KANSAS DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION TO THE
STANDARD SPECIFICATIONS, EDITION 2015

Delete SECTION 613 and replace with the following:

SECTION 613

ULTRATHIN BONDED ASPHALT SURFACE

613.1 DESCRIPTION

Construct the ultrathin bonded asphalt surface (UBAS) as designated in the Contract Documents.

BID ITEMS	UNITS
HMA Surface (Ultrathin Bonded) (*) (**)	Ton
Emulsified Asphalt (Emulsion Bonding Liquid)	Ton
Quality Control Testing (HMA)	Ton

* Type of mix gradation
** Grade of Asphalt Binder

613.2 CONTRACTOR QUALITY CONTROL REQUIREMENTS

a. General. Provide qualified personnel and sufficient equipment complying with the requirements listed in Part V to conduct quality control testing that complies with Appendix B - Sampling and Testing Frequency Chart for Asphalt Construction Items for Quality Control/Quality Assurance Projects.

Allow the Engineer access to the Contractor's laboratory to observe testing procedures, calculations, test documentation and plotting of test results.

Calibrate and correlate the testing equipment with prescribed procedures, and conduct tests in compliance with specified testing procedures as listed in Section 5.2.7- Contractor's Quality Control Plan, Part V.

Store and retain the most recent 2 lots per mix designation of quality control samples for KDOT. KDOT will retain the most recent 2 lots per mix designation gyratory compacted samples and the remaining material not previously used for testing (back half of sample). Do not retain more than the previous 3 lots per mix designation of quality control or verification samples. When the hot mix plant shuts down for the winter, discard the samples after 7 days.

Maintain control charts on an ongoing basis.

At the completion of the project, all documentation becomes the property of KDOT.

Provide the following test data to the KDOT Project Representative:

- Copies of all test results and control charts on a weekly basis, representing the prior week's production;
- Copies of the quality control summary sheet when available and not later than the next working day of obtaining the sample. Include, as a minimum, mix gradation, binder content, theoretical maximum specific gravity (G_{mm}) and film thickness; and
- Copies of all failing test results when available (based on a moving average of 3 tests, when appropriate).

b. Quality Control Plan (QCP). At the pre-construction conference, submit to the Engineer for approval, a QCP as outlined in Section 5.2.7 – Contractor's Quality Control Plan, Part V. Follow Appendix A of the Contractor's Quality Control Plan in Part V as a general guideline. The Contractor's laboratory and equipment will be inspected and approved as outlined in Section 5.2.7 - Contractor's Quality Control Plan, Part V.

Include a listing of the names and phone numbers of individuals and alternates responsible for quality control administration and inspection. On the Contractor's organizational chart, show the specified lines of authority relating both to mix design and quality control operations during production. Post the organizational chart in the Contractor's test facility.

Provide a quality control organization or private testing firm having personnel certified according to the Policy and Procedure Manual for the Certified Inspection and Testing (CIT) Training Program. The testing for this type of construction will require personnel certified in Aggregate Field Tester (AGF), Aggregate Lab Technician, Profilograph (PO), and Superpave Field (SF) classifications.

Only persons certified in the appropriate classifications covering the specific tests required shall perform such testing. At the beginning of the project, provide the Engineer with the list of certified technicians and alternates, phone numbers and tests/inspection they will be performing. Include certification expiration dates for all certified technicians. As personnel changes and certifications may expire, continue to provide the Engineer with an accurate list.

Provide an organizational chart showing the specified lines of authority relating to both mix design and quality control operations during production. Identify the company official acting as liaison with KDOT, and the Certified Technician who will direct inspection and testing. Post the chart in the test facility.

c. Required Duties of Certified Inspectors. Be available on the project site whenever UBAS is being produced and being placed on the project site. Perform and utilize quality control tests and other quality control practices to assure that delivered materials and proportioning meet the requirements of the mix designs.

Periodically inspect all equipment utilized in transporting, proportioning, mixing, placing, and compacting to assure it is operating properly and that placement and compaction comply with the contract requirements.

d. Contractor's Testing Facilities. Describe the testing facility and its accreditation in the QCP.

Locate the testing facility either at the plant site or at the project. Obtain approval of the testing facilities and location from the DME before the commencement of mixture production.

Provide suitable space for the required testing equipment. Also, equip the testing facility with these items for the exclusive use of the testing facility's quality control personnel and the Engineer:

A telephone with a private line for the exclusive use of the testing facility's quality control personnel; and

A copying machine for use by the Contractor's personnel and the Engineer.

Provide Broadband internet connection (for 1 computer). If the Engineer determines that broadband internet service is not available, provide a fax machine, at no additional cost.

An air conditioner capable of maintaining a temperature below 77°F in the main part of the Field Office and Laboratory.

Locate the KDOT field laboratory near the Contractor's testing facility and have it fully functional 2 working days before placement of the pre-production mix.

e. Documentation. Include in the QCP procedures, charts and forms to be used to provide the required documentation.

