WITHIN THE PROJECT

Following Table is added

Table 455.03.01-3 Exclusions for Diamond Grinding

Roadway	Lane Number	Exclusions

Lane designation is by increasing numbers from left to right in the direction of traffic with left lane being Lane 1.

2**********2

   b. **Corrective Action.** If the average IRI is greater than T+75 inches per mile after testing is performed, the Department may require corrective action or assess the maximum negative pay adjustment as computed in Table 455-03-01-1. If the Department requires corrective action submit a plan for corrective action. If the plan for corrective action is approved and the lot is corrected, the Department will retest and evaluate the corrected area as a new lot that must meet the same requirements as the initial work. If the plan for corrective action is not approved, the Department may require removal and replacement. The replacement work is subject to the same requirements as the initial work.

When regrinding to correct deficiencies is required, regrind the entire width of the lane in the area to be corrected.

SECTION 456 – SEALING EXISTING JOINTS IN CONCRETE PAVEMENT

456.03.01 Sealing Existing Joints in Concrete Pavement

THE FOLLOWING SENTENCE IS ADDED TO THE BEGINNING OF THE FIRST PARAGRAPH:

If diamond grinding is specified, perform diamond grinding prior to sealing joints.

THE LAST PARAGRAPH IS CHANGED TO:

Do not allow traffic over the sealed joints until the joint sealer has hardened to resist pickup.

DIVISION 900 – MATERIALS

SECTION 902 – ASPHALT

902.08.01 Composition of Mixture
THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

Mix HPTO in a plant that is listed on the QPL and conforms to the requirements for HMA Plants as specified in 1009.01. The composition of the mixture for HPTO is coarse aggregate, fine aggregate, and asphalt binder, and may also include mineral filler and a WMA additive. Do not use Reclaimed Asphalt Pavement (RAP), Ground Bituminous Shingle Material, Remediated Petroleum Contaminated Soil Aggregate, or Crushed Recycled Container Glass (CRCG). Use asphalt binder and aggregates that meet the following requirements:

1. Use polymer modified asphalt binder that is specially formulated for meeting the mix performance criteria in this specification. Consult with the asphalt binder supplier to obtain the appropriate material for the specific mix design. Submit a certificate of analysis (COA) showing the PG continuous grading (AASHTO R 29) for the asphalt binder used in the mix design.

   For quality assurance testing of the asphalt binder, the ME may sample the asphalt binder during production of the mix and compare the results with the COA submitted at the time of test strip. To analyze the binder the ME will test the binder at the nearest standard PG temperature then compare the results with the COA. If the high ($G^*/ \sin \delta$) and low (stiffness and m value) temperature passing test results are within 5 percent of the results from the passing temperature on the COA, then the ME will consider the asphalt binder comparable to the binder used during test strip.

2. WMA additives may be used in the mix and must conform to 902.01.05. If a WMA additive is pre-blended in the asphalt binder or added at the HMA plant, ensure that the mix meets the mix performance criteria in this specification and will not be negatively impacted by the WMA additive. Follow the manufacturer's recommendations for percentage of WMA additive needed. Controlled asphalt foaming system WMA is prohibited for use in this mixture.

3. Use coarse aggregate that is gneiss, granite, quartzite, or trap rock and conforms to 901.05.01.

4. For fine aggregate, use 100 percent stone sand conforming to 901.05.02 and having an uncompacted void content of at least 45 percent when tested according to AASHTO T 304, Method A. In addition, the minimum sand equivalent is 45 percent when tested according to AASHTO T 176.

5. If necessary, use mineral filler as specified in 901.05.03.

902.08.02 Mix Design
THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

At least 45 days before initial production, submit a job mix formula for the HPTO on forms supplied by the Department. Include a statement naming the source of each component and a report showing the results meet the criteria specified in Tables 902.08.02-1 and 902.08.02-2.

For the job mix formula for the HPTO mixture, establish the percentage of dry weight of aggregate passing each required sieve size and an optimum percentage of asphalt binder based upon the weight of the total mix. Determine the optimum percentage of asphalt binder according to AASHTO R 35 and M 323 with an Ndes of 50 gyrations. Before maximum specific gravity testing or compaction of specimens, condition the mix for 2 hours according to the requirements for conditioning for volumetric mix design in AASHTO R 30, Section 7.1. If the absorption of the combined aggregate is more than 1.5 percent according to AASHTO T 84 and T 85, condition the mix for 4 hours according to AASHTO R 30, Section 7.2 prior to compaction of specimens (AASHTO T 312) and determination of maximum specific gravity (AASHTO T 209). Ensure that the job mix formula is within the master range specified in, Table 902.08.02-1.

