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the area of the joint shall not deviate more than ¼ inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, parallel to the centerline.

Longitudinal Joints of each course shall be staggered a minimum of 6 inches with relation to the longitudinal joint of the immediate underlying course cold transverse construction joint, the cold existing asphalt concrete shall be trimmed to a vertical face for its full depth and exposing a fresh face. The fresh face shall be tacked prior to placement of the adjacent course. 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 ¼ inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, parallel to the centerline. The joint will be tack coated if required by the Engineer.

321.8.3 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.

as shown in Table 321.3

321.8.4 Compaction Base and Surface: It is the contractor's responsibility to perform any desired Quality Control monitoring and/or testing during compaction operations to achieve the required compaction. Asphalt concrete immediately behind the laydown machine shall be a minimum of 250 degrees F as measured from a probe type thermocouple thermometer that has been calibrated to an AASHTO standard. The probe type thermocouple thermometer shall have a current calibration sticker attached. When measuring the temperature of the mat, the probe shall be inserted at mid-depth and as horizontal as possible to the mat.

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.

Pneumatic tired compactors shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the compaction process.

The Engineer will determine the acceptability of the pavement compaction in accordance with Section 321.10.

321.8.5 Smoothness: 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 one-fourth (¼) inch from the lower edge of a 12-foot straightedge when the straightedge is placed parallel to the centerline of the roadway.

321.9 QUALITY CONTROL:

It is the contractor's responsibility to perform Quality Control monitoring and/or testing during asphalt concrete production to achieve the required compaction and to perform Quality Control monitoring and/or testing during asphalt concrete production to achieve the required mix properties. The Engineer may obtain samples of any portion of any material at any point of the operations for his own use. Also, the Engineer may order the use of any drying, proportioning and mixing equipment or the handling of any material discontinued which, in his/her opinion, fails to produce a satisfactory mixture.

The asphalt concrete produced shall conform to the properties of the mix design. When the asphalt concrete does not conform to the approved mix design properties, it shall be reported to the Engineer, and corrective quality control measures shall be implemented, or production shall cease immediately at no additional cost to the contracting Agency or Engineer.

321.10 ACCEPTANCE:

321.10.1 Acceptance Criteria: Unless otherwise specified, asphalt concrete will be divided into lots for the purpose of acceptance. A lot shall be considered to be one day's production. When the quantity of asphalt concrete placed in a day exceeds 500 tons but is less than 2000 tons, the lot shall be divided into 500 ton sublots or fraction thereof. Where the quantity of asphalt concrete placed in a day exceeds 2000 tons, the day's production will be divided into four (4) approximately equal sublots. A minimum of one sample will be obtained from each lot. Tests used to determine acceptance will be performed by the Engineer or a laboratory employed by the Engineer. In either case the laboratory shall be accredited by the AASHTO Accreditation Program (AAP), for the tests being performed. The acceptance laboratory will take representative samples of the asphalt concrete from each

Base ⁽¹⁾ Temp (°F)	Mat Thickness (inches)					
	½	¾	1	1 ½	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	275	270	265	260
+ 90	280	275	270	265	260	255

(1) Base on which mix is to be placed.

321.8.7 Pavement Fabric Interlayer: Pavement fabric interlayer shall be used only when specified on the plans or in the specifications.

Pavement fabric interlayer shall be in accordance with Table 796-1 and be the Class designated on the plans or in the specifications.

Asphalt binder coat used to bond the fabric to the pavement shall be paving asphalt PG 70-10 asphalt cement conforming to the requirements of Section 711. The application and distributing equipment for the asphalt binder shall conform to the requirements of Section 330. The asphalt binder coat shall be uniformly spray applied to the prepared pavement surface at the rate of 0.20 gallons per square yard for Class B fabric or at the rate of 0.25 gallons per square yard for Class A fabric. Some underlying surfaces may require a higher or lower application rate. A test strip may be necessary to determine the proper application rate. The width of liquid asphalt cement application shall be the fabric width, plus six inches.

Neither the asphalt binder coat or fabric interlayer shall be placed when weather conditions, in the opinion of the Engineer, are not suitable. The asphalt binder and fabric interlayer shall only be placed when the pavement is dry, the ambient air temperature is 50 degrees F and rising, and pavement temperature is 40 degrees F and rising.

