

SECTION 7

ASPHALTIC CONCRETE SURFACING

7.01 SCOPE

This section covers the construction of hot mix, hot laid asphaltic concrete pavement, asphalt pavement patching, cold milling, and related work.

A. Traffic Control. The Contractor shall provide work zone traffic control as specified in Section 4.24 for asphaltic concrete paving, asphalt patching, and cold milling operations unless it is stated otherwise in the Project Documents. Work zone traffic control shall be subsidiary to the paving, patching, or milling work unless pay items for work zone traffic control are included in the Project Documents.

7.02 ASPHALTIC CONCRETE PAVEMENT

A. General Description. Asphaltic concrete pavement shall consist of placing a leveling, base, intermediate, or surface course of hot-mixed, hot-laid asphaltic concrete on a prepared subgrade, base, or existing pavement in accordance with these Standard Technical Specifications and in conformity with the lines, grades, widths, thicknesses and typical sections shown in the Project Documents.

B. Materials. Materials shall conform to the requirements specified in Division 1200, Asphalt Materials, of the KDOT Standard Specifications except as amended herein.

(1) Asphalt Binder. Asphalt binder shall conform to the requirements of Performance Graded Asphalt Binder as specified in Subsection 1202.2 of the KDOT Standard Specifications. Unless otherwise specified or approved by the Engineer, PG 70-28 Performance Grade Asphalt Binder shall be used for the binder in BM-2A asphaltic concrete surface courses and PG 64-22 Performance Grade Asphalt binder shall be used in all other courses. Asphaltic concrete shall be comprised of all new materials or a blend of new materials in combination with a maximum of 10 percent reclaimed asphalt pavement unless specified otherwise in the Project Documents.

Only performance graded polymer modified asphalt binders that are supplied by producers included on KDOT's "Prequalified List" shall be used.

i. Basis of Acceptance. Asphalt Binder shall be accepted based upon the Engineer's receipt and approval of a certification prepared by the producer indicating the quality and quantity of material in each shipping container meets the requirements specified. Certifications must be based upon the producer's quality control testing as required for KDOT prequalification.

(2) Asphalt for Tack Coats. Cutback asphalt and emulsified asphalt for tack coats shall conform to the requirements of the KDOT Standard Specifications Section 1203 for Emulsified Asphalt and Section 1204 for Cutback Asphalt. Grades may vary for surface and temperature conditions.

i. Basis of Acceptance. Asphalt for tack coat material shall be accepted based upon the Engineer's receipt and approval of a certification prepared by the producer indicating the quality and quantity of material in each shipping container meets the requirements specified. Certifications must be based upon the producer's quality control testing as required for KDOT prequalification.

(3) Aggregate. Aggregates for asphaltic concrete shall conform to the requirements specified in Section 1103, Aggregates for Hot Mix Asphalt (HMA) of the KDOT Standard Specifications, except as amended herein.

The mix may be composed of any combination of aggregates and mineral filler supplements meeting the applicable requirements in Table 1103-1 and 1103-2 of Section 1103, Aggregates for Hot Mix Asphalt, of the latest edition of the "Standard Specifications for State Road and Bridge Construction", Kansas Department of Transportation. Not more than 30% of the material passing the No. 200 sieve shall be present in the uncrushed aggregate. Surface course shall contain natural sand from an alluvial deposit of such grading that the portion of the sand passing the No. 8 sieve and retained on the No. 200 sieve will be not less than 15% of the total mix.

i. Gradation. The gradation for the combined aggregates in the bituminous mixture shall be as follows:

<u>Sieve Size</u>	<u>% Retained</u>	<u>Job Mix Tolerance</u>
¾ inch	0	--
3/8 inch	6-21	± 5
No. 4	23-40	± 5
No. 8	38-56	± 5
No. 30	61-82	± 4
No. 100	88-99	± 3
No. 200	92-99	± 2

ii. Quality of Individual Aggregates.

Soundness, minimum 0.90
 Wear, maximum 40%
 Absorption, maximum 4.0%
 The Plasticity Index shall not exceed 6.
 The maximum moisture shall not exceed 0.5%.

iii. Deleterious Substances. The combined aggregates shall be free from alkali, acids, organic matter, or injurious quantities of other foreign substances. Other deleterious substances shall not exceed the following percentages by weight:

Sticks..... 0.1%
 Shale, shale-like or soft or friable particles
 singly or in combinations..... 1.0%
 Coal..... 0.5%

Aggregates shall be tested for deleterious substances by the aggregate producer by the test methods identified in Section 1115 - “Test Methods for Division 1100, Aggregates” of the KDOT Standard Specifications.

iv. Basis of Acceptance. Aggregates for asphaltic concrete shall be accepted based upon the Engineer’s receipt of a certification from the aggregate producer that the material meets the requirements specified.

C. Mix Designation. The asphaltic concrete shall conform to the mix designation BM-2A as defined and specified in the KDOT Standard Specifications for State Road and Bridge Construction, 1990 Edition. The asphaltic concrete shall be comprised of all new materials or a blend of new materials with a maximum of 10 percent reclaimed asphalt pavement (RAP) unless otherwise specified in the Project Documents.

D. Asphaltic Concrete Mix Design. The Marshall method of mix design shall be used to test specimens of asphaltic concrete. Specimens shall be compacted at a temperature of 200⁰F to 300⁰F. A minimum of five sets of Marshall Stability properties shall be plotted on standard graph paper. The range of asphalt binder content shall be wide enough so that the Marshall Stability Curve peaks. Determination of the design mix binder content shall be made from these graphs. The mix design shall meet the following criteria:

TABLE 7.02 D. - ASPHALTIC CONCRETE MIX DESIGN

Mix Design Criteria	Street or Road Functional Classification	
	Principal/Minor Arterial and Major/Minor Collector	Local
Compaction – Blows per side of specimen	75	50
Marshall Stability (minimum)	1800	1200
Flow (1/100 inches)	8 – 16	8 – 18
% Binder (deviation from target binder content)	+/- 0.6%	+/- 0.6%
% Voids – Total Mix ^{Note 1}	3 – 5	3 – 5
% Voids in Mineral Aggregate (minimum)	13% Base Course 14% Surface Course	13% Base Course 14% Surface Course

^{Note 1} The target air voids for determining asphalt content shall be 4%. See Subsection 7.02 I. (4).