Table 902.08.02-1 JMF Requirements for HPTO

Sieve Sizes	Percent Passing1	Production Control Tolerances2
3/8"	100	±0.0%
No. 4	65-85	±4.0%
No. 8	33-55	±4.0%

No. 16	20-35	±3.0%
No. 30	15-30	±3.0%
No. 50	10-20	±2.0%
No. 100	5-15	±2.0%
No. 200	5.0-8.0	±1.0%
Asphalt Binder Content (Ignition Oven)[3]	7.4 % minimum	±0.30%

1. Aggregate percent passing to be determined based on dry aggregate weight.
2. Production tolerances are for the approved JMF and may not fall outside of the wide band gradation limits.
3. The asphalt binder content may not be lower than the minimum after the production tolerance is applied.

Design the HPTO to meet the requirements in Table 902.08.02-2.

Table 902.08.02-2 Volumetric Requirements for Design and Control of HPTO

	Required Density (% of Max. Sp. Gr.)		Voids in Mineral Aggregate	Dust to Binder Ratio	Draindown AASHTO T 305
	N_{des} (50 gyrations)	N_{max} (100 gyrations)	(VMA)		
Design Requirements	96.5	≤ 99.0	≥ 18.0 %	0.6 - 1.2	≤ 0.1 %
Control Requirements	95.5 - 97.5	≤ 99.0	≥ 18.0 %	0.6 – 1.3	≤ 0.1 %

Ensure that the job mix formula provides a mixture that meets a minimum tensile strength ratio (TSR) of 85 percent when prepared according to AASHTO T 312 and tested according to AASHTO T 283 with the following exceptions:

1. Before compaction, condition the mixture for 2 hours according to AASHTO R 30 Section 7.1.
2. Compact specimens with 40 gyrations.
3. Extrude specimens as soon as possible without damaging.
4. Use AASHTO T 269 to determine void content.
5. Record the void content of the specimens.
6. If less than 55 percent saturation is achieved, the procedure does not need to be repeated, unless the difference in tensile strength between duplicate specimens is greater than 25 pounds per square inch.
7. If visual stripping is detected, modify or readjust the mix.

For each mix design, submit 3 gyratory specimens and one loose sample corresponding to the composition of the job mix formula, including the design asphalt content. The ME will use these samples for verification of the properties of the job mix formula. Compact the specimens to the design number of gyrations (Ndes). To be acceptable all three gyratory specimens must comply with the gradation and asphalt content requirements in Table 902.08.02-1 and with the control requirements in Table 902.08.02-2. The ME reserves the right to be present at the time of molding the gyratory specimens.

In addition, submit 11 gyratory specimens and two 5 gallon buckets of loose mix to the ME. The ME will use these additional gyratory samples for performance testing of the HPTO mix. The ME reserves the right to be present at the time of molding the gyratory specimens. Ensure that the additional gyratory specimens are compacted according to AASHTO T 312. Compact 6 of the specimens to 77 millimeters in height and an air void content of 5.0 ± 0.5 percent. The ME will test the six 77 millimeter specimens using an Asphalt Pavement Analyzer (APA) according to AASHTO T 340 at 64 °C, 100 pound per square inch hose pressure, and 100 pound wheel load. Compact the other 5 specimens to 115 millimeter in height. These 5 specimens will be cut, from the middle of each 115 millimeter in height specimen, to 38 millimeter in height test specimens. The air void content of the 5 cut specimen will be determined to ensure compliance with the target air void content of 5.0 ± 0.5 percent. The ME will use the five 38 millieter in height specimens to test using an Overlay Tester (NJDOT B-10) at 25 °C and a joint opening of 0.025 inch. The ME will eliminate the high and low Overlay test results then average and report the middle 3 test results. The ME will ensure that all submitted specimens are within the target air void content as tested at the Material's Central Lab. The ME will not accept specimens lower than the target air void content, but may accept and test specimens higher than the target air void content.

