

**Date:** August 5, 2015  
**To:** MAG Specifications and Details Committee  
**From:** Jeff Benedict, Chairman MAG Asphalt Working Group  
**Subject:** Revisions to Sections 321

**Case # 15-09**

**PURPOSE:** Incorporate revisions to Section 321, "*PLACEMENT AND CONSTRUCTION OF ASPHALT CONCRETE PAVEMENT*" into the MAG Specifications.

**REVISIONS:**

- 321.8.4 - Removed placement temperature table and replaced with simple minimum placement temperature of 265 °F. Existing table was too complex and difficult to implement. Current approach can result in required minimum mix temperature changing multiple times during the day depending on environmental and weather conditions. This could result in mix being rejected which was produced at the plant based on original project conditions which then change during transport. Also, temperature measuring devices being used on underlying base (infrared guns) are only accurate to approximately  $\pm 20$  °F, potentially resulting in incorrect mix temperature being required.
- 321.10.2 - Added and/or revised wording for binder content and laboratory air voids to indicate that Contractor must obtain the approval of the Engineer to perform additional coring to determine the limits or extent of a deficiency.
- 321.10.4 - Added and/or revised wording for pavement thickness to incorporate MCDOT sponsored changes approved by Asphalt Working Group.
- 321.10.5.2- Added wording to indicate that acceptable in-place air voids must fall within a range; i.e. there is both a lower and upper limit.
- 321.10.5.2- Deleted note from Table 321-5 related to in-place air voids since this table is intended to address Laboratory air voids only.
- 321.10.5.2- Revised wording for additional coring to correctly reflect intent of verifying a deficient in-place air void test result.
- 321.10.5.2- Also added and/or revised wording to indicate that Contractor must obtain the approval of the Engineer to perform additional coring to determine the limits or extent of a deficiency.
- 321.10.5.2- Deleted note from Table 321-8 and moved information into table itself to improve clarity.
- 321.10.5.2- Deleted parentheses, space, and colon from heading of column 3 of Table 321-8 to match formatting in rest of Section 321.

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case of the screed, auger extensions and vibrators shall be installed wherever the screed is extended more than one (1) foot beyond the end of the base auger or auger extension. However, when placing material against an extremely uneven curb or edge over a short distance, the Engineer may waive the auger extensions and vibrators.

At any place not accessible to the roller, the mixture shall be thoroughly compacted with tampers to provide a uniform and smooth layer over the entire area compacted in this manner.

**321.8.2 Joints:** Transverse joints, before a surface course is placed in contact with a cold transverse construction joint, the cold existing asphalt concrete shall be trimmed to a vertical face for its full depth exposing a fresh face. The fresh face shall be tack coated prior to placement of the new asphalt concrete. After placement and finishing the new asphalt concrete, both sides of the joint shall be dense and the joint shall be smooth and tight. The surface in the area of the joint shall not deviate more than 1/4 inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, parallel to the centerline.

Longitudinal joints of each asphalt course shall be staggered a minimum of 6 inches with relation to the longitudinal joint of the immediate underlying course's cold longitudinal construction joint.

Longitudinal joints with existing or cold (more than 32 hours old) asphalt concrete shall require the existing pavement to be trimmed to a vertical face for its full depth exposing a fresh face. The fresh face shall be tacked prior to placement of the adjacent course. Longitudinal joints with an existing asphalt pavement that is less than 32 hours old that has had its edge protected from damage may have adjacent new asphalt concrete placed after applying the required tack coat. After placement and finishing of longitudinal joints, both sides of the joint shall be dense and the joint shall be smooth and tight. The surface in the area of the joint shall not deviate more than 1/4 inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, in any direction.

**321.8.3 Asphalt Leveling Course:** A leveling course shall be used when specified, or as directed in writing by the Engineer, to bring existing pavement to a uniform grade prior to placing an overlay or other course. If a leveling course is being applied on an Asphalt surface, a tack coat shall be applied. The compaction requirements contained in Section [321.10](#) do not apply to leveling courses.

