Changes to the 2018 version of Part V of the Construction Manual

This document is intended as a guide to the changes that occurred between the 2016 and the 2018 versions of Part V of the Kansas Department of Transportation Construction Manual. Use this guide in conjunction with the published manual for context. This document may not reflect all changes that occurred. Refer to the official published version.

Table of Contents

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc
KT-85 (new)	**Procedures for Evaluating the Movement, Rotation, and Sound Generation of Portable Temporary Rumble Strips**

5.2.2.2 Random Sampling

Section	Change
2.1.5. (new)	2.1.5. Seed number: A number to provide a starting point for selection of the random numbers. The seed number may be generated from an odometer reading, random number function on a calculator or spreadsheet, or by pointing at the random number table.
3.2.1.	Sampling a large lot may require division into sublots to ~~i~~ensure all portions of a lot are represented Using an odometer reading such as ~~3~~7864~~.~~2 as a seed number, use the digit farthest to the right (2) to select the column in the table. Use the next two digits to the left ~~of the decimal point~~, (64) to select the row. If the seed number for the column is 0, use column 10 and if the seed for the row is 00, use row 100. In this case finding the intersection of the row and the column yields the number 0.338. Use this as a starting position and count down the column for the required number of samples. Selecting numbers for an X coordinate for three samples yields 0.338, 0.763 and 0.043. If a Y coordinate is also required use the fourth digit from the right for the column and the next two digits to the left, for the row. In this example that would yield column 8 and row ~~3~~7 producing a starting point at number ~~0.922~~ 0.521. If a total of three samples are required, counting down two more places yields numbers ~~0.198~~ 0.937 and ~~0.737~~ 0.912. Using this example, pairs of numbers for determining three X and Y coordinates are obtained, (0.338, ~~0.922~~ 0.521), (0.763, ~~0.198~~ 0.937) and (0.043, ~~0.737~~ 0.912). Any amount of numbers required may be selected this way. If ten samples are required count down the column until ten numbers are selected. Once the bottom of a column has been reached go to the top of the next column to the right and countdown to obtain more numbers, if the bottom of column 10 is reached go to the top of column 1.
4.2.1.1.	Use of the odometer to generate seed numbers is not recommended if more than one set of X and Y pairs of random numbers is required in a relatively short period of time due to the slow change of the left odometer numbers.

5.2.7.3 EXAMPLE OF A LABORATORY QUALITY MANUAL

Section	Change
VERIFICATION RECORD FOR MECHANICAL SHAKER	
Various	Change KT-1, KT-2, etc to KT-01, etc

5.2.7.4 CONCRETE: CONTRACTOR'S QUALITY CONTROL PLAN

Section	Change

Table 1.	
	Mechanical Shakers – KT-02
Compression Testing Machine	Added verification of surface planes @ 12 mo.s and lubricate @ 6 mos.

5.2.7.5 EXAMPLE OF A LABORATORY QUALITY MANUAL FOR CONCRETE

Section	Change
Various	KT-02
	Added:
REPORT FORM FOR COMPRESSION MACHINE	CHECK PLANE OF BEARING BLOCKS?:_Y/N CLEAN/LUBRICATE UPPER BEARING BLOCK?: _Y/N

5.2.7.8. CEMENT TREATED BASE: CONTRACTOR'S QUALITY CONTROL PLAN

Section	Change
Table 1.	
	Mechanical Shakers – KT-02
Compression Testing Machine	Added verification of surface planes @ 12 mo.s and lubricate @ 6 mos.

5.2.7.8.1. EXAMPLE OF A LABORATORY QUALITY MANUAL FOR CEMENT TREATED BASE

Section	Change
	Added:
REPORT FORM FOR COMPRESSION MACHINE	CHECK PLANE OF BEARING BLOCKS?:_Y/N CLEAN/LUBRICATE UPPER BEARING BLOCK?: _Y/N
Various	KT-02

5.3.1. CONCRETE MIX DESIGN

Section	Change
3.7.	...as determined in accordance with **KT-02**.

5.3.4. MIX DESIGN PROCEDURES FOR CIR (COLD-IN-PLACE RECYCLING) MATERIAL

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.5 REQUIRED SAMPLE SIZES

Section	Change
2.1.1.3. Crushed Stone	Two 50 ~~100~~ lb~~s~~ (~~45~~ 23 kg) bags of -1" (-25.0 mm), + #8 (+2.36 mm) material
2.5. JOINT SEALERS AND JOINT FILLERS	
	Prequalification: 25 lbs. (11 kg) per lot.
Hot ~~Type~~ Joint Sealing Compound	~~Information or Verification: 10 lbs. (4.5 kg)~~
~~Silicone Type Joint Sealing Compound~~	
Cold Applied Chemically Cured Joint Sealant	

2.8. PAINT MATERIALS AND MIXED PAINTS

~~Traffic Paint~~

Pavement Marking Paint	Two 1 qt (1 L) lined cans.