The ME will approve the JMF if the average rut depth for the 6 specimens in the Asphalt Pavement Analyzer testing is not more than 4 millimeter in 8,000 loading cycles and the average number of cycles to failure in the Overlay Tester is not less than 600. If the JMF does not meet the APA and Overlay Tester criteria, redesign the HPTO mix and submit for retesting. The JMF for the HPTO mixture is in effect until modification is approved by the ME. If required, the ME may

use the 5 gallon buckets of the loose HPTO mix to compact additional gyratory specimens for performance testing and the performance test results may be used for approval of the JMF.

When unsatisfactory results for any specified characteristic of the work make it necessary, the Contractor may establish a new JMF for approval. In such instances, if corrective action is not taken, the ME may require an appropriate adjustment to the JMF.

Should a change in sources or changes in the properties of materials occur, the ME will require that a new JMF be established and approved before production can continue.

The ME may verify a mix on an annual basis rather than on a project-to-project basis if the properties and proportions of the materials do not change. If written verification is submitted by the HMA supplier that the same source and character of materials are to be used, the ME may waive the requirement for the design and verification of previously approved mixes.

902.08.03 Sampling and Testing

THE ENTIRE TEXT AS APPEARS IN THE SI IS CHANGED TO:

A. General Acceptance Requirements. The RE or ME may reject and require disposal of any batch or shipment that is rendered unfit for its intended use due to contamination, segregation, improper temperature, lumps of cold material, or incomplete coating of the aggregate. For other than improper temperature, visual inspection of the material by the RE or ME is considered sufficient grounds for such rejection.

Ensure that the temperature of the HPTO at discharge from the plant or surge and storage bins is maintained between 300 and 330 °F. For mixes produced using a WMA additive or process, ensure that the temperature of the mixture at discharge from the plant or surge and storage bins is at least 10 °F above the WMA manufacturer's recommended laydown temperature.

Combine and mix the aggregates and asphalt binder to ensure that at least 95 percent of the coarse aggregate particles are entirely coated with asphalt binder as determined according to AASHTO T 195. If the ME determines that there is an on-going problem with coating, the ME may obtain random samples from 5 trucks and will determine the adequacy of the mixing on the average of particle counts made on these 5 test portions. If the requirement for 95 percent coating is not met on each sample, modify plant operations, as necessary, to obtain the required degree of coating.

B. Sampling. The ME will take a sample of HPTO for volumetric acceptance testing from each 700 tons of a mix. The ME will perform sampling according to AASHTO T 168, NJDOT B-2, or ASTM D 3665.

C. Quality Control Testing. The HMA producer is required to provide a quality control (QC) technician who is certified by the Society of Asphalt Technologists of New Jersey as an Asphalt Technologist, Level 2. The QC technician may substitute equivalent technician certification by the Mid-Atlantic Region Technician Certification Program (MARTCP). Ensure that the QC technician is present during periods of mix production for the sole purpose of quality control testing and to assist the ME. The ME will not perform the quality control testing or other routine test functions in the absence of, or instead of, the QC technician.

The QC technician is required to perform sampling and testing according to the approved quality control plan, to keep the mix within the limits specified for the HPTO mix being produced. The QC technician may use acceptance test results or perform additional testing as necessary to control the mix.

To determine the composition, perform ignition oven testing according to AASHTO T 308. For each acceptance test, perform maximum specific gravity testing according to AASHTO T 209 on a test portion of the sample taken by the ME. Sample and test coarse aggregate, fine aggregate, mineral filler, and asphalt binder according to the approved quality control plan for the plant.

D. Acceptance Testing and Requirements. The ME will determine volumetric properties at N_{des} for acceptance from samples taken, compacted, and tested at the HMA plant. The ME will compact HPTO to 50 gyrations, using equipment according to AASHTO T 312. The ME will determine bulk specific gravity of the compacted sample according to AASHTO T 166. The ME will use the most current QC maximum specific gravity test result in calculating the volumetric properties of the HPTO.

The ME will determine the dust-to-binder ratio from the composition results as tested by the QC technician.

Ensure that the HMA mixture conforms to the requirements specified in Table 902.08.02-2, and to the gradation requirements in Table 902.08.02-1. If 2 samples in 5 consecutive samples fail to conform to the gradation or volumetric requirements, immediately initiate corrective action.