**321.8.4 Compaction; Asphalt Base Course and Surface Course:** It is the contractor's responsibility to perform Quality Control monitoring and/or testing during compaction operations to achieve the required compaction. The temperature of the asphalt concrete immediately behind the laydown machine shall ~~meet the minimum requirements of Table 321-2 be at least 265 °F,~~ unless WMA technology is being used. If WMA technology is being used then the minimum requirements will be stated within the mix design recommended by the WMA manufacturer. A probe type electronic thermometer with a current calibration sticker attached will be used to measure the temperature of the asphalt concrete mixture. When measuring the temperature of the mat, the probe shall be inserted at mid-depth and as horizontal as possible to the mat. ~~The minimum temperatures in Table 321-2 do not guarantee that the asphalt mix will be compacted to the required density.~~ The contractor is responsible to achieve the required compaction.

<b>TABLE 321-2</b>						
<b>MINIMUM ASPHALT CONCRETE PLACEMENT TEMPERATURE</b>						
Base <sup>(1)</sup> Temp (°F)	Mat Thickness (inches)					
	1/2	3/4	1	1-1/2	2	3 and greater
40—50	—	—	310	300	285	275
50—60	—	310	300	295	280	270
60—70	310	300	290	285	275	265
70—80	300	290	285	280	270	265
80—90	290	280	270	270	265	260
+90	280	275	265	265	260	255

~~—(1) Base on which mix is to be placed~~

Asphalt compaction equipment shall be of sufficient size and weight to accomplish the required compaction. All compaction equipment shall be operated and maintained in accordance with the manufacturer's recommendations and the project requirements. During the rolling operation, the speed of the roller shall not exceed 3 miles per hour, unless otherwise approved by the Engineer.

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<b>TABLE 321-3A</b>				
<b>GRADATION ACCEPTANCE LIMITS FOR MARSHALL MIXES</b>				
Sieve Size	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	Base Mix
1 inch	---	---	---	±7%
3/4 inch	---	---	±7%	±6%
1/2 inch	---	±7%	---	---
3/8 inch	±7%	±6%	±6%	±6%
No. 8	±6%	±6%	±6%	±6%
No. 40	±4%	±4%	±4%	±4%
No. 200	±2%	±2%	±2%	±2%

<b>TABLE 321-3B</b>			
<b>GRADATION ACCEPTANCE LIMITS FOR GYRATORY MIXES</b>			
Sieve Size	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix
3/4 inch	---	---	±7%
1/2 inch	---	±7%	±6%
3/8 inch	±7%	±6%	---
No. 8	±6%	±6%	±6%
No. 40	±4%	±4%	±4%
No. 200	±2%	±2%	±2%

If the results from a single acceptance sample fall outside of the acceptance limits in Table [321-3A](#) or [321-3B](#) as applicable, a second sample shall be taken and if the second acceptance sample is also outside of the acceptance limits the Contractor shall cease production of asphalt concrete. Production shall not begin again until calibration test results verify that adjustments made to materials or proportions yield a gradation that falls within acceptance limits in Table [321-3A](#) or [321-3B](#) as applicable.

If the asphalt binder content is within  $\pm 0.40\%$  of the mix design target value, the asphalt concrete will be paid for at the contract unit price. If the asphalt binder content deviates by more than  $\pm 0.40\%$  from the mix design target value, the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient sample. The asphalt content of the original deficient sample will be averaged with the asphalt binder content of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the asphalt binder content deviates by more than  $\pm 0.40\%$  from the mix design target value, then Table [321-4](#) shall apply to the subplot. Upon approval of the Engineer, the Contractor may obtain A additional cores ~~may be required~~ to define the limits of the deficient area, ~~and~~ but these additional cores shall not be used for re-evaluating acceptance.