Record all original documentation in a bound field book or other KDOT approved bound record and turn over to KDOT at the end of the project.

At all times, have complete records of all inspections and tests available on site for the Engineer. All records documenting the Contractor's quality control inspections and tests become the property of KDOT upon completion of the work.

Indicate the nature and number of observations made, the number and type of deficiencies found, the quantities approved and rejected, and the corrective action taken in the records. Examples of quality control forms and charts are available in Part V, or Contractors may design their own. Documentation procedures are subject to approval by the Engineer before the start of the work and to compliance checks during the progress of the work.

Maintain control charts on an ongoing basis.

Provide the following test data to the KDOT Project Representative:

- Copies of all test results and control charts on a weekly basis, representing the prior week's production;
- Copies of the quality control summary sheet on a daily basis. Include, as a minimum, mix gradation, binder content, theoretical maximum specific gravity (G_{mm}) and film thickness; and
- Copies of all failing test results (based on a moving average of 3 tests, when appropriate). Include all applicable sieves, binder content and film thickness.

f. Testing Requirements. In the QCP, identify test methods, procedures and equipment proposed for use. Use standard KDOT test methods and properly calibrated measuring and testing equipment as outlined in Part V.

Detail any alternative sampling method, procedure or inspection equipment proposed to be used. Such alternatives are subject to review and approval by the DME.

Take all samples for tests and perform in-place tests at random locations, selected according to the Contractor's QCP and at the rates specified in the Sampling and Testing Frequency Chart for UBAS for Quality Control/Quality Assurance Projects in Appendix B, Part V.

g. Pre-Production Testing Requirements.

(1) The Engineer will observe the Contractor obtaining and splitting the pre-production test section samples into 3 representative portions. Each sample set shall consist of enough material for G_{mm} and ignition burnoff testing.

(2) Determine G_{mm}, perform ignition burnoff, evaluate the mix gradation and complete calculations.

(3) Provide the KDOT Field Representative with the 2nd sample set. The KDOT Field Representative will determine G_{mm}, perform ignition burnoff, evaluate the mix gradation and complete calculations.

(4) Retain or provide the 3rd sample set to the KDOT Field or District Materials Representative.

(5) The results of the testing will be compared. If Contractor and KDOT field laboratory test results do not compare favorably, the District Materials Laboratory will test their ⅓ of the sample. KDOT personnel will determine G_{mm}, perform ignition burnoff, evaluate the mix gradation and complete calculations.

If results are not acceptable to either party, repeat the above steps in **subsections 613.2g.(1)** through **(5)** for the Contractor's Field Laboratory, KDOT's Field Laboratory, and KDOT's District Laboratory until the issues may be resolved satisfactorily by all parties.

h. Lot 1 Testing Requirements.

(1) Sequence of Sampling. KDOT field personnel will determine the random truckload for the Contractor for sublots A, B, C and D, and the KDOT verification test.

The verification sample will be sampled and tested by KDOT field personnel. The verification sample shall be randomly taken within the lot and shall not be from the same truckload as selected for the Contractor's sublot samples A, B, C or D.

Obtain sampling using KT-25 procedure C.1 Plant Discharge or C.2 Truck Bed.

KDOT field personnel will:

- not supply the Contractor the identity of the truckload to be sampled ahead of time;
- notify the Contractor's laboratory of which truck to sample after the aggregate has left the cold feeds, and before the truck is finished loading; and
- determine whether the split sample will be taken from sublot A or B and notify the Contractor.

(2) Split Samples. The Contractor shall:

- obtain a sample large enough to split 3 ways for testing;
- retain and test ⅓ of the sample;
- supply ⅓ of the sample to the KDOT field laboratory for testing; and
- supply ⅓ of the sample for the KDOT District Materials Laboratory for testing.

(3) Results. At a minimum, compare G_{mm}, binder content, and film thickness results. The acceptable difference for the G_{mm} results is 0.019. If the results exceed this difference, take an additional split sample in Lot 1 from sublot C or D, as time permits.

If test results do not compare favorably, KDOT and the Contractor will investigate the differences in test results together and take appropriate action. The Contractor's test results will be used for quality control. KDOT Field Laboratory test results and District Materials Laboratory test results will be reported as "information only" samples.

i. Testing Requirements for Lots 2 and Greater.

(1) Take all samples for tests randomly as designated in the approved QCP at the rates specified in Appendix B - Sampling and Testing Frequency Chart, Part V.

Provide the Engineer with the random locations before obtaining the sample. The Engineer reserves the right to generate the random locations. If the Engineer generates the random locations, the Contractor will be notified of which truck to sample after the aggregate has left the cold feeds, and before the truck is finished loading.

(2) Conduct the tests for mixture properties, aggregate gradation and binder content on representative portions of the HMA, quartered from the larger sample of HMA. Take a random sample weighing a minimum of 55 pounds using a method to retain heat to facilitate sample quartering procedures.