The ME will test a minimum of 1 sample per 3500 tons for moisture, basing moisture determinations on the weight loss of an approximately 1600 gram sample of mixture heated for 1 hour in an oven at 280 ± 5 °F. Ensure that the moisture content of the mixture at discharge from the plant does not exceed 1.0 percent.

E. Performance Testing. Provide 11 gyratory specimens that are compacted according to AASHTO T 312 and 2 boxes of loose mix. Compact 6 of the specimens to 77 millimeter in height and an air void content of 5.0 ± 0.5 percent. Compact the other 5 specimens to 115 millimeter in height. These 5 specimens will be cut, from the middle of each 115 millimeter in height specimen, to 38 millimeter in height test specimens. The air void content of the 5 cut test specimens will be determined to ensure compliance with the target air void content of 5.0 ± 0.5 percent.

The ME will use the boxes of loose mix to determine the maximum specific gravity of the mix according to AASHTO T 209. The ME will use the gyratory samples for performance testing of the HPTO mix. The ME will test six 77 millimeter in height specimens using an Asphalt Pavement Analyzer (APA) according to AASHTO T 340 at 64 °C, 100 pound per square inch hose pressure, and 100 pound wheel load. The ME will use the five 38 millimeter in height specimens to test using an Overlay Tester (NJDOT B-10) at 25 °C and a joint opening of 0.025 inch. The ME will eliminate the high and low Overlay test result then average and report the middle 3 test results. The ME will ensure that all submitted specimens are within the target air void content as tested at the Material's Central Lab. The ME will not accept specimens lower than the target air void content, but may accept and test specimens higher than the target air void content.

Ensure that the first sample is taken during the construction of the test strip as specified in 406.03.01.C. Thereafter, sample every lot or as directed by the ME. If the test strip is done within the project limits and the performance testing results are acceptable to the ME, the results will be included into the first lot. A lot is defined as material placed on the traveled way within the project limits.

If a sample does not meet the criteria for performance testing as specified in Table 902.08.03-1, the Department will assess a pay adjustment as specified. The Department will calculate the pay adjustment by multiplying the percent pay adjustment (PPA) by the quantity in the lot and the bid price for the HPTO item. If APA rutting is greater than 12 millimenters or Overlay cycles is less than 400 or both, the Department will assess the maximum pay adjustment of PPA = -100 percent or may require removal and replacement. PPA for both APA and Overlay are cumulative and may not exceed -100 percent in total. If samples received are lower than the target air void range, 5.0 ± 0.5 percent, the Department will consider the samples un-testable and assess a PPA of -100 percent or may require removal and replacement of the lot. If the Department requires removal and replacement, then the replacement work is subject to the same requirements as the initial work.

Table 902.08.03-1 Performance Testing Pay Adjustments for HPTO

Test	Requirement	Test Result	PPA
APA @ 8,000 loading cycles, mm (AASHTO T 340)	5.0 maximum	$t \leq 5.0$	0
		$5.0 < t \leq 12.0$	-50(t-5)/7
		$t > 12.0$	-100 or Remove & Replace
Overlay Tester, cycles (NJDOT B-10)	600 minimum	$t \geq 600$	0
		$600 > t \geq 400$	-(600-t)/4
		$t < 400$	-100 or Remove & Replace

THE FOLLOWING SUBSECTION IS ADDED:

902.11 BINDER RICH INTERMEDIATE COURSE (BRIC)

902.11.01 Composition of Mixture.

Mix BRIC in a plant that is listed on the QPL and conforms to the requirements for HMA plants as specified in 1009.01. The composition of the BRIC mixture is coarse aggregate, fine aggregate, polymer modified asphalt binder, and may also include mineral filler, and crumb rubber. Do not add Reclaimed Asphalt Pavement (RAP), Crushed Recycled Container Glass (CRCG), Ground Bituminous Shingle Material (GBSM), or Remediated Petroleum Contaminated Soil Aggregate (RPCSA). Use asphalt binder and aggregates that meet the following requirements:

1. Use polymer modified asphalt binder that is specially formulated for meeting the mix performance criteria in this specification. Consult with the asphalt binder supplier to obtain the appropriate material for the specific mix design. Submit a certificate of analysis (COA) showing the PG continuous grading (AASHTO R 29) for the asphalt binder used in the mix design.