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<b>TABLE 321-4</b>		
<b>ASPHALT BINDER CONTENT ACCEPTANCE AND PENALTIES</b>		
Deviation from that permitted	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Over 0.2% <u>above</u> that permitted	Removal* or EA	Removal* or EA
Over 0.1% to 0.2% <u>above</u> that permitted	\$6.00	EA
Over 0.0% to 0.1% <u>above</u> that permitted	\$2.00	EA
Within permitted range	Full Payment	No Corrective Action
Over 0.0% to 0.1% <u>below</u> that permitted	\$2.00	EA
Over 0.1% to 0.2% <u>below</u> that permitted	\$6.00	EA
Over 0.2% <u>below</u> that permitted	Removal* or EA	Removal* or EA

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient.  
EA = Engineering Analysis per Section 321.10.6

If the laboratory air voids fall within a range of 2.8% to 6.2%, the asphalt concrete will be paid for at the contract unit price. If the laboratory air voids are outside of this range, the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient sample. The laboratory air voids of the original deficient sample will be averaged with the laboratory air voids obtained from each of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the resulting average of the laboratory air voids is outside the indicated range, then [Table 321-5](#) shall apply to the subplot. Upon approval of the Engineer, the Contractor may obtain additional cores to define the limits of the deficient area, but these additional cores shall not be used for re-evaluating acceptance. ~~Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.~~

<b>TABLE 321-5</b>		
<b>LABORATORY VOIDS ACCEPTANCE AND PENALTIES</b>		
Laboratory Air Voids (Measured at N <sub>des</sub> or 75 blows as applicable)	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Less than 1.5%	Removal* or EA	Removal* or EA
1.5-2.0%	\$5.00	EA
2.1-2.7%	\$2.00	EA
2.8-6.2%	Full Payment	No Corrective Action
6.3-6.9%	\$2.00	EA
7.0-8.0%	\$5.00	EA
Greater than 8.0%	Removal* or EA	Removal* or EA

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient  
EA = Engineering Analysis per Section [321.10.6](#)

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~~Removal for In place Air Voids Greater than 11.0% is not eligible for Section 321.10.6.~~

If an agency or Engineer is purchasing asphalt concrete directly from a commercial material supplier, the agency or Engineer will use Section [321.10](#), and specifically Tables [321-3A](#) or [321-3B](#) as applicable, [321-4](#) and [321-5](#) from Section [321.10](#), when determining the acceptance of the asphalt concrete with the material supplier.

**321.10.3 Surface Testing:** If directed by the Engineer surface drainage test shall be performed. The completed surfacing shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/4 inch from the lower edge of a 12-foot straightedge when the straightedge is placed parallel to the centerline of the roadway. The straightedge shall be furnished by the contractor and shall be acceptable to the Engineer.

All streets shall be water tested for drainage in the presence of the Engineer or designated representative before final acceptance. Any areas not draining properly shall be corrected to the Engineer's satisfaction at the Contractor's expense. Water for this testing shall be provided and paid for by the Contractor.

When deviations in excess of the above tolerance are found, humps or depressions shall be corrected to meet the specified tolerance, or shall be cut out along neat straight lines and replaced with fresh hot mixture and thoroughly compacted to conform with and bond to the surrounding area. Materials and work necessary to correct such deviations shall be at no additional cost to the Contracting Agency.

**321.10.4 Asphalt Pavement Thickness:** Asphalt Pavement thickness will be determined from cores secured from each lift of each subplot. Such cores will be taken and measured by the Asphalt Concrete Coring Method. This method can be found in Section [321.14](#). Each core location will be patched by the party responsible for the testing.

Acceptance or assessment of penalties for asphalt pavement thickness will be based on the combined total thickness of all asphalt concrete layers omitting all layers of asphalt-rubber asphalt concrete. If the final total pavement thickness exclusive of all ARAC layers is deficient from the target thickness by 0.25 inches or less, it will be paid for at the contract unit price.

If the thickness deficiency of the pavement core exceeds 0.25 inch, the thickness deficiency shall be evaluated by coring at a maximum interval of 100 feet on each side of the deficient core. The thickness of the original deficient core will be averaged with the thicknesses of the cores taken from each side of it to determine compliance with the acceptance requirements.

If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is not the owner (i.e. permits) the following will apply:

- (1) If the pavement thickness deviates from the target thickness by more than 0.25 inch but not more than 0.50 inch, corrective action will be required. This corrective action shall consist of application of a Type II slurry seal coat in accordance to Section 715. The Contractor may present an engineering analysis outlining other proposed remedial measures for the consideration by the Engineer. The Engineer will review the engineering analysis and decide within 30 working days whether to accept the proposed remedial measures.
- (2) If the pavement thickness deviates from the target thickness by more than 0.50 inch, corrective action will be required. The deficient area shall be overlaid with no less than a 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with appropriate end and edge milling, with a mixture approved by the Engineer. The Contractor may present an engineering analysis outlining other proposed remedial measures for the Engineer's consideration. The Engineer will review the engineering analysis and decide within 10 working days whether to accept the proposed remedial measures. If the Engineer chooses to reject the engineering analysis, the indicated overlay shall be constructed by the Contractor at no additional cost to the Owner.