(3) Record and document all test results and calculations on data sheets provided by KDOT. Record specific test results on a daily summary sheet provided by KDOT to facilitate the computation of moving test averages. Base moving averages on 3 consecutive test results. Calculations are to be based on the precision displayed on the data sheets. Use "precision displayed" when calculating within Excel. Appendix B - Sampling and Testing Frequency Chart, Part V shows the accuracy to "record to" for the tests listed. Include a description of quality control actions taken (adjustment of cold feed percentages, changes in Job Mix Formulas (JMF), etc.) in the Daily Quality Control Summary Sheet. In addition, post and keep current quality control charts, showing both individual test results and moving average values. As a minimum, plot the single test values on KDOT approved control charts for the mix characteristics shown in **TABLE 613-5**.

(4) If the Contractor and Engineer agree, the procedures shown for sampling, testing and evaluation of Lot 1 in **subsection 613.2h.** may be used for any other Lot produced on the project.

j. Corrective Action. In the QCP, identify procedures for notifying the Engineer when corrective measures must be implemented, and for halting production.

k. Non-Conforming Materials. In the QCP, specifically address how non-conforming materials will be controlled and identified. Establish and maintain an effective and positive system for controlling non-complying material, including procedures for its identification, isolation and disposition. Reclaim or rework non-complying materials according to procedures acceptable to the Engineer. This could include removal and replacement of in-place pavement.

Positively identify all non-conforming materials and products to prevent use, shipment and intermingling with complying materials and products. Provide holding areas, mutually agreeable to the Engineer and Contractor.

613.3 MATERIALS

a. Asphalt Binder. Provide Asphalt Binder that complies with **DIVISION 1200**. Post a legible copy of the latest bill of lading for the Asphalt Binder in the Contractor's Field Lab. Use the mixing and compaction temperatures shown on the bill of lading; however, the maximum mixing or compaction temperature is 340ºF, unless otherwise approved by the Field Materials Engineer. Notify the Engineer if the mixing or compaction temperature changes.

Provide Emulsion Bonding Liquid (EBL) that complies with **DIVISION 1200**.

b. Reclaimed Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS). Do not use RAP or RAS in the UBAS.

c. Aggregates. Provide aggregates that comply with **SECTION 1103**.

d. Combined Aggregates. Provide combined aggregates for the mixes required in the Contract Documents as shown in **TABLE 613-1**.

Mixes may use any combination (except as noted below) of aggregate and mineral filler supplements complying with the applicable requirements in **TABLES 1103-1** and **1103-2**. When coarse aggregates are blended from 1 or more sources, or if more than 1 type, each source or type shall meet the coarse aggregate properties (CAA, LA Abrasion, and micro-deval) in **TABLE 1103-3**.

The minimum Uncompacted Void Content of the Fine Aggregate "U" Value, of the combined aggregate is 45%.

The minimum sand equivalency (SE) of the combined aggregates is 45%.

Provide materials with less than 0.5% moisture in the final mixture.

The maximum quantity of crushed steel slag used in the mix is 50% of the total aggregate weight.

No natural sand will be used in the UBAS.

Traveled way mixes shall include:

- a minimum of 40% primary aggregate based on total aggregate weight;
- a minimum of 50% of the plus No. 4 mesh sieve material in the mixture shall be from the primary aggregate;
- a minimum of 45% of the plus No. 8 mesh sieve material in the mixture shall be from the primary aggregate; and

- Primary aggregates are designated as CS-1 (excluding limestone), CS-2 (excluding limestone), CG, CH-1 and CSSL as described in **subsection 1103.2a.(1)**. Primary aggregate requirements do not apply to the mixture on the shoulder.

e. Contractor Trial Mix Design. A minimum of 10 working days before the start of UBAS production, submit in writing to the DME for review and approval, a proposed JMF for each combination of aggregates. For each JMF submitted, include test data to demonstrate that mixtures complying with each proposed JMF shall have properties specified in **TABLE 613-1** for the designated mix type at the Recommended Percent Asphalt (P_{br}). Submit the proposed JMF on forms provided by KDOT. Submit the worksheets used in the design process to include at a minimum the individual coarse aggregate properties listed in **TABLE 1103-3**, the fine aggregate properties listed in **TABLE 1103-4**, and the mix properties listed in **TABLE 613-2**. Contact the DME to determine if additional material is needed for additional design checks.