For quality assurance testing of the asphalt binder, the ME may sample the asphalt binder during production of the mix and compare the results with the COA submitted at the time of test strip. To analyze the binder the ME will test the binder at the nearest standard PG temperature then compare the results with the COA. If the high ($G^*/\sin\delta$) and low (stiffness and m value) temperature passing test results are within 5 percent of the results from the passing temperature on the COA, then the ME will consider the asphalt binder comparable to the binder used during test strip.

2. For coarse aggregate in BRIC, use crushed stone conforming to 901.05.01.

3. For fine aggregate, use stone sand conforming to 901.05.02. Ensure that the combined fine aggregate in the mixture conforms to the requirements for compaction level M as specified in Table 902.02.02-2.

4. Use mineral filler, if necessary, that conforms to 901.05.03.

902.11.02 Mix Design

At least 45 days before initial production, submit a job mix formula for the BRIC on forms supplied by the Department, to include a statement naming the source of each component and a report showing that the results meet the criteria specified in Tables 902.11.03-1 and 902.11.03-2.

The job mix formula for the BRIC mixture establishes the percentage of dry weight of aggregate passing each required sieve size and an optimum percentage of asphalt binder based upon the weight of the total mix. Determine the optimum percentage of asphalt binder according to AASHTO R 35 and M 323 with an Ndes of 50 gyrations. Before maximum specific gravity testing or compaction of specimens, condition the mix for 2 hours according to the requirements for conditioning for volumetric mix design in AASHTO R 30, Section 7.1. If the absorption of the combined aggregate is more than 1.5 percent according to AASHTO T 84 and T 85, ensure that the mix is short term conditioned for 4 hours according to AASHTO R 30, Section 7.2 prior to compaction of specimens (AASHTO T 312) and determination of maximum specific gravity (AASHTO T 209). Ensure that the job mix formula is within the master range specified in Table 902.11.03-1.

Ensure that the job mix formula provides a mixture that meets a minimum tensile strength ratio (TSR) of 85 percent when prepared according to AASTHO T 312 and tested according to AASHTO T 283 with the following exceptions:

1. Before compaction, condition the mixture for 2 hours according to AASHTO R 30 Section 7.1.
2. Compact specimens with 40 gyrations.
3. Extrude specimens as soon as possible without damaging.
4. Use AASHTO T 269 to determine void content.
5. Record the void content of the specimens.
6. If less than 55 percent saturation is achieved, the procedure does not need to be repeated, unless the difference in tensile strength between duplicate specimens is greater than 25 pounds per square inch.
7. Report any visual stripping in accordance with AASHTO T 283 Section 11, modify or readjust the mix if stripping is evident.

For each mix design, submit with the mix design forms 3 gyratory specimens and 1 loose sample corresponding to the composition of the JMF. The ME will use these to verify the properties of the JMF. Compact the specimens to the design number of gyrations (Ndes). For the mix design to be acceptable, all gyratory specimens must comply with the requirements specified in Tables 902.11.03-1 and 902.11.03-2. The ME reserves the right to be present at the time the gyratory specimens are molded.

In addition, submit 11 gyratory specimens and two 5 gallon buckets of loose mix to the ME. The ME will use these additional gyratory samples for performance testing of the BRIC mix. The ME reserves the right to be present at the time of molding the gyratory specimens. Ensure that the 6 gyratory specimens are compacted according to AASHTO T 312, are 77 millimeters high, and have an air void content of 3.5 ± 0.5 percent. The ME will test 6 specimens using an Asphalt Pavement Analyzer (APA) according to AASHTO T 340 at 64 °C, 100 pound per square inch hose pressure, and 100 pound wheel load. Compact the other 5 specimens to 115 millimemters in height. These 5 specimens will be cut, from the middle of each 115 millimeters in height specimen, to 38 millimeters in height test specimens. The air void content of the 5 cut specimen will be determined to ensure compliance with the target air void content of 3.5 ± 0.5 percent. The ME will use the five 38 millimeters in height specimens to test using an Overlay Tester (NJDOT B-10) at 25 °C and a joint opening of 0.025 inch. The ME will eliminate the high and low Overlay test results then average and report the middle 3 test results. The ME will ensure that all submitted specimens are within the target air void content as tested at the Material's Central Lab.