If the contracting Agency is the owner and the pavement thickness deficiency is greater than 0.25 inches but less than 0.50 inches Table 321-6 will apply. If the pavement thickness deficiency is greater than 0.5 inches the deficient area shall be overlaid with no less than a 1-inch thick lift for the full width of the pavement to meet or exceed the designed thickness using an asphalt mixture approved by the Engineer. The Contractor shall provide appropriate end and edge milling. The overlay and milling shall be accomplished by the Contractor at no additional cost to the Contracting Agency. If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is not the owner (i.e. permits) the following steps

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will apply:

- ~~(1) If the thickness deficiency of the pavement exceeds 0.25 inch, the limits of the deficient area will be evaluated by coring at maximum intervals of 100 feet from the deficient core. The thicknesses of the original deficient core will be averaged with the thicknesses of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the resulting average thickness deficiency is greater than 0.25 inch, additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.~~
- ~~(2) If the pavement thickness from step one above deviates from the target thickness by more than 0.25 inch but not more than 0.50 inch, corrective action will be required. This corrective action will consist of application of a Type II slurry seal coat in accordance to Section 715. The Contractor may present an engineering analysis outlining other proposed remedial measures for the consideration of the Engineer. The Engineer will review the engineering analysis and decide within 30 working days whether to accept the proposed remedial measures.~~
- ~~(3) If the pavement thickness from step one above deviates from the target thickness by more than 0.50 inch, corrective action will be required. The deficient area shall be overlaid with no less than a 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with appropriate end and edge milling, with a mixture approved by the Engineer. The Contractor may present an engineering analysis outlining other proposed remedial measures for the Engineer's consideration. The Engineer will review the engineering analysis and decide within 10 working days whether to accept the proposed remedial measures. If the Engineer chooses to reject the engineering analysis, the indicated overlay will be constructed by the Contractor at no additional cost to the Owner.~~

~~If the contracting Agency is the owner and the pavement thickness deficiency is greater than 0.25 inches but less than 0.50 inches Table 321-6 will apply. If the pavement thickness deficiency is greater than 0.5 inches the deficient area shall be overlaid with no less than a 1 inch thick lift for the full width of the pavement to meet or exceed the designed thickness using an asphalt mixture approved by the Engineer. The Contractor shall provide appropriate end and edge milling. The overlay and milling shall be accomplished by the Contractor at no additional cost to the Contracting Agency.~~

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or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor will provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in Section [321.14](#). Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

If the pavement density has in-place voids of between 4.0% and 8.0% ~~or less~~, the asphalt concrete will be paid for at the contract unit price. If the acceptance core for a subplot indicates that the pavement density has in-place voids of less than 4.0% or greater than 8.0%, ~~the deficient area will be evaluated within the subplot by coring at maximum intervals of 100 feet from the deficient core(s). If both cores in a subplot are deficient, the deficient area will be evaluated by coring two additional locations at maximum intervals of 100 feet from the deficient core. The in-place voids of the original deficient core will be averaged with the in-place voids of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the resulting average of the in-place voids is outside the indicated range, then Table 321-8 shall apply to the subplot. 3 to 4 additional cores may be necessary to re-evaluate acceptance. The in-place voids of all the original core(s), whether deficient or acceptable, will be averaged with the in place voids of the cores taken for re-evaluation to determine compliance with the acceptance requirements. If the average of the in place voids is greater than 8.0% then Table 321-8 shall apply to the subplot. Upon approval of the Engineer, the Contractor may obtain additional cores to define the limits of the deficient area, but these additional cores shall not be used for re-evaluating acceptance. Additional cores may be required to define the limits of the deficient area, and shall not be used for re-evaluating acceptance.~~