For each aggregate used in the mix design, determine the specific gravity using KT-6. This may be accomplished while the project is being constructed or anytime during the 12 months preceding the start of construction on a project. If construction has not yet begun, notify the DME 5 working days prior to obtaining the material for the specific gravity test so that companion samples may be obtained at the same time. If construction has already begun on the project, then determine the specific gravity values of the individual aggregates before 10,000 tons of HMA is produced. Provide the test results to the DME within 14 days of sampling the material. If the producer of the aggregate has been required to submit material to KDOT for a new Official Quality test report since the time the Contractor ran the specific gravity tests, then perform KT-6 on the aggregate currently produced. Do not use the specific gravity values obtained from these tests in the mix design calculations for current projects unless mutually agreeable to both parties. Use the information, as soon as it becomes available, as part of the process to verify and update the "Monthly Hot Mix Aggregate Specific Gravity Values" posted on KDOT's Internet site.

TABLE 613-1: COMBINE AGGREGATE REQUIREMENTS FOR ULTRATHIN BONDED ASPHALT SURFACE*

Mix Designation / Nom Thickness	Percent Retained – Square Mesh Sieves										Asphalt Content (%)
	¾"	½"	⅜"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
Type A - ⅝"		0	0-7	45-60	68-78	75-85	82-90	87-92	90-94	94.0-96.0	5.0 to 6.2
Type B - ⅝"	0	0-7	0-25	62-75	73-83	77-85	82-90	87-92	90-94	94.0-96.0	4.8 to 6.2
Type C - ⅝"	0	0-25	20-50	62-75	73-83	77-85	82-90	87-92	90-94	94.0-96.0	4.6 to 6.2

*For flat and elongated particles in the combined coarse aggregate, use the ratio of 3:1 in lieu of 5:1 shown in KT-59. Do not exceed 25% for the total sample.

TABLE 613-2: MIX PROPERTIES

Property	Test Method	Limits
Total Amine Value of Antistrip Agent, (mg/g of KOH, min) [a]	ASTM D2074	500
Design Film Thickness (μm, min.)	KDOT Construction Manual	9.0 [b]
Drain Down (% max.)	KT-63	0.10
Gyratory Compacted Revolutions, Ndes	KT-58	100 [c]
Emulsion Bonding Liquid (EBL),(gal/sy)	Equation 1	(0.20 ± 0.07) [d]

a – The asphalt binder used in the mix will contain a minimum of 0.25% of an amine based antistripping agent by weight of the asphalt binder.
b – Calculate using the film thickness equation in Section 5.10.4-Calcs for Marshall Mix Design of Bituminous Mixtures, Part V.
c – Compact gyratory specimen to 100 gyrations. Calculate the percent air voids using KT-15, Procedure IV.
d – Calculate the target EBL Shot Rate (S_{ebl} (gal.sy)), using Equation 1; however, the value must be within the limits in this table.

Equation 1: $$S_{ebl} = 3.93 * P_s * \frac{(V_a + MF)}{100}$$

The particle size (P_s), and the mix factor (MF) are based on the mix designation as shown in the **TABLE 613-3**.

TABLE 613-3: VARIABLES IN EBL SHOT RATE EQUATION		
Mix Designation	**Particle Size (Ps)**	**Mix Factor (MF)**
Type A	0.250	3.2
Type B	0.375	3.2
Type C	0.500	3.2

Consider adjusting the EBL spray rate based on the condition of the existing surface as listed in the **TABLE 613-4**. Consult the supplier of the EBL to obtain the recommended adjustment to the spray rate.

TABLE 613-4: EBL ADJUSTMENT CONSIDERATIONS		
Existing Pavement Type	**Condition**	**Adjustment Rate (gal/sy)**
PCCP	Smooth	0.00
	Textured	+0.02 to +0.04
HMA	Flushed	-0.02 to -0.04
	New	0.00
	Matte and OGFC	+0.02
	Dry	+0.03
	Milled	+0.02 to +0.04
Surface Recycle & Cold Recycle	Flushed	-0.02 to -0.04
	Black	+0.02
	Dry	+0.03
Chip Seal	Flushed	-0.02 to -0.04
	Black	+0.02
	Dry	+0.03

613.4 CONSTRUCTION REQUIREMENTS

a. Plant Operation. Adjust all plant operations to operate continuously.

(1) Preparation of the Asphalt Binder. Heat the asphalt binder to within a range as specified in **SECTION 601**. When heating the asphalt binder to the specified temperature, avoid local overheating. At all times, provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. Asphalt binder received from the refinery at temperatures less than 375°F may be used as received, if the requirements regarding the reheating of asphalt binder in **SECTION 601** are met.

(a) Commingling of Asphalt Binders. Do not add or commingle asphalt binders from 2 or more sources into a storage tank. If this occurs, the contents of the storage tank are considered contaminated. Do not use the contents of the storage tank on the project, except as follows: It is permissible, at the Contractor's option, to thoroughly mix the contents of the tank and request sampling of the mixture. Submit the sample to the MRC for testing. Do not use the asphalt binder until approved, and when needed, a new mix design evaluation is completed.

(b) Asphalt Binder Sources. Before changing asphalt binder sources on a project, obtain approval from the DME. A new JMF may be required.