The ME will approve the JMF if the average rut depth for the 6 specimens in the asphalt pavement analyzer testing is not more than 6 mm in 8,000 loading cycles and the number of cycles to failure in the Overlay Tester is not less than 700. If

the JMF does not meet the APA and Overlay Tester criteria, redesign the BRIC mix and submit for retesting. The JMF for the BRIC mixture is in effect until modification is approved by the ME.

When unsatisfactory results for any specified characteristic of the work make it necessary, the Contractor may establish a new JMF for approval. In such instances, if corrective action is not taken, the ME may require an appropriate adjustment to the JMF.

Should a change in sources be made or any changes in the properties of materials occur, the ME will require that a new JMF be established and approved before production can continue.

The ME may verify a mix on an annual basis rather than on a project-to-project basis if the properties and proportions of the materials do not change. If written verification is submitted by the HMA supplier that the same source and character of materials are to be used, the ME may waive the requirement for the design and verification of previously approved mixes.

902.11.03 Sampling and Testing

A. General Acceptance Requirements. The RE or ME may reject and require disposal of any batch or shipment that is rendered unfit for its intended use due to contamination, segregation, improper temperature, lumps of cold material, or incomplete coating of the aggregate. For other than improper temperature, visual inspection of the material by the RE or ME is considered sufficient grounds for such rejection.

For BRIC, ensure that the temperature of the mixture at discharge from the plant or surge and storage bins is at least 10 °F above the manufacturer's recommended laydown temperature. Do not allow the mixture temperature to exceed 330 °F at discharge from the plant.

Combine and mix the aggregates and asphalt binder to ensure that at least 95 percent of the coarse aggregate particles are entirely coated with asphalt binder as determined according to AASHTO T 195. If the ME determines that there is an on-going problem with coating, the ME may obtain random samples from 5 trucks and will determine the adequacy of the mixing on the average of particle counts made on these 5 test portions. If the requirement for 95 percent coating is not met on each sample, modify plant operations, as necessary, to obtain the required degree of coating.

B. Sampling. The ME will take a sample of BRIC for volumetric acceptance testing from each 700 tons. The ME will perform sampling according to AASHTO T 168, NJDOT B-2, or ASTM D 3665.

C. Quality Control Testing. The HMA producer shall provide a quality control (QC) technician who is certified by the Society of Asphalt Technologists of New Jersey as an Asphalt Technologist, Level 2. The QC technician may substitute equivalent technician certification by the Mid-Atlantic Region Technician Certification Program (MARTCP). Ensure that the QC technician is present during periods of mix production for the sole purpose of quality control testing and to assist the ME. The ME will not perform the quality control testing or other routine test functions in the absence of, or instead of, the QC technician.

The QC technician shall perform sampling and testing according to the approved quality control plan, to keep the mix within the limits specified in Tables 902.11.03-1, 902.11.03-2, and 902.11.03-4. The QC technician may use acceptance test results or perform additional testing as necessary to control the mix.

To determine the composition, perform ignition oven testing according to AASHTO T 308. For fully automated plants, the QC technician may determine composition using hot bin analysis according to NJDOT B-5. Use only one method for determining composition within a lot.

D. Acceptance Testing and Requirements. The ME will determine volumetric properties at N_{des} for acceptance from samples taken, compacted, and tested at the HMA plant. The ME will compact HMA to the number of design gyrations (N_{des}) of 50 gyrations, using equipment according to AASHTO T 312. The ME will determine bulk specific gravity of the compacted sample according to AASHTO T 166. The ME will use the most current QC maximum specific gravity test result in calculating the volumetric properties of the HMA.

The ME will determine the dust-to-binder ratio from the composition results as tested by the QC technician.

Ensure that the HMA mixture conforms to the requirements specified in Table 902.11.03-2 and to the gradation requirements in Table 902.11.03-1. If 2 samples in a lot fail to conform to the gradation or volumetric requirements, immediately initiate corrective action.

The ME will test a minimum of 1 sample per lot for moisture, basing moisture determinations on the weight loss of an approximately 1600 gram sample of mixture heated for 1 hour in an oven at 280 ± 5 °F. Ensure that the moisture content of the mixture at discharge from the plant does not exceed 1.0 percent.