2.9.2. Pavement Marking Thermoplastic

~~1 gal (4 L) lid sample per lot~~. One sample per lot on a 1 gal (4 L) metal can lid.

2.11.

Change lime sample size to 1 quart

2.13.3

~~Steel Sign Posts:~~
~~≤ 100~~
~~> 100 but ≤ 1000~~
~~Each additional 1000 or fraction thereof.~~

2.15.3.

Material	Sample Size
Routine Analysis Only	5 lbs (2.5 kg).
Routine Analysis and Compaction	Two 50 ~~100~~ lbs (~~45~~ 23 kg) Bags.
Routine analysis, Compaction, and Resilient Modulus	Two 50 ~~100~~ lbs (~~45~~ 23 kg) Bags.
Soil Cement Tests	300 lbs (135 kg). In 50 lb (23 kg) Bags.
Soil Lime Tests	300 lbs (135 kg). In 50 lb (23 kg) Bags.
Moisture Determination	6 oz (170 g) sealed ointment can.
Resistivity and pH	10 ~~5~~ lbs (~~2.~~5 kg).
Permeability	Two 50 ~~100~~ lbs (~~45~~ 23 kg) Bags.

5.6 AGGREGATES

Section	Change
4.1.	Aggregate shall not be used for KDOT work until the deposit from which it is being produced and the production process has been approved. The aggregate producer shall notify the District Materials Engineer (DME) and request that an Official Quality sample be obtained during the production of the aggregate.
4.2.1.	Deposits approved on the basis of OFQ tests conducted on either processed (crushed, screened, washed, etc.) or "pit-run" production samples remain approved if there are no significant changes in production or deposit characteristics or no other reasons to doubt the quality of the material. Significant changes in production include, but are not limited to: how ledge is quarried, equipment changes or modifications to include crushers, screens and wash plants, change in the scalped versus scalpings products, and changes in the production sequence. Significant changes in deposit characteristics include, but are not limited to: color change, bed thickness change, shale seam thickness change, and mineral changes. KDOT quarry and project inspection personnel, the contractor, and the aggregate producer shall be alert for any of these significant changes in production or deposit characteristics...

~~Once approval of aggregate from a specific source has been given to a contractor for use in a specific project, that approval will be maintained for the duration of that project; unless subsequent testing indicates the product no longer meets specification requirements, unless inspection reveals deterioration of the product due to significant change in production or deposit characteristics, due to some unknown reason, or unless field condition surveys demonstrate aggregate failure or aggregate deterioration that may lead to aggregate failure. In the event that the project sample indicates deterioration of the product, material from that source will be discontinued immediately. Should any sample taken from the project and submitted for quality testing fail, a new OFQ sample will be collected and submitted forthwith. The results of the new OFQ sample will be used to determine whether further use of the material will be permitted on the project or whether the contractor will be required to obtain acceptable material from another source. The new OFQ sample test results will also be considered in determining approval of the material for use on future projects. In the event that field condition survey indicates deterioration of the product, material from that source will be discontinued immediately and the DME will determine the role of that material for use on the project and use on future projects.~~

Once approval of aggregate from a specific source has been given to a contractor for use in a specific project, that approval will be maintained for the duration of that project; in the event that the project sample indicates deterioration of the product and if subsequent testing indicates the product no longer meets specification requirements, if inspection reveals deterioration of the product due to significant change in production or deposit characteristics, due to some unknown reason, or if field condition surveys demonstrate aggregate failure or aggregate deterioration that may lead to aggregate failure, material from that source will be discontinued immediately.

Should any sample taken from the project and submitted for quality testing fail, a new OFQ sample will be collected and submitted forthwith. The results of the new OFQ sample will be used to determine whether further use of the material will be permitted on the project or whether the contractor will be required to obtain acceptable material from another source. The new OFQ sample test results will also be considered in determining approval of the material for use on future projects.

In the event that field condition survey indicates deterioration of the product, material from that source will be discontinued immediately and the DME will determine the role of that material for use on the project and use on future projects. Field condition surveys include, but not limited to: surveys performed by maintenance personnel, pavement management surveys, surveys conducted by Research, inspections by Headquarters, District, Area, and Subarea personnel, and any other field survey conducted under KDOT's authority.

4.3. If either of the two resamples fail, no further OFQ testing will be conducted on the location until the DME has determined the operations have moved a significant distance or there is a significant change in production or deposit characteristics as defined in section **5.6.4.2.1**

5.2.2.1. Commercial stone from active production locations is sampled yearly. Intermittently producing locations are sampled each calendar year that aggregate is being produced or, for locations with mobile production equipment, each time the equipment is remobilized. A contractor may still consider sources with a lapsed OFQ for contract bidding purposes provided the OFQ sample was taken within the last 1000 tons of production and the Quarry Inspector has evidence that no production has taken place since the mobile production equipment that produced the material for the OFQ had moved out. However, a current OFQ is required before the material is used on a project.