No asphaltic concrete shall be produced for payment until an asphaltic concrete mix design, including a design job-mix gradation, has been approved by the Engineer. The preparation of the asphaltic concrete mix design shall be performed by an approved testing laboratory and technicians certified in Asphalt Marshall Design (AMD). The preparation of the mix design shall be subsidiary to the bid item “Asphaltic Concrete”.

E. Equipment. Equipment shall conform to the requirements specified herein. No diesel fuel shall be allowed on an asphaltic concrete lift.

(1) Hot Mix Asphalt Plant. The hot mix asphalt plant shall conform to the requirements specified in Subsections 155.6 (a) and 155.6 (c) of the KDOT Standard Specifications.

(2) Storage or Surge Bins. Storage or surge bins for asphaltic concrete shall be used only with written approval of the Engineer. If, after approving the use of storage or

surge bins, the Engineer determines that segregation is occurring with their use, the Engineer may prohibit their continued use. Storage or surge bins shall conform to requirements specified in Subsection 155.3 of the KDOT Standard Specifications.

(3) Weighing Equipment. The weighing equipment for truck-hauled material shall consist of 1) an accurate and reliable platform scale or 2) an electronic system in which the scale is equipped with an automatic printout system that will print the weights of the material being delivered.

The scale shall be accurate to 0.5% throughout the range of use. The scale shall be checked, adjusted and certified by a qualified manufacturer's representative or an approved testing firm at 1) a maximum of 6 months intervals, 2) when the scale is repaired, and 3) any other time deemed necessary by the Engineer to assure the scale's accuracy. Platform scales shall have a platform of adequate length to weigh the longest truck in use on the project in one operation.

(4) Hauling Equipment. Any truck used for hauling asphaltic concrete shall have a tight, clean, smooth metal bed which has been thinly coated with a minimum amount of paraffin oil, lime solution, or other approved material to prevent the asphaltic concrete from adhering to the bed. The coating material shall not contaminate or alter the characteristics of the asphaltic concrete being hauled. The use of petroleum derivatives for coating the truck beds is prohibited. Trucks shall be equipped with a canvas cover or other suitable material of such size as to protect the mixture from the weather.

(5) Asphalt Distributor. The distributor shall conform to the requirements specified in Subsection 155.2 of the KDOT Standard Specifications. The distributor shall be calibrated and checked before being used. The Contractor shall provide to the Engineer a certificate indicating that the distributor meets the specified requirements and has been calibrated.

(6) Paver. The paver shall conform to the requirements specified in Subsection 155.4 of the KDOT Standard Specifications.

(7) Thermometers and Heat Sensing Guns. The Contractor shall provide to the Engineer certificate indicating that thermometers and heat sensing guns have been calibrated at the frequency and manner recommended by the manufacturer.

(8) Compaction Equipment. Self-propelled steel rollers shall conform to the requirements specified in Subsection 151.4 (c) of the KDOT Standard Specifications. Heavy self-propelled pneumatic-tired rollers shall conform to the requirements specified in Subsection 151.3 (c) of the KDOT Standard Specifications.

F. Construction Requirements. Any base course shall be compacted, tested, and approved before the placement of an intermediate or surface course. Unless otherwise specified, any and all leveling, base and intermediate courses shall be the same mix designation as the surface course.

(1) Preparation of the Asphalt Binder. The asphalt binder shall be heated to a temperature within the range recommended by the liquid supplier and in manner that avoids local overheating.

(2) Preparation of the Aggregate. Except for the minor fluctuations, the aggregate for the asphaltic concrete shall be dried and heated at the time of mixing to be within a temperature range of 260 °F. to 335 °F. Flames used for drying and heating shall be properly adjusted to avoid damage to the aggregate and to avoid soot on the aggregate.

(3) Preparation of the Asphaltic Concrete. Dried aggregate shall be combined in the plant in accordance with the approved design job-mix gradation and asphaltic concrete mix design. The combined aggregate shall be thoroughly dry mixed prior to adding the bind. The binder shall be introduced into the mixture in proportion to the approved asphaltic concrete mix design. The wet mixing time shall not be less than 40 seconds, but in all cases shall be sufficient to produce a homogeneous mixture in which all the aggregate is uniformly coated. At the time of discharge from the plant, the asphaltic concrete shall be within the temperature range recommended by the binder supplier.

Sampling and testing of the asphaltic concrete to determine conformance with the asphaltic concrete mix design and the design job-mix gradation shall be made at intervals corresponding to the production of approximately 500 tons of asphaltic concrete, but not less than one set of tests shall be made each day asphaltic concrete is produced. This sampling and testing shall be performed by an approved testing laboratory and shall be subsidiary to the bid item “Asphaltic Concrete”. The Contractor or the testing laboratory shall submit written test results to the Engineer’s Project Representative as soon as the testing is complete.

(4) Grade Control. The Project Surveyor will make the survey required for the reference grade and will establish the center line points. The Contractor shall maintain the location of the points until the completion of the surface course or as directed by the Engineer.

The Contractor shall erect and maintain a reference string line and operate the paver to conform to the string line for the initial lift and any other lifts if specified by the Engineer. The string line shall be erected parallel with the reference grade, and the asphaltic concrete shall be spread at a constant elevation above, below or at the string line elevation as directed.

If automatic profile road building type equipment is used to prepare the subgrade, the requirements for an erected reference string line may be waived by the Engineer. The Contractor shall furnish and maintain an approved mobile string line for all lifts not laid with the erected string line, and operate the paver to conform to that string line. The longitudinal and transverse controls of the paver shall operate independent of each other to the extent necessary for the surface of the asphaltic concrete to conform to the string line and be uniform in cross section or crown.