E. Performance Testing. Provide 11 gyratory specimens and 2 box samples of loose mix to the ME. The ME will use these additional gyratory samples for performance testing of the BRIC mix. The ME reserves the right to be present at the time of molding the gyratory specimens. Ensure that the 6 gyratory specimens are compacted according to AASHTO T 312, are 77 millimeters high, and have an air void content of 3.5 ± 0.5 percent. The ME will test 6 specimens using an Asphalt Pavement Analyzer (APA) according to AASHTO T 340 at 64 ºC, 100 pound per square inch hose pressure, and 100 pound wheel load. Compact the other 5 specimens to 115 millimeters in height. These 5 specimens will be cut, from the middle of each 115 millimeters height specimen, to 38 millimeters in height test specimens. The air void content of the 5 cut specimen will be determined to ensure compliance with the target air void content of 3.5 ± 0.5 percent. The ME will use the five 38 millimeters in height specimens to test using an Overlay Tester (NJDOT B-10) at 25 °C and a joint opening of 0.025 inch. The ME will eliminate the high and low Overlay test results then average and report the middle 3 test results. The ME will use the boxes of loose mix to determine the maximum specific gravity of the mix according to AASHTO T 209. The ME will ensure that all submitted specimens are within the target air void content as tested at the Material's Central Lab.

Ensure that the first sample is taken during the construction of the test strip as specified in 409.03.01.C. Thereafter, sample every second lot or as directed by the ME. If a sample does not meet the design criteria for performance testing as specified in Table 902.11.03-4, the ME may stop production of BRIC until corrective action is taken. If the BRIC mix exceeds the APA criteria of 12 millimeters in 8,000 loading cycles, the RE may require removal and replacement of the lot of BRIC.

Table 902.11.03-1 JMF Requirements for BRIC

Sieve Sizes	Percent Passing[1]	Production Control Tolerances[2]
3/8"	100	±0%
No. 4	90-100	±2%
No. 8	55-90	±4%
No. 30	20-55	±4%
No. 200	4-10	±2%
Asphalt Binder Content (Ignition Oven)[3]	7.4 % minimum	±0.40%
Maximum Lift Thickness	1.5 inch	

1. Aggregate percent passing to be determined based on dry aggregate weight.
2. Production tolerances are for the approved JMF and may fall outside of the wide band gradation limits.
3. The asphalt binder content may not be lower than the minimum after the production tolerance is applied.

Table 902.11.03-2 Volumetric Requirements for Design and Control of BRIC

	Required Density (% of Max Sp. Gr.) @ Ndes (50 gyrations)	@ Nmax (100 gyrations)	Voids in Mineral Aggregate (VMA)	Dust to Binder Ratio	Draindown AASHTO T 305
Design Requirements	97.5	≤ 99.0	≥ 18.0 %	0.6 – 1.2	≤ 0.1 %
Control Requirements	96.5 – 98.5	≤ 99.0	≥ 18.0 %	0.6 – 1.3	≤ 0.1 %

Table 902.11.03-3 Mix Design Performance Testing Requirements for BRIC

Test	Requirement
Asphalt Pavement Analyzer (AASHTO T 340)	≤ 6 mm@ 8,000 loading cycles
Overlay Tester (NJDOT B-10)	≥700 cycles

Table 902.11.03-4 Production Performance Testing Requirements for BRIC

Test	Requirement
Asphalt Pavement Analyzer (AASHTO T 340)	≤ 7 mm@ 8,000 loading cycles
Overlay Tester (NJDOT B-10)	≥ 650 cycles

DIVISION 1000 – EQUIPMENT

SECTION 1008 – MISCELLANEOUS EQUIPMENT

1008.01 MILLING MACHINE

THIS SUBSECTION IS CHANGED TO:

A **Standard Milling Machine.** Provide a self-propelled planing, grinding, or cutting milling machine with variable operating speeds that is capable of removing HMA or concrete without the use of heat. Ensure that the milling machine is equipped with automatic grade controls. Use either a stringline or ski type reference system. If a ski type reference system is used, ensure that the ski has a minimum length of 20 feet. Ensure that the milling machine is equipped with an automatic audible warning signal when operating in reverse. The RE may not require use of the automatic grade controls at intersections and other locations.

Immediately replace teeth in the milling drum that become dislodged, broken, or unevenly worn with teeth of the same length as the remaining teeth in that row.