5.2.2.2. Unopened quarries are sampled by opening the quarry face the full depth of the usable ledge or ledges far enough back from exposure to reach unweathered stone. From this opening, the full depth of the ~~unweathered~~ finish face is shot down…

...~~The District Materials Engineer may deem that u~~ Uncrushed ledge samples are acceptable for OFQ samples when the stone is intended for use in the construction of +2" sized aggregate products or other miscellaneous uses. The CMS inspection type for these samples is OFQA.

5.4.2.2. ...Producers have the option of submitting ledge samples or production samples for initial testing for prequalification determination. Producer's must submit a production plan if production samples are being submitted for testing.

Sand-gravel sources must submit production samples for prequalification testing, therefore only one additional sample must meet the requirements for OGCA. Sand-gravel sources must have two passing production samples to meet the requirements for OGCA.

5.4.2.3. …

...Producers shall provide updated production plans to the DME at the beginning of each production season, or as otherwise determined by the DME, and any time significant changes occur in production or deposit characteristics as defined in section

5.4.3.1. 5.6.4.2.1.

...Documentation of such reassignments should be disseminated to the affected ~~concerned~~ quarry inspectors and the producer

5.4.4 ~~parties~~.
...KDOT will attempt to notify the aggregate producer at least 24 hours in advance of when OGCA production samples are collected from a concrete production plant.

5.4.4.1. Sampling from Aggregate Production Site
A minimum of one production sample must be collected annually from the aggregate production site when OGCA is being provided to KDOT projects. Samples of non-calcareous aggregate produced from sources outside Kansas may be collected annually from the point in which they are shipped into Kansas.

The DME has discretion for adjusting sampling frequencies at any site to provide adequate assurance of material quality. The DME will inform the producer when the frequency will be adjusted and provide the reason for doing so.

...The Engineer of Tests will issue test result reports and notify the DME and the producer of ~~atypical~~ test results in a timely

5.4.4.2. manner.

Failing material can be identified either through OFQ testing, production sample testing, or through field condition surveys as defined in section **5.6.4.2.1** of existing pavements. A source will be evaluated for failing field performance if its stone is used for OGCA on a state highway project and the completed on-grade concrete shows evidence of aggregate caused ~~related~~ deterioration

5.4.5.2. prior to 20 years of life.

Procedure for On-Grade Concrete Aggregate Removal

Prior to KDOT removing an aggregate source from its "List of Prequalified Aggregates Sources for On-Grade Concrete" (the "PQL") due to a failing test, the Engineer of Tests will average the three most recent KTMR-22 Relative Dynamic Modulus of Elasticity (RDME) test results for the aggregate. If the RDME 3 point rolling average is 96 or greater, then the aggregate will remain on the "List of Prequalified Aggregates Sources for On-Grade Concrete" (the "PQL") provided the expansion is below

5.4.5.4. 0.025%.

5.4.5.4.1.2. ...Producers may request data from test results older than two years by contacting the Engineer of Tests.

… The Chief Geologist will make this determination for riprap. Either the quarry inspector or the Chief Geologist will make this

5.5.2. determination for ditch lining and other miscellaneous uses.
Geologic Inspection Expiration

5.5.~~2~~3.1 Geologic site inspections are good for ~~two~~ five years from the date the inspection was completed.

Failing material can be identified either through OFQ testing, production sample testing, or through field condition surveys as

5.5.~~2~~ 3.2. defined in section **5.6.4.2.1.** of existing material.

5.6.2.2. Follow the sampling methods outlined in KT-01 of this manual.

5.9. SAMPLING AND TEST METHODS FOREWORD

Section	Change
2. Scope	Unless otherwise stated in the test method, drying to a constant mass means less than 0.1% mass decrease from the previous measurement after 1 hour following the temperature requirements in the test method.

5.9.01 SAMPLING AND SPLITTING OF AGGREGATES (Kansas Test Method KT-01)

Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.02 SIEVE ANALYSIS OF AGGREGATE (Kansas Test Method KT-02)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc
5. Note:	Remove deleterious material prior to determining the total original dry mass of sample if required by relevant specifications.
5.1.	Record this as the total original dry mass of sample.
5.2.	Determine the mass of the sample to the nearest 0.1% of the total original dry mass of sample.
6.5.	Determine the mass of each sieve size increment to the nearest 0.1% of the total original dry ~~sample~~ mass of sample (as define in Section 5.1. of this test method) by weighing on a scale or balance conforming to the requirements specified in Section 3.1. of this test method. The total mass of the material after sieving should check closely with the original mass of the sample placed on the sieves.
8.	Report gradation test results to the nearest whole percent, except ~~for~~ when the percentage passing the No. 200 (75 µm) sieve is less than 10%~~, it~~ In this case, both the percentage passing the No. 200 (75 µm) sieve and the material retained on the No. 200 (75 µm) sieve shall be reported to the nearest 0.1%. ~~unless otherwise directed (most~~ Note that some specifications require these values be reported to the 0.01% such as asphalt mix gradations ~~are rounded to the nearest 0.01%)~~.