(c) Anti-Strip Additives. If liquid anti-strip additives are added at the Contractor's plant, install a "totalizer" to monitor the quantity of anti-strip additive being added. The Engineer may approve alternative methods for including anti-strip additives in a batch plant. If added at the plant, the anti-strip will be added in line with the asphalt binder as it is being transferred from the transit unit to the asphalt binder storage tank. Provide a method for the Engineer to monitor the percent of additive being added.

(2) Preparation of Mineral Aggregate. When the mineral aggregate is composed of 2 or more ingredients, combine as shown in the approved JMF.

Temperature Requirements. Dry the aggregate for the mixture and heat to a temperature to obtain an asphalt-aggregate mixture temperature immediately after mixing within the 75 to 150 second Saybolt viscosity range of the asphalt binder used. Obtain the temperature for this viscosity range from the MRC or the Asphalt Binder Producer. No mixing or compaction temperatures are to exceed 340ºF

without approval from the Field Materials Engineer. The minimum temperature may be revised by the DME provided it is demonstrated that satisfactory results may be obtained at a lower temperature. In such event, deliver the HMA to the paver at a temperature sufficient to allow the material to be satisfactorily placed and compacted to the specified density and surface tolerance requirements.

(3) Preparation of HMA. Introduce asphalt binder into the prepared aggregate in the proportionate amount determined by the P_{br} in the JMF.

(a) Basis of Rejection. HMA will be rejected if the aggregate, as it is discharged from the drum or the pugmill, contains sufficient moisture to cause foaming of the mixture, or if the temperature of the aggregate is such that the asphalt-aggregate mixture temperature is outside the range specified in **SECTION 601**.

(b) Mixing Time. Operate drum mixers at a rate to provide uniform aggregate coating in a continuous operation. For batch and continuous type plants, the minimum wet mixing time is 40 seconds. In all cases, mix a sufficient time to produce a uniform mixture in which all the aggregate particles are thoroughly coated. On batch plants, begin the timing at the start of the asphalt binder introduction into the pugmill, and end upon the opening of the discharge gate. For continuous flow plants, mixing time in seconds shall equal:

[pugmill dead capacity in pounds] divided by [pugmill output in pounds per second].

(c) Manufacturer's Specifications. Operate all drying, pumping and mixing equipment within the limits specified by the manufacturer, unless it can be demonstrated to the satisfaction of the Engineer that such limits may be exceeded without detriment to the HMA.

(d) Batcher Operation. Coordinate HMA batchers (Gob Hoppers) with the plant production rate at all times so the hopper is more than ¾ full before the gates open, and the gates close before material can drop through the gob hopper directly into the surge bin, weigh hopper or truck.

(e) Wasted Material. Wasted material is not measured for pay.

If after an interruption of production, the drum-mixer contains cold, uncoated or otherwise unsuitable material, waste material through a diversion chute. In a continuous or batch plant drier, waste unsuitable material through the pugmill.

At the end of a production run, waste any segregated material in the cone of the storage bin.

(4) End of Day Quantities. At the end of each day of production, provide the Engineer with a document signed by the Plant Foreman or the Project Manager listing the dry weight of each aggregate and mineral filler; the tons of asphalt binder, and the tons of anti-strip agent used for the project during the day. The dry weight is the tons of the material less the water content.

b. Road Surface Preparation.

(1) Preparation of an Existing Asphalt Pavement. Clean the surface to remove all foreign material and broom to remove dust. Excavate areas shown in the Contract Documents to be patched to a depth directed by the Engineer. Fill with HMA and compact.

(2) Preparation of an Existing Concrete or Brick Pavement. Clean all foreign material and broom to remove dust. Clean and fill cracks and joints, and construct surface leveling as shown in the Contract Documents.

c. Weighing Operations. See **subsection 109.1** for details regarding weighing operations.

d. Hauling Operations. Schedule operations to minimize hauling over a surface course.

Deliver HMA to the paver at a temperature sufficient to allow the material to be placed and compacted to the specified density and surface tolerance.

e. Paving Operations.

(1) Equipment Use a transfer device between the haul units and the paver to assist in maintaining continuous placement. Use equipment such as a shuttle buggy, material transfer vehicle or mobile conveyor. (The material will not be deposited on the roadway and a pick-up device used to transfer the material to the paver.)

Use a self-priming spray paver approved by the Engineer.

Use a spray paver that conforms with asphalt paver requirements in **SECTION 155** and the following:

- equipped with a receiving hopper, feed conveyor, asphalt emulsion storage tank, a system for measuring the EBL volume applied, a spray bar, and a heated, variable width, vibratory screed;

- capable of uniformly spraying the EBL at the specified rate, applying the hot mix surface course and leveling the surface of the mat in one pass;
- capable of paving at a controlled speed from 30-100 feet/minute;
- equipped so no wheel or other part of the paving machine is in contact with the EBL before the hot mix surface course is applied; and
- has a screed with the ability to crown the pavement at the center and extensions that can be adjusted vertically to accommodate the desired pavement profile.