(5) Preparation of the Subgrade or Base. The requirements for the preparation of earth or treated subgrade are specified in Subsections 3.10 and 3.11. No asphaltic concrete shall be placed on frozen subgrade.

i. Cleaning Surface. Concrete or asphalt pavement bases shall be cleaned of all dirt and other foreign material. Power brooms will not be acceptable for cleanup work without adequate dust control procedures. Clean and fill cracks and joints.

ii. Tack Coat. After the surface has been cleaned, a tack coat shall be applied at a rate of from 0.05 to 0.10 gallon per square yard to ensure a bond between pavement surfaces. Tack coat should be applied to uniformly cover the entire surface, including all vertical surfaces of joints, curbs, gutters, manholes and inlets, and brick or concrete base. Areas that cannot be coated from a distributor truck shall be coated by use of a spray wand.

The tack coat shall be applied to the top of base, intermediate and leveling courses the same day the subsequent lifts are to be laid. Tack coat is required for all subsequent lifts regardless of whether or not the lower lift was paved the same day. The tack coat shall be applied only to the area on which the asphaltic concrete is to be placed that same day. The Contractor shall re-apply tack coat to areas not paved the same day the tack was applied at no additional expense to the Owner.

Traffic, both construction and local, should be kept off fresh tack. A freshly applied tack coat surface may be slick, particularly before the asphalt emulsion has broken. To limit disruption of traffic and to keep traffic off the fresh tack, the Contractor shall reduce the length ahead of the asphalt laydown operation that the tack is applied. Workers shall be provided by the Contractor to prevent traffic from traveling over the tack coat.

If exposure of the tacked surface to traffic is unavoidable, the Contractor shall sand the surface at the rate of 6 lbs. per square yard. The Contractor shall broom the sand from the surface before the new pavement is placed to ensure a proper bond and then reapply the tack coat. The Contractor shall also clean and reapply tack to areas where traffic has tracked dirt onto the tacked surface or where traffic has pulled tack off of the surface.

(6) Protection of Concrete Contact Surfaces. Asphaltic concrete shall not be laid against concrete contact surfaces such as curb and gutter, inlets, etc. until the concrete is at least 5 days old and has reached 75% of its design strength.

(7) Contact Surfaces. Contact surfaces of curb and gutters, manholes, valve boxes, monuments boxes, and other similar structures shall be sprayed or painted with a thin, uniform tack coat.

(8) Lift Thickness. The nominal thickness of the compacted mat shall not exceed 2 inches for surface courses and 4 inches for other courses, unless specified otherwise in the Project Documents or requested by the Engineer. The Engineer may adjust the lift thickness when such adjustment is more adaptable to the total pavement thickness and when, in the opinion of the Engineer, it is not detrimental to placement and rolling conditions. The Engineer may also adjust the lift thickness to utilize the most efficient method of acquiring the required density and surface characteristics.

(9) Laydown Temperature Requirements. All asphaltic concrete shall be delivered to the paver at a temperature between 260⁰F and 335⁰F. Laydown operations shall be discontinued if, in the opinion of the Engineer, wind velocities create excessive cooling of the asphaltic concrete or moisture conditions cause excessive steam.

TABLE 7.02 F. (9): RECOMMENDED MINIMUM LAYDOWN TEMPERATURE (°F) FOR BASE COURSES *

Base or Subgrade Temperature (°F)	Lift Thickness					
	1/2"***	3/4"***	1"	1 1/2"	2"	3+"
32-40	---	---	---	305	295	280
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+	275	270	265	260	260	260
Recommended Minimum Rolling Time (minutes)	4	6	8	12	15	15

*Surface course must be installed with ambient air temperature 50°F and rising.

**Thicknesses less than 1 inch may be used only with written approval of the Engineer.

(10) Paving Operations. The asphaltic concrete shall be placed reasonably true to crown and grade by an automatically controlled paver. Asphaltic concrete may be placed by hand methods only where machine methods are impractical. The paver shall spread the asphaltic concrete without tearing, shoving or gouging the surface and shall strike a finish that is smooth, true to cross section, free of segregation, uniform in density and texture, seamless at center joints, true and straight at the edge lines, and free from hollows, transverse corrugations and other irregularities. If the pavement does not conform to all of these requirements, the plant production and paving operations shall be suspended until the deficiency is corrected.

All asphaltic concrete shall be delivered to the paver in time to permit the completion of the placement and compaction of the asphaltic concrete during daylight hours. Nighttime work on projects not open to traffic may be permitted only with written approval of the Engineer. The Contractor shall supply ample, appropriate lighting.

Tickets certifying asphalt mix and binder shall accompany each load of asphaltic concrete delivered to the project and shall be given to the Engineer's Representative.

(11) Compaction. The asphaltic concrete shall be uniformly compacted immediately following placement without tearing, shoving or gouging the surface. Delays in compacting freshly placed asphaltic concrete shall not be permitted.

Compaction of the mixture shall be accomplished using a steel-wheel roller **or a pneumatic tire roller**. Breakdown rolling shall be as close behind the paver as possible. The breakdown roller shall be **a steel-wheel roller** and **operating** in the vibratory mode **or a pneumatic tire roller**. The intermediate roller shall also roll closely behind the breakdown roller **and shall be either a steel-wheel roller or a pneumatic tire roller**. Finish rolling shall be accomplished by **a steel-wheel roller** operating in the static mode for the purpose **of** eliminating roller marks.

Rolling shall be continued until density is obtained in all portions of each course. Rollers and rolling procedures that result in crushing of the aggregate shall not be permitted. Compaction shall be sufficient to achieve field densities equal to or greater than 92% of the Maximum Theoretical Density as determined by tests made on specimens taken from the

compacted course in accordance with the requirements of 7.02 H, testing of completed Asphaltic Concrete Pavement.