5.9.03 MATERIAL PASSING NO.

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc
5.1.	Record this as the total original dry mass of sample.
5.4.	Dry all material retained to constant mass at a temperature of approximately 230 ± 9°F (110 ± 5°C). Weigh the sample to the nearest 0.1% of the total original dry mass of sample. Record this as the final dry mass. Note that the final dry mass is the same as the original mass of the sample placed on the sieves in KT-02.
8.	Record the material passing the No. 200 (75 µm) sieve by the wash method to 0.1% of the total original dry mass of sample.

5.9.04 PERCENT RETAINED ON THE NO. 200 (75 µm) SIEVE BY DRY SCREENING (Kansas Test Method KT-04)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.05 UNIT WEIGHT OF AGGREGATE (Kansas Test Method KT-05)

Section	Change

Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.06 SPECIFIC GRAVITY AND ABSORPTION OF AGGREGATES (Kansas Test Method KT-06)

Section	Change
4.2.2.5.	Continue the process until there are no visible air bubbles present. ~~or for a maximum of 15 minutes, whichever comes first.~~
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.07 CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATE (Kansas Test Method KT-07)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.08 SHALE OR "SHALELIKE" MATERIALS IN AGGREGATE (Kansas Test Method KT-08)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.10 PLASTICITY TESTS (Kansas Test Method KT-10)

Section	Change
1.	**KT-10** reflects testing procedures found in **AASHTO R ~~58~~ ~~T 87~~, T 89** and **T 90**.

5.9.18 AIR CONTENT OF FRESHLY MIXED CONCRETE BY THE PRESSURE METHOD (Kansas Test Method KT-18)

Section	Change
7.4.1.	The initial pressure line shall be adjusted if two or more determinations show the same variation from zero ~~5~~ % ...
7.3.1	R = (w/W) * 100
7.4.3.1.	Broke large paragraph into smallers paragraphs.
7.4.3.1.	**7.4.3.1.** Fill the measuring bowl with water as described in **Section 7.2.2** of this test method. Screw the short piece of tubing or pipe furnished with the apparatus into the threaded petcock hole on the underside of the cover assembly. Assemble the apparatus. Close the air valve between the air chamber and the measuring bowl and open the two petcocks on holes through the cover assembly. Add water through the petcock on the cover assembly having the extension below until all air is expelled from the second petcock.
7.4.3.2.	**7.4.3.2.** ...Remove water from the assembly to the calibrating vessel controlling the flow by opening the petcock provided with the tube or pipe extension and cracking open the air valve between the air chamber and the measuring bowl, or by opening the air valve and using the petcock to control flow.
7.4.3.3.	**7.4.3.3**. Perform the calibration at an air content which is within the normal range of use….
7.4.3.4.	**7.4.3.4.** Calculate the correct air content, R, by using the equation in **Section 7.3.1** of this test method….
7.4.3.5.	**7.4.3.5.** Pump air into the air chamber until the pressure reaches the initial pressure line marked on the pressure gauge, close both petcocks in the cover assembly, …
8. New	**8. Record**
	8.1. The masses determined to the nearest 0.001 lbs. (0.1 g).

	8.2. The volume of the measuring bowl to the nearest 0.0001 cu.ft.
	8.3. The effective volume of the calibration vessel (R) to the nearest 0.1 %.
9. New	**9. Report**
	9.1. The air content of the concrete sample to the nearest 0.1 percent after subtracting the aggregate correction factor, unless the gauge reading of the meter exceeds 8 percent, in which case the corrected reading shall be reported to the nearest 1⁄2 scale division on the dial.
	9.2. The time and date of the test.

5.9.20 MASS PER CUBIC FOOT (METER), YIELD, AND AIR CONTENT (GRAVIMETRIC) OF FRESHLY MIXED CONCRETE (Kansas Test Method KT-20)

Section	Change
2.2.	KT-05 Unit Weight of Aggregate
3.3.	...shall conform to the requirements of **KT-05** of this manual.
4.3.	Weigh and record the mass of the measure, water, and cover plate. Record this mass as B.
4.5.	D = Density of water (see **KT-15**), lb/ft^3 (kg/m^3)
5.2.	**5.2.** Weigh the measure ~~with the cover plate~~ and record the mass as A.
5.4.5.	**5.4.5.** Clean all excess concrete from the exterior of the filled measure. Weigh the filled measure to the nearest 0.1 lb (50 g) and record the mass as D.