**TABLE 321-8**

**PAVEMENT DENSITY PENALTIES**

Limits of In-place Air Voids for design lift thicknesses 1.5 inches and greater	When the contracting agency is the owner:	When the contracting agency is not the owner; <del>(i.e. permits):</del>
	Payment Reduction (\$ per ton of asphalt concrete)	Corrective Action
Below 3.0%	Removal* or EA	Removal* or EA
3.0% to below 4.0%	\$10.00	EA and Type II Surry Seal
4.0% to 8.0%	Full Payment	No Corrective Action
Greater than 8.0% to less than 9.0%	\$6.00	EA
9.0% to 10.0%	\$10.00	EA and Type II Surry Seal
Greater than 10.0%	Removal* or EA	Removal* or EA
<u>Greater than 11.0%</u>	<u>Removal*</u>	<u>Removal*</u>

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient.

EA = Engineering Analysis per Section [321.10.6](#)

~~Removal for In-place Air Voids greater than 11.0% is not eligible for Section [321.10.6](#).~~

**321.10.6 Engineering Analysis (EA):** Within 10 working days after receiving notice that a lot or subplot of asphalt concrete is deficient and is found to fall within the “Removal or EA” band per Table(s) [321-4](#), [321-5](#), and/or [321-8](#) the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties along with possible remediation(s) listed in the “Removal or EA” category. Engineering Analysis can also be proposed for non-removal categories of “Corrective actions” when the contracting agency is not the owner (i.e. permits).

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action to the material(s) in place as it relates to

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TABLE 321-3A				
GRADATION ACCEPTANCE LIMITS FOR MARSHALL MIXES				
Sieve Size	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	Base Mix
1 inch	---	---	---	±7%
3/4 inch	---	---	±7%	±6%
1/2 inch	---	±7%	---	---
3/8 inch	±7%	±6%	±6%	±6%
No. 8	±6%	±6%	±6%	±6%
No. 40	±4%	±4%	±4%	±4%
No. 200	±2%	±2%	±2%	±2%

TABLE 321-3B			
GRADATION ACCEPTANCE LIMITS FOR GYRATORY MIXES			
Sieve Size	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix
3/4 inch	---	---	±7%
1/2 inch	---	±7%	±6%
3/8 inch	±7%	±6%	---
No. 8	±6%	±6%	±6%
No. 40	±4%	±4%	±4%
No. 200	±2%	±2%	±2%

If the results from a single acceptance sample fall outside of the acceptance limits in Table [321-3A](#) or [321-3B](#) as applicable, a second sample shall be taken and if the second acceptance sample is also outside of the acceptance limits the Contractor shall cease production of asphalt concrete. Production shall not begin again until calibration test results verify that adjustments made to materials or proportions yield a gradation that falls within acceptance limits in Table [321-3A](#) or [321-3B](#) as applicable.

If the asphalt binder content is within  $\pm 0.40\%$  of the mix design target value, the asphalt concrete will be paid for at the contract unit price. If the asphalt binder content deviates by more than  $\pm 0.40\%$  from the mix design target value, the deficient area will be evaluated within the subplot by coring **one additional location** at a maximum intervals of 100 feet ~~from~~ **on each side of** the deficient sample. The asphalt content of the original deficient sample will be averaged with the asphalt binder content of the **two additional** cores ~~taken for re-evaluation~~ to determine compliance with the acceptance requirements. If the resulting average of the asphalt binder content deviates by more than  $\pm 0.40\%$  from the mix design target value, then Table [321-4](#) shall apply to the subplot. ~~Upon approval of~~ **approved by** the Engineer, the Contractor may obtain additional cores to ~~define the limits of the deficient area~~ **assist in formulation of an Engineering analysis**, but these additional cores shall not be used for re-evaluating acceptance.