Compaction necessary to achieve the specified 92% of the maximum theoretical density shall be accomplished before the surface temperature of the bituminous mixture falls below 175⁰F. Subsequent lifts shall not be placed until the specified densities have been achieved, the temperature of the existing bituminous mat is below 175⁰F, and placement does not cause deformation of the existing bituminous mixture.

Compaction in all places inaccessible to the rollers, such as locations adjacent to curbs, driveways, inlets manholes, valve boxes, monument boxes and other similar structures, shall be completed to the specified 92% density using a vibratory plate compactor.

(12) Construction Joints. Joints between old and new pavements or between successive days' paving work shall thoroughly and continuously bond the two pavements. The transverse construction joint between old and new pavements or between successive days' work shall be constructed by cutting the asphaltic concrete back for its full depth so as to expose a fresh, vertical surface. Before placing asphaltic concrete against the cut joint, the contact surface shall be sprayed or painted with a thin, uniform tack coat. Starter blocks shall be placed beneath the entire length of the paver's screed, front to back, when beginning placement of asphaltic concrete from the transverse construction joint. The paver's screed shall not be set directly on the previously laid mat and dragged off of the existing asphaltic concrete. The thickness of the starting blocks shall allow for the additional thickness needed for placing the uncompacted lift prior to its compaction to the required thickness for the asphaltic concrete. The approximate thickness of the starting blocks should be equal to the compacted lift thickness in inches multiplied by ¼ inch per inch.

The height of the new asphaltic concrete above the existing mat shall allow for the additional thickness needed for placing the uncompacted lift prior to its' compaction to the required thickness for the asphaltic concrete; approximate height should be equal to the compacted lift thickness in inches multiplied by ¼ inch per inch. Any excess asphaltic concrete shall be bumped back onto the second lane with a lute or rake. Excess asphaltic concrete shall not be scattered across the fresh mat. Compaction of longitudinal construction joint shall be achieved by pinching the bumped excess asphaltic concrete down onto the joint. The longitudinal construction joints in successive courses shall be offset not less than 6 inches nor more than 12 inches. The widths and placements of the surface course shall conform to traffic lane lines. Joints shall be straight. If the pavement does not conform to all of these requirements, the plant production and paving operations shall be suspended until the deficiency is corrected.

G. Surface Tolerances. The surface shall be true to established crown and grade. The surface may be checked by the Engineer using a 10-foot straightedge at the Engineer's discretion. The maximum allowable variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed ¼ inch. Any areas with surface variations greater than the maximum allowable shall be corrected at the expense of the Contractor. The methods for corrections shall be diamond grinding, removal of the surface course by milling and overlay, overlaying with surface course or other methods as approved by the Engineer. The corrective measures shall be applied to the full lane width of the pavement and the corrected areas shall be squared normal to the centerline of the paved surface.

H. Testing of Completed Asphaltic Concrete Pavement. All lifts of asphaltic concrete shall be compacted and tested before the placement of a subsequent lift. Testing for density, and thickness shall be based on random core samples taken from each completed lift. The random test locations may be selected using the method described in Subsection 7.07 or by another random sampling technique approved by the Engineer.

Core samples of the completed lift shall be obtained by the Contractor or a certified testing laboratory retained by the Contractor. Cores shall be at least 4 inches in diameter. The Contractor shall furnish and operate an approved saw or core drill for cutting pavement samples. The equipment shall be capable of cutting the mixture without shattering the edges or otherwise disturbing the density.

The samples shall be tested and measured by a certified testing laboratory retained by the Contractor to determine the density of the asphaltic concrete. A single test shall be considered the average of three core samples taken at random locations throughout a block or within an intersection/cul-de-sac. Core samples shall not be taken closer than 3.0 feet to the toe of a curb or edge of pavement or within 1.5 feet of a construction joint. A minimum of one test (three cores) shall be taken for each block of completed lift, measured from ECR to ECR, and one test from each completed lift in an intersection or cul-de-sac. Results shall be reported to the Engineer in writing.

The Contractor shall patch the core locations with high strength non-shrink grout or other approved material.

I. Basis of Acceptance. Completed asphaltic concrete pavement shall be accepted based upon the following:

(1) Surface Smoothness. Asphaltic concrete pavement shall meet the surface tolerances specified in Subsection 7.02 G. Pavement not meeting these surface tolerances, after any necessary corrections, shall not be accepted.

(2) Compacted Thickness. Asphaltic concrete pavement shall be accepted for thickness where the thickness in a test area as specified in Subsection 7.02 H. is not more than 0.25 inches less than the thickness specified in the Project Documents. A test area shall be considered the average of three core samples taken at random locations throughout a block or within an intersection/cul-de-sac.

Where the thickness of the asphaltic concrete pavement in a test area is deficient by more than 0.25 inch, but not more than 1.0 inch, the pavement shall be accepted for thickness. However, payment for such deficient pavement shall be made at an adjusted price as specified in Table 7.02 I. (2). Deductions for deficient pavement thickness may be entered on any payment estimate after the information becomes available.

Where the pavement is more than 1 inch deficient in thickness, the Contractor shall remove such deficient areas and replace them with pavement of satisfactory quality and thickness. The Contractor shall receive no compensation for materials or labor involved in the removal or the replacement of deficient pavement. With the consent of the Engineer, the Contractor may leave the deficient pavement in place and receive no compensation or payment for such pavement. The area of pavement for which no payment is made shall be identical to the area of pavement which the Contractor would be required to remove and replace.

TABLE 7.02 I. (2): PRICE ADJUSTMENT FOR PAVEMENT THICKNESS DEFICIENCY

Deficiency in Specified Pavement Thickness as Determined by Cores	Proportioned Part of the Contract Price Allowed
0.00 to 0.25 inch	100%
0.26 to 0.50 inch	90%
0.51 to 0.75 inch	75%
0.76 to 1.00 inch	60%

(3) Compacted Density. Asphaltic concrete pavement shall be accepted for density where the density, tested as specified in Subsection 7.02 H., is equal to or greater than 92% of the maximum theoretical Marshall density. A test area shall be considered the average of three core samples taken at random locations throughout a block or within an intersection/cul-de-sac.