5.9.23 FLEXURAL STRENGTH OF CONCRETE (THIRD-POINT LOADING METHOD) (Kansas Test Method KT-23)

Section	Change
3.1.1. (new)	Verify that the faces of the bearing blocks are plane every 12 months. Except for the concentric circles described in AASHTO T 22, Section 5.2., the bearing block faces shall not depart from a plane by more than 0.001 in. (0.02 mm) along any 6 in. (150mm) length for bearing blocks with a diameter of 6 in. (150mm) or larger, or by more than 0.001 in. (0.02 mm) in any direction for smaller bearing blocks. New bearing blocks shall be manufactured within one half of this tolerance.
3.1.2. (new)	Clean and lubricate the curved surfaces of the socket and spherical portion of the upper bearing block every six months. Check for any visible wear on the spherical portion of the upper bearing block during the cleaning and lubrication. Any noticeable wear is cause for replacement of the upper bearing block. The lubricant shall be conventional motor oil.

5.9.24 DETERMINATION OF FREE MOISTURE OR ABSORPTION OF AGGREGATE FOR USE IN CONCRETE (Kansas Test Method KT-24)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.25 SAMPLING AND SPLITTING PLANT MIXED ASPHALT MIXTURES (Kansas Test Method KT-25)

Section	Change
4.3.4.	Fixed formatting of diagram

5.9.30 FIELD SAMPLING OF THERMOPLASTIC PAVEMENT MARKING MATERIAL (Kansas Test Method KT-30)

Section	Change
2.1	Metal gallon-can lids.
3.3.	Once **Section 3.1 and 3.2** of this test method have been satisfied, place a metal gallon can lid under the spray nozzle,
FIGURE 1	Metal can lid with protective material underneath

5.9.31 DETERMINATION OF PERCENTAGE OF CRUSHED PARTICLES IN CRUSHED GRAVEL (Kansas Test Method KT-31)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.32 METHOD OF TEST FOR DENSITY OF COMPACTED ASPHALT MIXTURES BY NUCLEAR METHOD (Kansas Test Method KT-32)

Section	Change
Section 4.	**4. TEST SITE SELECTION AND PREP~~E~~A**RATION

5.9.34 SIEVE ANALYSIS OF EXTRACTED AGGREGATE (Kansas Test Method KT-34)

Section	Change
2.2.	KT-02; Sieve Analysis of Aggregates
5.2.	to assure a ~~through~~ thorough separation of the material
5.2.	**NOTE:** There should be enough wetting agent to produce a small amount of suds when the sample is agitated. The quantity will depend on the hardness of the water and the quality of the detergent. Excessive suds may overflow the sieves and carry some material with them.
5.5.	The aggregate shall then be sieved according to procedures found in **KT-02 Section 6.1**

5.9.36 DENSITY OF FRESHLY MIXED CONCRETE IN BRIDGE DECK OVERLAYS BY NUCLEAR GAUGE (Kansas Test Method KT-36)

Section	Change
5.2.3.	The nuclear readings on the overlay are corrected by using the formula in section 5.2.3.1. or by using the nomograph and the procedure in the manufacturer's manual, as follows:
New 5.2.3.1.	**5.2.3.1.** The following formula may be used to correct thin layer measurements of overlays of 1 to 3 inches (25 to 75 mm) in thickness when using Troxler 3401, 3411-B and 3430: $DT = \frac{DG - DB * K}{1 - K}$ Where: DT = Corrected overlay density DG = Density read by gauge DB = Bottom layer density K = Effect of top layer thickness on the gauge (From Table 1 below)
New Table 1	See test method.

5.9.37 MAKING, CURING AND TESTING CEMENT TREATED AND UNBOUND BASES IN THE LABORATORY (Kansas Test Method KT-37)

Section	Change
New 2.6.	**2.6.** ASTM C 1231; Use of Unbonded Caps in Determination of Compressive Strength of Hardened Cylindrical Concrete Specimens
4.1.	For mix design, dry the base aggregate to a constant mass at approximately 230°F (110~~0~~°C).

5.9.39 THEORETICAL MAXIMUM SPECIFIC GRAVITY OF ASPHALT PAVING MIXTURES (Kansas Test Method KT-39)

Section	Change
3.11.	**3.11.** Test equipment ~~must~~ will be arranged as shown in **Figure 1**~~.~~ , except that the vacuum control ~~must~~ can be ~~placed~~ located anywhere ~~after~~ between the pump and ~~before~~ the sample container ~~and manometer~~; otherwise incorrect vacuum readings may occur.