B **Micro-Milling Machine.** Provide a standard milling machine as specified in 1008.01.A that is equipped with a cutting mandrel designed specifically for cold planing and texturing asphalt and concrete pavement surfaces to close tolerances as defined herein. Ensure that the cutting mandrel is equipped with four wraps of flighting with blocks that bolt in, each accepting 3 to 4 carbide or polycrystalline diamond (PCD) tipped cutting bits on the wear side of the flight. The cutting bits on the wraps at 0 degrees and 180 degrees repeat each other. Likewise the cutting bits at 90 degrees and 270 degrees also repeat each other, creating a double hit cutting mandrel. Ensure that tips of the cutting bits, on any given wrap, are spaced at a maximum of 1/4 inch axial distance between the tips of each bit, plus or minus of 1/32 inch. Repeat the cutting bits on the second wrap to the proceeding wrap at 1/4 inch maximum.

Ensure that the cutting bits and height of the holder blocks are uniform so that the cutting radius of the mandrel is within plus or minus of 0.02 inch. Ensure that the blocks are completely machined and capable of being easily removed from the cutting mandrel to check tolerance and height of the holders.

Ensure that the equipment used does not cause strain or damage to the underlying pavement surface course, causes excessive ravel, aggregate fractures, spalls or disturbance of the transverse or longitudinal joints.

Replace cutting bits that become dislodged, broken, or unevenly worn. When only changing intermittent cutting bits, remove an existing "sample" cutting bit from the machine and measure amount of wear and gage height. Ensure that replacement bit is matched to existing height of the "sample" cutting bit, plus or minus of 1/32 inch, to insure even micro-milling.

NJDOT TEST METHODS

NJDOT R-1 – OPERATING INERTIAL PROFILER SYSTEMS FOR EVALUATING PAVEMENT PROFILES

THE TITLE AND ENTIRE TEXT IS CHANGED TO:

NJDOT R-1 – DETERMINING RIDE QUALITY OF PAVEMENT SURFACES

A. Scope. This test method is used to determine the ride quality of a pavement surface using a Class 1 Inertial Profiler System (IPS). If any part of this test procedure is in conflict with the referenced documents, such as ASTM or AASHTO standards, this test procedure takes precedence for its purpose.

B. Apparatus. Use the following apparatus:

1. Class 1 IPS that meets the requirements of ASTM E 950, Sections 4.0, 5.0 and 6.0 of AASHTO M 328, and the following:
    a. Valid certification approved by the Department.
    b. The data system provides the raw profile data in an ASCII format acceptable to the Department.
    c. Current version of *ROADRUF*, *ProVal*, or other Department approved pavement profile analysis software installed on the IPS computer to compute the IRI.
2. Base plate and gauge blocks, of 1 inch and 2 inch thickness, provided by the manufacturer to verify daily vertical calibration.
3. Retro-reflective traffic marking tape or other approved mechanism to automatically trigger the start and stop of profile measurements.

C. Procedure. Perform the following steps:

1. Turn on the inertial profiler and warm up all electronic equipment in accordance with the manufacturer recommendations in advance of testing.
2. Perform Block and Bounce tests each day prior to collecting data. Record the results in the calibration log. Ensure tolerances are within the certified limits.
3. Ensure retro-reflective traffic marking tape or other approved mechanism is placed at the beginning and end of each direction of travel lane.
4. Enter project information in the system.
5. Make provisions to start and stop recording profile at the beginning and end of testing. If automatic trigger mechanism is not install, make provision to initiate start and end data recording manually by pressing a specific key on the computer.
6. Ensure that the required speed is achieved and system is collecting profile data prior to recording profile.
7. For each test section, perform three test runs to collect data of both wheel paths of each lane in the longitudinal direction of travel. The wheel path is defined as being located approximately 3 feet on each side of the centerline of the lane and extending for the full length of the lane. Lanes are defined by striping.
8. Save data from each run separately prior to subsequent run or lane testing, clearly identifying each test section, lane identification, and run number.

D. Report. Generate an electronic report in excel format, compatible with the Department's version, of continuous IRI for each 0.01 mile lot after applying 300 feet high-pass filter. The report shall contain the following information:

1. Date of testing, IPS identification number used for testing, and name of operator.
2. Route, milepost location, direction, lane identification, run number, IRI of each wheel path, and average speed.