When the density of any individual lift in any test area is less than 92% and greater than or equal to 90.5% of the maximum theoretical Marshall density, the asphaltic concrete pavement within the test area will be accepted for density but payment shall be made at an adjusted unit price calculated as follows:

Adjusted Unit Price = (Contract Unit Price of Asphaltic Concrete) x (Specified Thickness of Lift Sampled divided by Total Specified Pavement Thickness) x (Appropriate Price Adjustment Factor as Specified in Table 7.02 I. (3))

TABLE 7.02 I. (3): PRICE ADJUSTMENT FOR PAVEMENT DENSITY DEFICIENCY

Pavement Density as a Percentage of Maximum Theoretical Marshall Density in Test Area	Proportioned Part of the Contract Price Allowed
92.00% or above	100%
91.00% - 91.99%	80%
90.50% - 90.99%	70%
Less than 90.50%	0%

Deductions for deficient density may be entered on any pay request after the information becomes available.

Where the density of any individual lift of asphaltic concrete pavement in a test area is less than 90.5% of the Maximum Theoretical Density, the Contractor shall remove the deficient area of asphaltic concrete pavement represented by the test and replace it with pavement material of satisfactory quality and density. Full depth pavement removal and replacement will be required if a bottom or intermediate lift is deficient. The Contractor shall receive no compensation for materials or labor involved in the removal and replacement of the deficient pavement.

(4) Percent Air Voids – Total Mix. Asphaltic concrete pavement shall **be sampled and tested to determine percent air voids and conformance with the asphaltic concrete mix design at intervals corresponding to the production of approximately 500 tons of asphaltic concrete, but not less than one set of tests each day asphaltic concrete is produced, as specified in Subsection 7.02 F (3).** Asphaltic concrete pavement shall be

accepted for air voids when the percent air voids are within the range of 3% to 5%. If the test results for percent air voids are outside of the specified range of 3% to 5%, payment will be made an adjusted price, as specified in Table 7.02 I (4). Deductions for deficient air voids will reflect the area of pavement represented by the corresponding 500 ton test sample. Deductions for deficient air voids in the total mix may be entered on any pay request after the information becomes available.

TABLE 7.02 I. (4): PRICE ADJUSTMENT FOR AIR VOID RANGE DEFICIENCY

Measured % Air Voids - Total Mix	Proportioned Part of the Contract Price Allowed
3% to 5%	100%
2.5% to 2.9% or 5.1% to 5.5%	70%
< 2.5% or > 5.5%	0% or Remove and replace at the discretion of the Engineer.

(5) Surface Condition. The final surface of the asphaltic concrete shall be visually inspected by the Engineer. The surface finish shall be substantially free of tears, shoving, ruts, gouges, segregation, variations in texture, excessive variation at seams and center joints, corrugations or other irregularities identified by the Engineer. The Contractor will be required to repair deficient areas to the satisfaction of the Engineer. No payment will be made for correcting deficiencies in the pavement surface condition.

J. Bid Item, Measurement, and Payment.

(1) Bid Item:

(*) ASPHALTIC CONCRETE Unit: Square Yard (nearest S.Y.)

(*) Specified Thickness of Asphaltic Concrete Pavement in inches.

(2) Measurement. “(*) Asphaltic Concrete” shall be measured by the area of the top of the asphaltic concrete pavement constructed. Dimensions of individual areas shall be measured to the nearest 0.1 foot, the areas computed, summed and rounded to the nearest square yard for each pay application. The portion of an asphaltic concrete base placed under curbs and the tapered/sloped portion of the pavement between the top and bottom of the pavement section at the pavement’s edges shall not be measured.

(3) Payment. Payment for completed and accepted asphaltic concrete pavement, measured as provided above, shall be made at the Contract Unit Price for “(*) Asphaltic Concrete” per square yard subject to price adjustments for thickness, density, and air void deficiencies as stipulated in Subsections 7.02 I.(2), 7.02 I.(3), and 7.02 I.(4) above. Such payment shall be full compensation for the drying and screening of the aggregates; the mixing of the asphaltic cement with the aggregates; the preparation of the subgrade, unless bid as a separate bid item; the preparation of the base or surface to which the asphaltic concrete is applied; the application of prime and tack coats; the hauling, placing, finishing, and compaction of the asphaltic concrete; mobilization; providing all traffic control, unless provided by the owner or established as a separate pay item; and for all labor, equipment, tools, supplies, and incidentals necessary to complete the work.

7.03 ASPHALT PAVEMENT PATCHING.

A. Materials. Unless otherwise specified in the Project Documents, materials used for patching asphalt pavement shall meet the requirements for asphaltic concrete pavement specified in Subsection 7.02 B.

B. Construction Requirements.

(1) Initial Removal of Pavement. The Engineer shall mark in the field the limits of the asphaltic concrete pavement to be removed and replaced. The pavement shall be removed by first saw cutting around the perimeter of the patch area to the full depth of the pavement to be removed. The Contractor shall remove and dispose of the pavement as Specified in Subsection 3.13.

i. Removal of Pavement Containing Bricks (Projects within the City Limits Only). If the area to be patched has one or more underlying layers of brick, the requirements of Subsection 4.05 and the City of Topeka Brick Street, Alley and Sidewalk Policy shall apply. Upon encountering pavement containing bricks, the Contractor shall contact the City Street Maintenance Section and request instruction relative to preservation of the brick. The Contractor shall not proceed with any excavation of pavement containing brick until authorization from the Street Maintenance Section is received.

After the authorization to proceed has been received from the Street Maintenance Section, the Contractor may proceed with removal of bricks as specified in Subsection 4.05 and using care to not damage the bricks. The bricks, including those overlain with asphalt shall be salvaged to the Street Maintenance Section or disposed of as specified in Subsection 4.05.