5.9.42 SIEVE ANALYSIS FOR ACCEPTANCE OF LIME OR CEMENT TREATED SOILS (Kansas Test Method KT-42)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.43 MOISTURE CONTENT OF ASPHALT MIXTURES OR MINERAL AGGREGATES MICROWAVE OVEN METHOD (Kansas Test Method KT-43)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.44 METHOD OF TESTING THE

Section	Change

5.9.49 METHOD FOR OBTAINING AND TESTING DRILLED CORES FROM PCCP AND PRECAST GIRDERS (Kansas Test Method KT-49)

Section	Change
4.1.1. (new)	Verify that the faces of the bearing blocks are plane every 12 months. Except for the concentric circles described in AASHTO T 22, Section 5.2., the bearing block faces shall not depart from a plane by more than 0.001 in. (0.02 mm) along any 6 in. (150mm) length for bearing blocks with a diameter of 6 in. (150mm) or larger, or by more than 0.001 in. (0.02 mm) in any direction for smaller bearing blocks. New bearing blocks shall be manufactured within one half of this tolerance.
4.1.2. (new)	Clean and lubricate the curved surfaces of the socket and spherical portion of the upper bearing block every six months. Check for any visible wear on the spherical portion of the upper bearing block during the cleaning and lubrication. Any noticeable wear is cause for replacement of the upper bearing block. The lubricant shall be conventional motor oil.

5.9.50 UNCOMPACTED VOID CONTENT OF FINE AGGREGATE (Kansas Test Method KT-50)

Section	Change
2.2.	KT-03; Material Passing No. 200 (75 µm) Sieve by the Wash Method
2.3. to 2.6.	Delete **2.3.** ~~**2.3.** KT-15; Bulk Specific Gravity and Unit Weight of Compacted Asphalt Mixtures~~. Renumber **2.4.** through **2.6.** to **2.3.** through **2.5.**
3.4.	Move second paragraph through Note to new **Section 4.**

Section 4. Renumber to **Section 5.**

New Section 4. **4. DETERMINATION OF THE VOLUME OF CYLINDRICAL MEASURE**

Apply a light coat of grease to the top edge of the dry, empty measure. Weigh the measure, grease, and a flat glass plate slightly larger than the diameter of the measure. Fill the measure with distilled/deionized water at a temperature of 77 ± 2°F (25 ± 1°C). Place the glass on the measure, being sure that no air bubbles remain. Dry the outer surfaces of the measure and determine the combined mass of measure, glass plate, grease and water by weighing. This procedure should be done at least once a year.

Calculate the volume of the measure as follows:
Change "~~density of water~~" in formula to 0.99704

$$V_c = \frac{W}{0.99704}$$

Where: Vc= volume of cylinder, mL
W= d-c = net mass of water, g
c= cylinder + glass + grease, g
d= cylinder + glass + grease + water, g

0.99704 g/ml is the density of water at 77 + 2°F (25 + 1°C),
Determine the volume to the nearest 0.1 ml.
NOTE: Density of water varies based on temperature. Since the water bath temperature is fixed at 77 ± 2°F (25 ± 1°C), use the specified value of 0.99704 g/mL. For tests not restrained by the 77 ± 2°F (25 ± 1°C) requirement, select the proper density for water from **KT-15, Table 1**. Divide the value given in the table by 1000 for g/mL.

Section 5. Renumber to **Section 6.**

New Section 5. **SAMPLE PREPARATION**

5.1. Wash the sample over the No. 200 (75 µm) sieve using the equipment and procedures listed in **KT-03, section 3 and section 5.**

NOTE: If U_k values below the specified (full pay) value have been obtained from previous tests on this project, the Engineer may increase the number of test samples from two to four, and go directly to the U_k determination specified in **section 89.** of this test method. This is in lieu of performing a two sample test, discarding a failed result, and retesting with four samples.

5.3.

Section 6. Renumber to **Section 7.**

New Section 7. **CALCULATIONS**
7.1 U1,2=100 [Vw -Vf+Vc ~~(Vf-Vc)~~]/Vc
Where: Vf= volume of flask (manufacturer's calibrated volume), 200 mL
Vc= Calibrated volume of cylinder, mL

Where: B= mass of flask, water and aggregate, g
A= mass of flask and aggregate, g
0.99704 g/mL is the density of water at 77 + 2°F (25 + 1°C
~~Vf= volume of flask (manufacturer's calibrated volume), mL~~
~~Vc= Calibrated volume of cylinder, mL~~

NOTE: Density of water varies based on temperature. Since the water bath temperature is fixed at 77 ± 2°F (25 ± 1°C), use the specified value of 0.99704 g/mL. For tests not restrained by the 77 ± 2°F (25 ± 1°C) requirement, select the proper density for water from **KT-15, Table 1**. Divide the value given in the table by 1000 for g/mL.