Equipment for placing the fabric shall be mechanized and capable of handling full rolls of fabric. The equipment shall be able to lay the fabric smoothly to maximize pavement contact and remove air bubbles. Stiff bristle brooms shall be used to smooth the fabric. The equipment used to place the fabric shall be in good working order and is subject to approval by the Engineer.

Pavement fabric interlayer shall not be placed if the in-place binder is hotter than 325 degrees F or has cooled to 180 degrees F or below (as determined by non-contact thermometer).

Pavement fabric interlayer shall be placed onto the asphaltic binder with the heat bonded side up with a minimum amount of wrinkling or folding. Large Remaining wrinkles or folds 1-inch and larger shall be removed or slit and shingle-lapped in the direction of paving. Burning or torching of wrinkles is not allowed. Fabric shall overlap three to six inches to insure full closure of the joint. Transverse joints shall be shingle-lapped in the direction of paving to prevent edge pickup by the paver. A second application of hand-placed asphalt binder may be required at laps and repairs as determined by the Engineer to ensure proper binding of the narrow double fabric layer. No joints shall be lapped with more than two layers of fabric.

All areas where fabric has been placed shall be paved with asphaltic concrete during the same workshift. Placement of the asphaltic concrete shall closely follow fabric lay down. The temperature of the asphaltic concrete immediately behind the laydown machine shall not exceed 325 degrees F. In the event that the asphalt binder coat bleeds through the fabric causing construction problems before the overlay is placed, the affected areas shall be sanded with a sand blotter in compliance with Section 333. Excess sand shall be removed before beginning the paving operation. In the event of rainfall prior to the placement of the asphaltic concrete, the fabric shall be allowed to dry before the asphalt concrete is placed.

Turning of the paving machine or of other vehicles on the fabric shall be gradual and kept to a minimum to avoid damage to the fabric. Should equipment tires stick to the fabric during pavement operations, small quantities of paving asphalt concrete shall be broadcast on the fabric to prevent pick-up. Decrease of binder rate in order to minimize pick-up on tires is not allowed.

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sublot to allow for gradation, binder content, air voids, pavement thickness and compaction of base and surface course. Each sublot will be accepted based upon the test data from the sample(s) from that sublot. All acceptance samples shall be taken using random locations or times designated by the Engineer in accordance with ASTM D 3665.

321.10.2 Gradation, Binder Content and Air Voids: The acceptance laboratory will take a sample of the asphalt concrete in accordance with the requirements of Section 2 or 4 of Arizona Test Methods 104 or AASHTO T168 from each sublot. The minimum weight of the sample shall be 45 pounds. Asphalt binder content and gradation shall be determined in accordance with AASHTO T308 using the ignition furnace for each sublot. The acceptance laboratory is responsible for obtaining the necessary materials and performing an ignition furnace calibration as outlined in AASHTO T308 for each asphalt concrete mixture utilized on the project. The correction factor used for each test shall be clearly indicated on the report. The bulk density for Marshall Mix designs shall be tested in accordance with AASHTO T245. The bulk density for Gyratory mix designs shall be tested in accordance with AASHTO T312. The maximum theoretical density shall be tested in accordance with the requirements of AASHTO T209. Effective voids determined on the laboratory compacted specimens will be determined at a minimum of once per lot in accordance with the requirements of AASHTO T269. Should the testing for effective air voids not meet the "Full Payment" or "No Corrective Action" requirements of Table 321-~~6~~, additional testing for laboratory air voids on the remaining sublots will be performed as necessary to determine the extent of the deficiency. Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

The allowable deviations for acceptable production of each measured characteristic from the values established in the JMF for each sublot are as follows:

Maximum Aggregate Size	100% passing
Nominal Maximum Aggregate Size	±7%
No. 8 Sieve to the Nominal Maximum Aggregate Size	±6%
No. 100 and No. 30 Sieves	±4%
No. 200 Sieve	±2%

If the results from a single acceptance sample fall outside of the acceptance limits in Table 321-~~3~~, a second sample shall be taken and if the second acceptance sample is also outside of the acceptance limits in Table 321-~~3~~, 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-~~3~~.

The asphalt binder content shall be considered acceptable if it is within ± 0.40% of the mix design target value.