(2) Subgrade Stabilization. After removal of the pavement, the Contractor shall request an inspection of the subgrade by the Engineer. If the Engineer determines that the subgrade is unstable, it shall be excavated to a depth determined by the Engineer and backfilled with Crushed Aggregate Base – Type AB-3 as specified in Subsection 3.12 or with other material as directed by the Engineer. The aggregate base shall be moistened and deposited in lifts not exceeding 6 inches and compacted to a minimum density of 95% of the standard density with moisture content of +/-3% of the optimum moisture or to the satisfaction of the Engineer when testing of the density of the material is waived by the Engineer. The installation and compaction of the aggregate base shall be paid for by the ton under the pay item “Aggregate Base – Type AB-3” Excavation of the subgrade shall be paid for by the cubic yard under the pay item “Unclassified Excavation”.

(3) Additional Pavement Removal. Additional existing pavement shall be full depth sawcut and carefully removed by the Contractor to provide a minimum shoulder width of 9 inches of undisturbed subgrade on each side of the trench.

If the asphalt patching is necessary due to an excavation into the roadbed, the Contractor shall backfill the excavation as specified in Section 2.10 to the bottom of the adjacent pavement prior to removing additional pavement for the minimum 9 inch subgrade shoulder.

(4) Placing the Patch. The width from sawcut to sawcut shall be filled with asphalt (referred to in the following as “the patch”) as specified in Standard Detail Drawing DT-007 and DT –008 and matching the thickness of the existing pavement. Pavements consisting of an asphalt overlay on concrete shall be replaced in kind as specified in the Standard Detail Drawing DT—007 and DT -- 008.

Before placing the patch, the Contractor shall clean the exposed edges of the existing pavement and apply a thin tack coat of emulsified asphalt to the clean edges of the existing pavement.

Asphaltic Concrete shall be placed and compacted from the depth of the bottom of the adjacent pavement to the final surface elevation in uniform layers of 3 inches or less. The Contractor shall compact each layer until no further consolidation is observed. The surface of the preceding layer shall be cleaned before the succeeding layer of asphalt material is placed. Where the patch area is designated to be finished as specified in Subsection 7.04, the patch asphalt shall be placed and compacted from the depth of the bottom of the adjacent pavement in uniform layers of 3 inches or less, leaving room for the specified depth of surface course.

When patches have a transverse width greater than 8.5 feet and a longitudinal length greater 10 feet, the final lift shall be placed with a paving machine and compacted with a breakdown roller.

All edges of patched areas shall be sealed with hot type joint sealant. Sealing of the edges of the patch is subsidiary to the patch.

C. Basis of Acceptance.

(1) Surface Tolerances. The surface of the patch may be checked by the Engineer using a 10-foot straightedge at selected locations at the Engineer’s discretion. The maximum allowable variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed 1/4 inch. Any patch areas with surface variations greater than the maximum allowable shall be corrected at the expense of the Contractor.

(2) Compacted Density. Asphalt pavement patches shall be accepted for density where the density, is equal to or greater than 92% of the maximum theoretical Marshall density as tested by a nuclear densimeter. If the patch fails to meet these requirements, the Contractor shall remove and satisfactorily replace the patch to the satisfaction of the Engineer at no additional cost to the Owner.

(3) Surface Condition. The final surface of the asphalt patch shall be visually inspected by the Engineer. The surface condition of the patch shall be accepted if it is substantially free of tears, shoving, ruts, gouges, segregation, variations in texture, excessive variation at joints, corrugations, or other irregularities identified by the Engineer. The Contractor will be required to repair the deficient area to the satisfaction of the Engineer at no additional cost to the Owner.

D. Bid Item, Measurement, and Payment. Crushed rock surfacing used to repair subgrade for asphalt pavement patches shall be measured and paid for as specified in Subsection 4.07.

(1) Bid Item:

ASPHALT PAVEMENT PATCHING

Unit: Ton (nearest 0.1 ton)

(2) Measurement. The asphaltic concrete filling the area between the final sawcuts shall be considered “Asphaltic Pavement Patching” and shall be measured as the weight of the material, to the nearest 0.1 Ton, installed. The weight shall be computed based upon the volume of the patch with individual dimensions measured to the nearest 0.1 foot and an assumed unit weight of 145 pounds per cubic foot. Sawcutting, removal of pavement, cleaning, applying emulsified asphalt tack, and compaction of the asphalt shall not be measured and shall be considered incidental to the item Asphalt Pavement Patching.

(3) Payment. Payment for completed and accepted asphalt pavement patches, measured as provided above, shall be made at the Contract Unit Price for “Asphalt Pavement Patching” per Ton. Such payment shall be full compensation for sawcutting, removal of pavement, cleaning, applying emulsified asphalt tack, placing and compaction of the asphalt; providing all traffic control, unless provided by the owner or established as a separate pay item; and for all labor, equipment, tools, supplies, and incidentals necessary to complete the work as specified

7.04 OVERLAYING ASPHALT PATCHING.

A. General. When indicated in the Project Documents asphalt patches shall be finished as specified herein.

B. Materials. Unless otherwise specified in the Project Documents, overlay materials used for patching asphalt pavement shall meet the requirements for asphaltic concrete pavement specified in Subsection 7.02 B.

C. Construction Requirements. An area surrounding the full depth repair area (the patch) shall be milled to a depth of 2 inches and the patch and milled area overlaid with 2 inches asphaltic concrete. Surface course milling shall meet the requirements of Subsection 7.05. The asphaltic concrete shall be constructed as specified in Subsection 7.02. Final mill and overlay limits shall be perpendicular to the centerline of the roadway unless approved otherwise.

(1) Asphalt Pavements Less Than Three Years Old. When the existing asphalt pavement is less than three years old, the area milled shall surround the patch to the width of the affected lane in the transverse direction and at least 10 feet beyond the patch in longitudinal directions. The milled area shall have at least one foot of milled surface surrounding all squared edges of the patch. If the milled area, as described above, extends into the adjacent lane, then the entire adjacent lane width shall also be milled. If the distance between two milled areas is closer than 20 feet, then the mill and overlay operation shall be extended to combine the areas into one area. If there are more than 3 repair areas in a 100 foot section of street, then the areas shall be combined into one large mill and overlay area. The requirements set forth in this paragraph also apply to asphalt on concrete pavements that have an asphalt surface course less than three years old.