Section 7.	Renumber to **Section 8.**
Section 8.	Renumber to **Section 9.**
New Section 9.	**CONFIRMATION OF TEST VALUES**
9.1.	If two samples are prepared in **Section 54.3** of this test method, and the raw values of U_1 and U_2 differ by more than 1.0%, discard those U_1 and U_2 values and rerun the full test. Prepare four trial samples instead of two, as specified in **Section 54.3** of this test method. Determine the four trial values, U_1, U_2, U_3 and U_4 and calculate U_k using the following formula:
9.2.	If the U_k value is below the specified (full pay) value and based on only two values (U_1 and U_2), discard those values and rerun the full test. Prepare four trial samples in **Section 54.3** of this test method and proceed with the testing. Calculate U_k using the four tests as shown in **Section 98.1.** of this test method. Use this U_k value for determining the pay factor.
Section 9.	Renumber to **Section 10**.

5.9.56 RESISTANCE OF COMPACTED ASPHALT MIXTURE TO MOISTURE INDUCED DAMAGE (Kansas Test Method KT-56)

Section	Change
2.2.	KT-06; Specific Gravity and Absorption of Aggregate
New 3.7.1.	**3.7.1. Freezer operation should be checked every 6 months by determining the high and low temperatures reached during compressor cycles. A thermal mass (thermometer well) may be used to reduce temperature fluctuation during compressor cycles. A 2" x 2" x 3.75" aluminum block, drilled at one end to receive a thermocouple, will adequately dampen temperature swings.**
4.2.	A minimum of six specimens ~~plugs~~ will be required to perform this test.
6.2.	Determine the specimen thickness, to the nearest 0.001 in (0.01 mm), at approximately quarter points on the periphery ~~of the plug~~.
6.5.	Sort specimens into two subsets of three specimens each so the average air voids of the two subsets are as ~~approximately~~ equal as mathematically possible.
ADDENDUM TO KT-56	**4.3.1.** Determine the SSD condition (**KT-06**) for the combined aggregate gradation.
7.3.9.	Determine the height and diameter of the ~~plug~~ specimen prior to testing.

5.9.57 DETERMINATION OF ASPHALT CONTENT AND GRADATION OF HOT MIX ASPHALT CONCRETE BY THE IGNITION METHOD

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

~~Repeat steps in **Sections 10.7** through **10.9** of this manual until a visual inspection indicates complete burn-off has been accomplished. Adjust the 40 minute time so a single burn-off sequence is required. It may be necessary to cycle the sample through for an additional 10 minute program after the initial run. The material will appear free of asphalt (no small black asphalt particles intermixed in material) and the change is measured in mass (W_A) does not exceed 0.1% of the initial mass (W_S). Additional burn time may indicate a need for a new filter. Filters have found to last two to four burn-offs.~~

Repeat steps in **Sections 10.7 (exception: adjust burn time to 10 minutes)** through **10.9** of this manual until a visual inspection indicates complete burn-off has been accomplished. The material will appear free of asphalt (no small black asphalt particles intermixed in material) and the change in measured mass (WA) does not exceed 0.01% of the initial mass (WS).

It is desirable to accomplish complete burn-off in one sequence. Adjust the 40 minute burn time to achieve this requirement. Additional burn time may indicate a need for a new filter. Filters have been found to last two to four burn-offs.

10.10

13.1 Note The precision estimates given in Table 2 are based on the analysis of test results from three pairs of ~~AMRL~~ AASHTO Re:source proficiency samples.

5.9.58 METHOD FOR PREPARING AND DETERMINING THE DENSITY OF HOT MIX ASPHALT (HMA) SPECIMENS BY MEANS OF THE SUPERPAVE

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.59 FLAT AND ELONGATED PARTICLES IN COARSE MATERIAL TEST (Kansas Test Method KT-59)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.69 Relative Density (Kansas Test

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

5.9.73 DENSITY, ABSORPTION AND VOIDS IN HARDENED CONCRETE(Kansas Test Method KT-73)

Section	Change
Title	5.9.73 DENSITY, ABSORPTION AND VOLUME OF PERMEABLE VOIDS IN HARDENED CONCRETE
1. SCOPE	This method covers the determinations of density, percent absorption and percent volume of permeable voids in hardened concrete.
3.~~3~~.2.	**3.2.** Forced draft oven
3.~~2~~.3	**3.3.** Container suitable for ~~immersing the specimen and suitable apparatus for suspending the specimen in water~~ boiling the immersed specimens with a rack suitable for supporting the specimens a minimum of ¼" above the bottom of the container .
New 3.4.	**3.4.** Hot plate, stove or other heat source capable of maintaining the water at boiling for 5 hours.
4.	**TEST SPECIMENS**

4.1.