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<b>TABLE 321-4</b>		
<b>ASPHALT BINDER CONTENT ACCEPTANCE AND PENALTIES</b>		
Deviation from that permitted	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Over 0.2% above that permitted	Removal* or EA	Removal* or EA
Over 0.1% to 0.2% above that permitted	\$6.00	EA
Over 0.0% to 0.1% above that permitted	\$2.00	EA
Within permitted range	Full Payment	No Corrective Action
Over 0.0% to 0.1% below that permitted	\$2.00	EA
Over 0.1% to 0.2% below that permitted	\$6.00	EA
Over 0.2% below that permitted	Removal* or EA	Removal* or EA

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient.  
EA = Engineering Analysis per Section 321.10.6

If the laboratory air voids fall within a range of 2.8% to 6.2%, the asphalt concrete will be paid for at the contract unit price. If the laboratory air voids are outside of this range, the deficient area will be evaluated within the subplot by coring **one additional location** at a maximum intervals of 100 feet ~~from on each side of~~ the deficient sample. The laboratory air voids of the original deficient sample will be averaged with the laboratory air voids obtained from each of the **two additional cores taken for re-evaluation** to determine compliance with the acceptance requirements. If the resulting average of the laboratory air voids is outside the indicated range, then Table 321-5 shall apply to the subplot. ~~Upon approval of~~ **approved by** the Engineer, the Contractor may obtain additional cores ~~to define the limits of the deficient area~~ **assist in formulation of an Engineering analysis**, but these additional cores shall not be used for re-evaluating acceptance.

<b>TABLE 321-5</b>		
<b>LABORATORY VOIDS ACCEPTANCE AND PENALTIES</b>		
Laboratory Air Voids (Measured at N <sub>des</sub> or 75 blows as applicable)	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Less than 1.5%	Removal* or EA	Removal* or EA
1.5-2.0%	\$5.00	EA
2.1-2.7%	\$2.00	EA
2.8-6.2%	Full Payment	No Corrective Action
6.3-6.9%	\$2.00	EA
7.0-8.0%	\$5.00	EA
Greater than 8.0%	Removal* or EA	Removal* or EA

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient  
EA = Engineering Analysis per Section [321.10.6](#)

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or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor ~~will~~ shall provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in Section [321.14](#). Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

If the pavement density has in-place voids of between 4.0% and 8.0%, the asphalt concrete will be paid for at the contract unit price. If the acceptance core for a subplot indicates that the pavement density has in-place voids of less than 4.0% or greater than 8.0%, the deficient area will be evaluated by coring two additional locations at maximum intervals of 100 feet from the deficient core. The in-place voids of the original deficient core will be averaged with the in-place voids of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the resulting average of the in-place voids is outside the indicated range, then Table [321-8](#) shall apply to the subplot. ~~Upon approval of~~ approved by the Engineer, the Contractor may obtain additional cores to ~~define the limits of the deficient area~~ assist in formulation of an Engineering analysis, but these additional cores shall not be used for re-evaluating acceptance..

<b>TABLE 321-8</b>		
<b>PAVEMENT DENSITY PENALTIES</b>		
Limits of In-place Air Voids for design lift thicknesses 1.5 inches and greater	When the contracting agency is the owner:  Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner; i.e. permits  Corrective Action
Below 3.0%	Removal* or EA	Removal* or EA
3.0% to below 4.0%	\$10.00	EA and Type II Surry Seal
4.0% to 8.0%	Full Payment	No Corrective Action
Greater than 8.0% to less than 9.0%	\$6.00	EA
9.0% to 10.0%	\$10.00	EA and Type II Surry Seal
Greater than 10.0%	Removal* or EA	Removal* or EA
Greater than 11.0%	Removal*	Removal*

NOTES: \*The Contractor shall remove and replace the entire subplot that is deficient.

EA = Engineering Analysis per Section [321.10.6](#)

**321.10.6 Engineering Analysis (EA):** Within 10 working days after receiving notice that a lot or subplot of asphalt concrete is deficient and is found to fall within the “Removal or EA” band per Table(s) [321-4](#), [321-5](#), and/or [321-8](#) the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties along with possible remediation(s) listed in the “Removal or EA” category. Engineering Analysis can also be proposed for non-removal categories of “Corrective actions” when the contracting agency is not the owner (i.e. permits).

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action to the material(s) in place as it relates to the in-place material’s performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs.

If a lot or subplot is accepted for referee testing and the referee test results still show a deficiency, the contractor shall have ten working days to submit an engineering analysis beginning upon notification of referee test results.