(2) Asphalt Pavements More Than Three Years Old. When the existing asphalt pavement is more than 3 years old, the area milled shall extend 1 foot beyond each squared edge of the patch. If the distance between two milled areas is closer than 10 feet then the mill and overlay operation shall be extended to combine the areas into one area. If there are more than 3 repair areas in a 50 foot section of street, then the areas shall be combined into one large mill and overlay area.

D. Bid Item, Measurement and Payment.

(1) Bid Item:

ASPHALTIC CONCRETE

Unit: Square Yard (nearest 1 Sq. Yd.)

(2) Measurement. “Asphaltic Concrete” shall be measured by the area of pavement milled and overlaid. Dimensions of individual areas shall be measured to the nearest 0.1 foot, the areas computed, summed and rounded to the nearest square yard for each pay application.

(3) Payment. Payment for the completed and accepted milling and overlay of asphalt patch areas shall be made at the Contract Unit Price per square yard for “Asphaltic Concrete,” which price shall be full compensation shall all materials, labor, equipment, hauling, stockpiling, and incidentals necessary to complete the work as specified.

7.05 COLD MILLING.

A. Construction Requirements. Cold milling shall consist of the removal of pavement surfaces to the depth and limits as indicated in the Project Documents or as directed by the Engineer. Milling will require grade lines using approved equipment automatically controlled with regard to longitudinal grade and cross slope.

The longitudinal termini of milled areas shall be sawcut transverse to centerline to provide a clean vertical edge and milled to a depth not less than 2 inches. Where through traffic crosses the edge of a milled area, or where traffic is being carried on a milled area, and the condition will remain overnight or for a longer period, temporary asphalt wedges 10-feet in length shall be constructed to smooth the transition from the normal pavement surface and the milled surface. Temporary asphalt wedges are subsidiary.

Unless otherwise indicated, all milled material shall be loaded into dump trucks and hauled by the Contractor to designated City or County stockpile locations.

B. Bid Item, Measurement and Payment.

(1) Bid Item:

COLD MILLING

Unit: Square Yard (nearest 1 Sq. Yd.)

(2) Measurement. “Cold Milling” shall be measured by the area of pavement milled. Dimensions of individual areas shall be measured to the nearest 0.1 foot, the areas computed, summed and rounded to the nearest square yard for each pay application.

(3) Payment. Payment for the completed and accepted milling of pavement shall be made at the Contract Unit Price per square yard for “Cold Milling,” which price shall be full compensation for all materials, labor, equipment, hauling, stockpiling, and incidentals necessary to complete the work as specified.

7.06 ASPHALT OIL PRICE ADJUSTMENT.

A. General. When the item “Asphalt Oil Price Adjustment” is included as a pay item in the Project Documents, the total Contract amount for asphaltic concrete work will be adjusted for variations in the price of asphalt binder material.

B. Commencement and Timely Completion of Work. The parties recognize that asphalt prices are volatile and that timely completion of the Project is essential. Upon Commencement of Contract time as defined in Section 2.3 of the General Conditions of the Project Manual, the Contractor shall begin work on the Project as soon as possible and pursue the work in an expeditious manner. The Contractor may not move off the Project without the written permission of the Owner. If the Contractor moves off the Project without the written permission of the Owner, the Owner will discontinue additional payments to the Contractor for asphalt oil price adjustments due to price increases for the remainder of the Project Contract. However, deductions for asphalt oil price adjustments will continue to be applied regardless of whether or not the additional payments are discontinued for price increases. The Owner’s written permission will not be withheld unreasonably.

C. Bid Item, Measurement and Payment.

(1) Bid Item.

ASPHALT OIL PRICE ADJUSTMENT (*Maximum) Unit: Dollars
(nearest \$0.01)

*Maximum price of adjustment in Dollars, bid form amount for this bid item will be set at \$0.00

(2) Measurement. When included as a pay item in the Project Documents, “Asphalt Oil Price Adjustment” shall be measured based upon an Asphalt Material Index (AMI) established by Shawnee County each month and the volume of asphalt constructed in that same month. Shawnee County will determine the AMI by averaging the rack prices for PG 64-22 as quoted to the County by Conoco Oil and Ergon Inc. in Kansas City. The County will publish the AMI monthly on the Shawnee County Public Works web page. The AMI for the month the Project Contract is let becomes the Starting Asphalt Index (SAI) for the project regardless of the grade of asphalt oil used on the project. The Contractor’s bid price for each Asphaltic Concrete bid item shall be based on the SAI.

Asphalt Oil Price Adjustment (increases/decreases) will be included in each pay application based on the following computations:

Asphalt Oil Price Adjustment

$$= [(** \text{Area of Asphalt Placed} \times \text{\#thickness} \times \psi 145 \text{ pcf} \times \phi .05) / 2000] \times \text{“A”}$$

Where: “A” = (AMI - SAI)

**Area of Asphalt Placed is the area of asphalt pavement constructed in a particular month and shall be measured as the surface area of the top of the asphaltic concrete pavement constructed. Dimensions of individual areas shall be measured to the nearest 0.1 foot, the areas computed, summed and rounded to the nearest square foot for each pay application. The tapered/sloped portion of the pavement between the top and bottom of the pavement section at the pavement's edges shall be measured.

#Thickness is in feet of corresponding pavement areas constructed in a particular month, which may not be the final plan thickness if all lifts have not been constructed.