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
0.0 to 0.1% points	\$2.00	EA (see 321.10.6)
Over 0.1 to 0.2% points	\$6.00	EA (see 321.10.6)
Over 0.2% points	Removal*	Removal*

Note: Removal* refers to Section 321-10.6

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Laboratory Air Voids (Measured at N_{60} 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*	Removal*
1.5-2.0%	\$2.50	EA (see 321.10.6)
2.1-2.7%	\$1.00	EA (see 321.10.6)
2.8-6.2%	Full Payment	No corrective action
6.3-6.9%	\$1.00	EA (see 321.10.6)
7.0-8.0%	\$2.50	EA (see 321.10.6)
Greater than 8.0%	Removal*	Removal*

Note: Removal* refers to 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-~~3~~, 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 sublot for this purpose. Such cores will be taken and measured by the Asphalt Concrete Coring Method. This method can be found at in Section 321.14. Each core location will be patched by the party responsible for the testing.

If the pavement thickness is deficient from the target thickness by 0.25 inches or less, it will be paid for at the contract unit price. 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 will apply:

- (1) If the thickness deficiency of the pavement exceeds 0.25 inch, the limits of the deficient area will be isolated 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.
- (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.

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(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 will be overlaid with no less than 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with the 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 pavement thickness deficiency is greater than 0.25 inches and the contracting agency is the owner, Table 321-2 will apply.

Specified Mat Thickness	Reduction in Payment or Corrective Action
Less than 1.5 inches	50%
1.50 inches to 1.99 inches	33%
2.00 inches to 2.49 inches	25%
2.50 inches to 2.99 inches	20%
3.00 inches and over	17%

321.10.5 Density: Achieving the required compaction is the responsibility of the contractor. The number and types of rollers is the contractor's responsibility and shall be sufficient to meet these requirements.

In-place air voids shall be determined in accordance with AASHTO T269 utilizing cores taken from the finished pavement. The maximum theoretical density used in the determination of in-place air voids will be the average value from the acceptance samples determined for the Lot as outlined in 321.10.1.

The Engineer will designate two random test locations for each subplot and the acceptance laboratory will obtain two cores from each location. The two cores will be averaged for acceptance. The outside one foot of each pass of the pavement course 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. The acceptance laboratory will furnish test results within 3 working days of receipt of the cores.

If the pavement density has in-place voids of 8.0% or less, the asphalt concrete will be paid for at the contract unit price. If the pavement density has in-place voids greater than 8.0%, the limits of the deficient area will be isolated within the subplot by coring 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 average of the in-place voids is greater than 8.0% then Table 321-6 shall apply to the subplot.

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Limits of In-place Air Voids	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 inches		
8.1% to 9.0%	\$4.00	EA
9.1% to 10.0%	\$6.00	EA and Type II Surry Seal
10.1% to 11.0%	Removal*	Removal*
Greater than 11.0%	Removal	Removal

Notes: Removal refers to Section 321-10.6. The Contractor shall remove and replace the entire subplot that is deficient. 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 subplot of asphalt concrete is deficient for "Removal" by the Engineer, the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties listed in the "Removal" 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 on the performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs. If the subplot is submitted for referee testing by the contractor, the ten working days allowed to prepare an engineering analysis will begin upon notification of referee test results.

When an Engineering Analysis recommends that a specific lot or subplot not be removed, the Engineering Analysis will recommend that the following penalties (Table 321-8) be paid when the contracting agency is the owner, for the specific criteria being reviewed by the EA.

Acceptance Criteria	Acceptance Limits	Penalty When Contracting Agency is the Owner (\$/Ton)
Asphalt Binder Content	Over 0.2% points from that Permitted	\$9.00
Laboratory Air Voids (Measured at N ₆₀ or 75 blows as applicable)	Less than 1.5% or Greater Than 8.0%	\$3.75
Limits of In-place Air Voids	10.1% to 11.0%	\$9.00

Within 15 working days, the Engineer will determine whether or not to accept the contractor's proposed Engineering Analysis.

321.11 REFEREE:

In the event the contractor elects to question the acceptance test results for a subplot, the Contractor may make a written request for additional testing of that subplot. The Contractor will engage an independent laboratory (at the Contractor's own expense) who