The Engineer will check the pavement for longitudinal streaks and other irregularities. Make every effort to prevent or correct any irregularities in the pavement, such as changing pavers or using different and additional equipment.

Do not raise (dump) the wings of the paver receiving hopper at any time during the paving operation.

(2) Application: Spray the EBL by a metered mechanical pressure spray bar at the temperature specified in **TABLE 601-1**, or as recommended by the EBL supplier. Use a sprayer that accurately and continuously monitors the rate of spray and provides a uniform application across the entire width to be overlaid. The Engineer may make adjustments to the spray rate based upon the existing pavement surface conditions and the recommendations of the EBL supplier.

Apply the UBAS at a temperature of 290-330ºF. Place the UBAS over the full width of the EBL with a heated vibratory screed. Control the amount of mix in front of the screed so it does not interfere with the application of the asphalt emulsion. Adjust the screed and its extensions to eliminate variances in surface texture caused by density segregation. Operate the paver as continuously as possible.

The target application rate of the UBAS will be stated in the Contract Documents. Use a field application rate as necessary to minimize fracturing of the top size aggregate by the screed. The Engineer will determine the acceptable extent of fracturing at the edge of the paving for tapering purposes.

The finished asphalt surface shall be free of oversized material. The Engineer will determine the extent of the oversized material in the UBAS. Take immediate corrective action to eliminate the source. If the source of the oversized material is determined to be a stockpile or a process of plant operations, cease production until corrective actions are complete.

Spread the UBAS without tearing the surface. Strike a finish that is smooth, free of segregation, true to cross section, uniform in density and texture and free from surface irregularities. If the pavement does not comply with all of these requirements, plant production and paving will be suspended until the deficiency is corrected.

(3) Compaction: Roll the UBAS with a minimum of 1 pass and a maximum of 3 passes with 2-axle tandem steel rollers having a minimum weight of 10 tons, before the material temperature has fallen below 195ºF. The Engineer will determine the number of passes necessary based on appearance of the rolled material. Do not allow the roller or rollers to remain stationary on the freshly placed UBAS. Perform rolling immediately following the placement of the UBAS with approved asphalt rollers. Supply adequate roller units so the rolling will be accomplished promptly following the placement of the material. A release agent (added to the water system) may be required to prevent adhesion of the fresh mix to the roller drum and wheels. Normally, perform rolling in the static mode. Do not excessively roll the driving lanes, to the extent of aggregate degradation. The Engineer will determine the acceptable extent of fracturing at the edge of the pavement from the rolling operation. Do not open the new pavement to traffic or allow any roller to sit idle on the pavement until the rolling operation is complete and the material has cooled below 160°F.

Damaged Areas: Replace any defective areas, as determined by the Engineer, at no additional cost to KDOT.

(4) Construction Joints.

- Transverse Construction Joints. Use a method of making transverse construction joints which provide a thorough and continuous bond and provide an acceptable surface texture. Do not vary the surface elevation more than 3/16 inch in 10 feet, when tested longitudinally across the joint. When required, repair the joints or paving operations will be suspended.
- Longitudinal Joints. Construct well bonded and sealed longitudinal joints to obtain maximum compaction at the joint.

(5) Adjustment of Manholes (Set Price). When required, this work will be performed and paid for under **SECTION 816**.

f. Treatment of Adjacent Areas. Pave sideroads, entrances and turnouts for mailboxes as shown in the Contract Documents. Overlay all widening areas designated in the Contract Documents or ordered by the Engineer.

g. Pavement Smoothness. UBAS is excluded from profilograph testing, and not eligible for pay adjustments.

613.5 PROCESS CONTROL

a. General. Establish gradation limits and proportions for each individual aggregate and mineral filler. Specify the limits and proportions such that the material produced complies with the applicable requirements of the designated mix type. The Contractor is responsible for all process control operations including testing. At no time will KDOT's representative issue instructions to the Contractor or producer as to setting of dials, gauges, scales and meters. KDOT will collect and test verification samples and assurance samples and inspect the Contractor's quality control operations.

b. JMF Adjustments. Produce a mixture of uniform composition closely complying with approved design JMF to obtain the specified properties when compacted. If, during production, results from quality control tests demonstrate a need to make adjustments to the mix design, then make adjustments to the design JMF single point gradation and binder content to achieve the specified properties. The JMF adjustments shall produce a mix that complies with **TABLE 613-1** for the specified mix designation. When necessary, adjust on a sublot basis. Report the new JMF to KDOT's field representative and the DME before making such changes, and submit a new mix design for review and approval if required by the DME.

c. Specification Working Ranges. Establish acceptable limits for field test results by applying the tolerances shown in **TABLE 613-5** to the JMF or adjusted JMF for binder content. Establish acceptable limits for the other listed mix characteristics by applying the tolerances shown in **TABLE 613-5** to the requirements of **TABLE 613-1**.