ψ assumed unit weight =145 pcf

φ assumed oil in mix = 5%

Example:

Given the following:

Area = 18,000 SF

Thickness = 3" (.25') plan thickness

SAI = \$400/ton

AMI = \$450/ton for the month

Asphalt Oil Price Adjustment = $[(18,000 \times .25 \times 145 \times .05) / 2000] \times \$50 = \$815.63$

(3) Payment. When included as a pay item in the Project Documents, payment or deductions for "Asphalt Oil Price Adjustment", measured as provided for above, shall be made as the project progresses by adjusting the item "Asphalt Oil Price Adjustment" on the Contractor's Applications for Payment. The Contractor shall prepare and submit a form similar to Form 1 on the next page:

Asphalt Oil Price Adjustment – Form 1

Month: July 2012
 Contractor Name: John Doe Paving, Inc.
 Contract No. XXX
 Project No. XXX
 Project Name: NW ROUGH ROAD PAVING
 Pay Applications: 4

Asphaltic Concrete Paving Completed in June 2012

Station to Station	*Width (feet)	Thickness (feet)	Volume (cubic feet)
10+55 to 11+25	10.00 to 12.00	0.58	446.60
11+25 to 15+00	12.00	0.75	3375.00
15+00 to 16+25	12.00 to 10.00	0.75	1031.25
Total Volume of Asphalt =			4853

*The tapered/sloped portion of the pavement between the top and bottom of the pavement section at the pavement's edges shall be measured.

Starting Asphalt Index (SAI) = \$400.00/ton

Pay App. No. 4

(1) Pay App. No.	(2) Month Paving Completed	(3) Total Volume (cubic feet)	(4) Column (3) x 5% x (145/2000) = Tons of Oil	(5) (AMI) for Month of Paving	(6) Change in Oil Price SAI - AMI	(7) Asphalt Oil Price Adjustment Col. 4 x Col. 6
1	April	1000	3.625	\$440.25	40.25	\$145.91
2	May	4500	16.3125	\$450.00	\$50.00	\$815.63
3	June	0	0	NA	NA	0.00
4	July	4853	17.5921	\$335.65	-64.35	-1132.05

Total Asphalt Oil Price Adjustment = -\$170.51

Article 3 of Document 530 of the Project Documents. Deductions for “Asphalt Oil Price

Deductions for “Asphalt Oil Price Adjustment” will be made for asphalt paving regardless of whether the Contract Time for Final Completion has expired or not.

7.07 RANDOM TEST LOCATIONS

A. General. It is intended that all test locations be selected in an unbiased manner. Random test locations may be selected using Method A described below or by another random sampling technique approved by the Engineer.

A single test shall be considered the average of three core samples taken at random locations throughout a block or within an intersection/cul-de-sac. A minimum of one test (three cores) shall be taken for each block of completed lift, measured from ECR to ECR, and one test (three cores) from each completed lift in an intersection or cul-de-sac. Core samples shall not be taken closer than 3.0 feet to the toe of a curb or edge of pavement or within 1.5 feet of a construction joint.

When a core location falls within an area that is not appropriate (i.e., a joint, a manhole lid), the location shall be moved 10 feet ahead on stationing as appropriate.

B. Method A Location Determination. To determine the first random location for Method A, find the X and Y coefficient from the table below for the day of the month that the asphalt was placed.

Date	X	Y	Date	X	Y	Date	X	Y
1	0.290	0.170	12	0.183	0.530	23	0.389	0.170
2	0.119	0.760	13	0.669	0.310	24	0.626	0.710
3	0.594	0.510	14	0.971	0.860	25	0.930	0.440
4	0.953	0.140	15	0.314	0.400	26	0.742	0.230
5	0.784	0.420	16	0.508	0.720	27	0.473	0.680
6	0.284	0.800	17	0.877	0.130	28	0.203	0.870
7	0.576	0.250	18	0.193	0.610	29	0.504	0.400
8	0.069	0.540	19	0.430	0.770	30	0.913	0.590
9	0.691	0.780	20	0.751	0.240	31	0.620	0.320
10	0.973	0.290	21	0.508	0.460			
11	0.328	0.850	22	0.221	0.831			

Start with the beginning station of the block or intersection to be tested. Add the longitudinal distance to the first core location by multiplying the length of the block or intersection by the X coefficient for the day the asphalt was placed. Determine the transverse distance from the right edge of asphalt pavement by multiplying the asphalt width at that X location by the Y coefficient for the day the asphalt was placed. Both longitudinal and transverse distances should be rounded to the nearest 0.1 feet.

To calculate the next test location, determine the X and Y coefficients for the following day of the month. For example, if the day the asphalt was placed was the 10th, then the next location is calculated from the X and Y coefficients for the 11th. Calculate the longitudinal distance to the second core location by multiplying the length of the block or intersection by the X coefficient for the following day. Calculate the transverse distance from the right edge of asphalt pavement by multiplying the asphalt width at that X location by the Y coefficient for the following day.

The third location is determined by taking the X and Y coefficients for the second day following asphalt placement. From the example above, the second day would be the 12th. The longitudinal distance to the third core location is determined by multiplying the length of the block or intersection by the X coefficient for the second day. The transverse distance from the right edge of asphalt pavement is calculated by multiplying the asphalt width at that X location by the Y coefficient for the second day.

Example:

Beginning Block Station = 20 + 00
 Block Length = 500 feet
 Asphalt Pavement Width = 34 feet
 Day Asphalt was placed = 10th

First Test Location:
 X coefficient for 10th = 0.973
 Y coefficient for 10th = 0.290

First Test Location = $2000 + (500 \times 0.973) = \text{Sta. } 24 + 86.5$

Transverse Offset = $(34 \times 0.290) = 9.9$ feet from right asphalt pavement edge

Second Test Location:

X coefficient for 11th = 0.328

Y coefficient for 11th = 0.850

Second Test Location = $2000 + (500 \times 0.328) = \text{Sta. } 21 + 64.0$

Transverse Offset = $(34 \times 0.850) = 28.9$ feet from right asphalt pavement edge

Third Test Location:

X coefficient for 12th = 0.183

Y coefficient for 12th = 0.530

Third Test Location = $2000 + (500 \times 0.183) = \text{Sta. } 20 + 91.5$

Transverse Offset = $(34 \times 0.530) = 18.0$ feet from right asphalt pavement edge

END OF SECTION