TABLE 613-5: SPECIFICATION WORKING RANGES (QC/QA)

Mix Characteristic	Tolerance from JMF and Specification Limits		
	Single Test Value	Plot	3 Point Moving Average Value
Binder Content (Maximum deviation from JMF)	±0.3%	*	±0.3%
Film Thickness	n/a	*	zero tolerance
Gradation**	n/a	*	zero tolerance
Course Aggregate Angularity (CAA)	zero tolerance		n/a
Fine Aggregate Uncompacted Voids (FAA)	zero tolerance		n/a
Sand Equivalent	zero tolerance		n/a

*Values to plot. In addition, plot the Gmm values. For gradations, as a minimum, plot the No. 4, 8, 30 and 200 sieves.

The maximum deviation for UBAS from the JMF for the sieves with a ± tolerance shall be as listed in **TABLE 613-6. Only the No. 16, 30, 50 and 100 sieves may exceed the limits listed in **TABLE 613-1** provided the minimum retained percentage shown in **TABLE 613-6** is met.

TABLE 613-6: SPECIFICATION WORKING RANGES FROM THE JMF

Mix Designation	Percent Retained – Square Mesh Sieves									
	¾"	½"	⅜"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200
Type A				±5	68 - 78	75 min	82 min.	87 min.	90 min.	94.0 – 96.0
Type B			±5	±4	73 - 83	77 min.	82 min	87 min.	90 min.	94.0 – 96.0
Type C		±5	±5	±4	73 - 83	77 min.	82 min	87 min.	90 min.	94.0 – 96.0

d. EBL Shot Rate Specification. The Engineer will document the application rate at least twice a day. Acceptable tolerance of the application rate is the target rate ±0.02 gal/sq yd. Provide the Engineer with the number of gallons of asphalt emulsion each time the machine is recharged, and the total number of gallons used at the end of each day's production. The Engineer will correct the gallons of asphalt emulsion for temperature prior to calculating the shot rate.

Periodically verify that the asphalt emulsion is applied uniformly to the road surface. Check for proper coverage at least twice per day. If coverage cannot be verified by the Engineer during normal paving operations, apply the asphalt emulsion to the road surface for a minimum distance of 20 feet. When the Engineer verifies the coverage meets specification, back up the paver and shoot not more than 1/4 of the EBL shot rate over the previously tacked segment.

613.6 WEATHER LIMITATIONS

Do not place UBAS on any wet or frozen surface or when weather conditions otherwise prevent the proper handling and finishing of the mixture.

Only place UBAS when either the minimum ambient air temperature is 50°F or the minimum road surface temperature is 55°F.

613.7 MIXTURE ACCEPTANCE

a. General. Test the UBAS at each plant for compliance with **TABLE 613-1**. Acceptance will be made on a lot-by-lot basis contingent upon satisfactory test results. Obtain quality control and verification samples of the UBAS using KT-25 sampling procedure C.1 Plant Discharge or C.2 Truck Bed.

A load or loads of mixture which, in the opinion of the Engineer, are unacceptable for reasons such as being segregated, aggregate being improperly coated, foaming aggregate or being outside the mixing temperature range may be rejected.

b. Lot Definition for Mix Production Sampling and Testing. A lot is defined as an isolated quantity of a specified material produced from a single source or operation. Each lot shall normally be represented by 4 contiguous test results. A lot may be represented by test results on samples taken from 1 or more day's production.

c. Lot Investigation. The Engineer may examine materials represented by individual test results which lie beyond the Contractor's normal quality control testing variation. The investigation may be based on either Contractor or KDOT test results. The information from additional testing (including testing of in-place HMA) may be used to define unacceptable work according to **SECTION 105**. The Engineer may apply appropriate price reductions or initiate corrective action.

For any test, if a dispute exists between the Engineer and Contractor about the validity of the other's test results, the KDOT District Materials Laboratory or the MRC will perform referee testing. If the disputed KDOT test results were generated at the District Laboratory, the MRC will perform the referee tests. If the disputed KDOT test result was generated at the MRC, an independent laboratory agreeable to both parties will be selected. The Laboratory shall be accredited by the AASHTO Accreditation Program in the appropriate testing category.

If referee testing indicates that KDOT test results are correct, the Contractor pays for the additional testing, including referee testing performed at the MRC. This will be paid using the bid item Contract Deduct which will be an item added to the contract.

If the referee testing indicates that Contractor test results are correct, KDOT pays for the additional testing. Pay the independent lab for the testing and submit the paid invoice to KDOT. The Engineer will reimburse the Contractor (based on the invoice price) as Extra Work, **SECTION 104**.

d. Multiple Projects. If multiple projects are supplied from 1 or more plants using the same mix, carry over the lots at each hot mix plant from project to project.

e. Lot Size. A standard size mix production lot consists of 4 equal sublots of 500 tons each of asphalt mixture (lot size 2,000 tons). If the last sublot contains less than 250 tons, combine it with the previous sublot.

It is anticipated that lot size shall be as specified. However, with the Engineer's approval, the Contractor may re-define lot size for reasons such as, but not limited to, change in contract quantities or interruption of the work. Take 1 sample during production of each sublot and utilize it to determine disposition of the lot in which it occurs.

f. Increased Lot Size. After 8 consecutive sublots have been produced with the tolerances shown for all mix characteristics listed in **TABLES 613-5** and **613-6**, the sublot size may be increased by the Contractor to 750 tons each of asphalt mixture (lot size 3,000 tons), provided normal production rate of the plant is over 200 tons per hour. Immediately notify the Engineer of lot size change. If subsequent test results fall outside the tolerances shown for any mix characteristics listed in **TABLES 613-5** and **613-6**, the sublot size will be decreased to 500 tons. When the increased lot size criteria are again met, the sublot size maybe increased to 750 tons.

g. Pre-Production Mix. Test and evaluate a pre-production mix, limited to a maximum of 200 tons from each plant before production of that mix. Evaluate the pre-production mix at initial start-up and after suspension of production resulting from failing test results. Limit pre-production quantities to 100 tons following a suspension of production. Provide a pre-production mix that complies with the "Single Test Value" in **TABLES 613-5** and **613-6**. Except for initial start-up, normal delivery of material to the project before completion of certain test results on pre-production mixes may be authorized by the DME.

At the direction of the Engineer, remove the pre-production mix if it is both out of specification and the material shortens the pavement life or changes the intended function. The Engineer will pay for the replacement of one pre-production mix at 100% of the contract unit price. The payment will be full compensation to the Contractor for the placement and removal of that pre-production mix. KDOT will not be financially responsible for any subsequent failed pre-production mixes (that require removal) for that mix. The removed material is the property of the Contractor.

The Engineer will not pay for pre-production mixes that are required to be replaced due to poor workmanship or equipment failure. The Engineer will make the final decision to remove a failed pre-production mix with input from the Contractor.

h. Suspension of Mix Production. Suspend production of the mix until appropriate corrections have been made, if 2 consecutive test results for any single mix characteristic fail to fall within the limits established by the tolerances shown in the single test value column of **TABLE 613-5**. Additionally, suspend production of the mix until appropriate corrections have been made, if any 3-point moving average value for any single mix characteristic fails to fall within the limits established by the tolerances shown in the 3-point moving average value column of **TABLE 613-5**. Production remains suspended pending the satisfactory results of a pre-production mix, unless waived by the DME.

When the mix fails to meet the criteria listed in **TABLE 613-5**, identify the cause and document, in detail, what corrective action was taken. The JMF may only be adjusted, when requested by the Contractor, and when approved by the Engineer. For significant changes in the JMF, as determined by the Engineer, a new mix design may be required by the Engineer before the JMF is approved.

The Engineer may stop production of HMA at any time the mix or process is determined to be unsatisfactory. Make the necessary corrections before production will be allowed to resume. Failure to stop production of HMA subjects all subsequent material to rejection by the Engineer or acceptance at a reduced price, as determined by the Engineer.

613.8 MEASUREMENT AND PAYMENT

a. Ultrathin Bonded Asphalt Surface. The Engineer will measure UBAS by the ton of material at the time of delivery to the road. Batch weights will not be allowed as a method of measurement, unless all the following conditions are met:

- the plant is equipped with an automatic printer system approved by the Engineer;
- the automatic printer system prints the weights of material delivered; and
- the automatic printer system is used in conjunction with an automatic batching and mixing control system approved by the Engineer.

Provide a weigh ticket for each load. Due to possible variations in the specific gravity or weight per cubic foot of the aggregates, the tonnage used may vary from the proposal quantities and no adjustment in contract unit price will be made because of such variances.

Payment for "HMA Surface (Ultrathin Bonded)" at the contract unit prices is full compensation for the specified work.

Sideroads, entrances and mailbox turnouts that are not shown in the Contract Documents that are to be surfaced shall be paid for at 1½ times the unit price for "HMA Surface (Ultrathin Bonded)".

b. Emulsified Asphalt. The Engineer will measure emulsified asphalt used for tack by the ton. Payment for "Emulsified Asphalt (Emulsion Bonding Liquid)" at the contract unit price is full compensation for the specified work.

c. Quality Control Testing (HMA). The Engineer will measure Quality Control Testing (HMA) performed by the Contractor on a per ton basis of UBAS placed on the project. No adjustment in the bid price will be made for overruns or underruns in the contract quantity. The bid price will constitute payment for all necessary mix design testing, field process control testing, the testing laboratory and all necessary test equipment.

Payment for "Quality Control Testing (HMA)" at the contract unit price is full compensation for the specified work.

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