Prepare 3 specimens per sample , each to be tested separately ~~samples per mix design~~. Each specimen ~~The samples~~ shall consist of a 2" thick by 4" diameter piece ~~specimen~~ taken from the top portion of a cast concrete cylinder~~s~~ or core~~s~~. Remove not more than 3/8" from the top of the cylinder or core and obtain the ~~sample~~ specimen from the next 2". Each specimen ~~portion~~ shall be free from observable cracks, fissures, or shattered edges. Cylinders molded and cured in accordance with **KT -22** of this manual shall be used for mix design approval and most verification samples. Cores obtained in accordance with **KT-49** of this manual~~,~~ may be used for verifications on PCCP.

5.1.

Determine the mass of each specimen. Place each specimen on its edge in a forced draft oven directly on the oven rack and dry the ~~samples~~ specimens at a temperature of 230 ± 9 °F (110 ± 5 °C) for not less than 24 hours. Do not ~~lay~~ place the specimens inside a pan or any other container. Do not ~~lay~~ place the specimens on the flat surface of the cylinder. Allow enough room between ~~samples~~ specimens for complete airflow around each ~~sample~~ specimen. ...

...If the difference between values obtained from two successive values of mass exceeds 0.5% of the lesser value, return the specimens to the oven for an additional 24 hour drying period.~~, and r~~Repeat ~~the~~ this procedure until the difference between any two successive values is less than 0.5 % of the lowest value obtained. Designate this final mass value **A**.

5.2.

5.2. ~~Immerse the specimen on its edge in water at 72 ± 5°F (22 ±3°C). Do not place the specimen on the flat surface of the cylinder. Continue soaking the specimen in water for not less than 48 hours and until two successive values of mass of the surface-dried sample at intervals of 24 hours show an increase in mass of less than 0.5% of the larger value. Surface-dry the specimen by removing surface moisture with a towel, and determine the mass. Designate the final surface-dry mass after immersion **B**.~~

~~5.3.~~ Begin boiling tap water in a suitable container. Verify that the water is rapidly boiling prior to placing the specimens in the water for testing. Place the specimen on its edge on a rack in the boiling water a minimum of 1/4" from the bottom of the container. The water must return to boiling in less than 1 hour. Boil the specimens completely submersed for a minimum of 5 hours. Do not add additional water during boiling. Allow ~~it~~ the specimens and water to cool by natural loss of heat for not less than 14 hours to a final temperature of 72 ± 5 °F (22 ± 3 °C). Continue to store the ~~samples~~ specimens on their edges in the boiled water until the final two steps are completed.

5.~~4~~3.

5.3. Suspend the specimen in the bucket at a constant water level by the suitable apparatus and determine the apparent mass of the ~~sample~~ specimen in water at 77 ± 2 °F (25 ± 1 °C). Designate this apparent mass ~~**D**~~ **B**.

5.~~5~~4.

Remove the ~~sample~~ specimen from the water. Quickly damp-dry the ~~sample~~ specimen with a damp absorbent cloth and determine the mass of the specimen. Designate the ~~soaked,~~ boiled~~,~~ surface-dried mass **C**.

6.1.

Absorption ~~after immersion and boiling~~, % = [(C-A)/A] x 100
Bulk density, dry = [A/(C-~~D~~B)] x d_w ~~= g_1~~
~~Bulk density after immersion = [B/(C-D)]~~
Bulk density after ~~immersion and~~ boiling = [C/(C-~~D~~B)] x d_w
Apparent density = [A/(A-~~D~~B)] x d_w ~~= g_2~~
Volume of permeable voids (pore space), % = [(C-A)/(C-~~D~~B)] x 100

Where: A = Mass of oven dried ~~sample~~ specimen in air
~~B = Mass of surface-dry sample in air after immersion~~
~~D~~B = Apparent mass of ~~sample~~ specimen in water after immersion and boiling
C = Mass of surface-dry ~~sample~~ specimen in air after ~~immersion and~~ boiling
dw = density of water at 77 ± 2 °F (25 ± 1 °C), 62.243 lb/ft3 (997 kg/m3)
~~g1 = Bulk density, dry~~
~~g2 = Apparent density~~

7.2.	Record densities to the nearest ~~0.01 g/cm^3~~ 0.1 lb/ ft^3 (1 kg/m^3).
7.3.	Record the volume of permeable voids (pore space) to the nearest 0.01 % and report to the nearest 0.1%.

5.9.76 METHOD FOR TESTING THE COMPRESSIVE STRENGTH OF MOLDED CYLINDRICAL CONCRETE SPECIMENS (Kansas Test Method KT-76)

Section	Change
4.1.1. (new)	**4.1.1.** Verify that the faces of the bearing blocks are plane every 12 months. Except for the concentric circles described in AASHTO T 22, Section 5.2., the bearing block faces shall not depart from a plane by more than 0.001 in. (0.02 mm) along any 6 in. (150mm) length for bearing blocks with a diameter of 6 in. (150mm) or larger, or by more than 0.001 in. (0.02 mm) in any direction for smaller bearing blocks. New bearing blocks shall be manufactured within one half of this tolerance.
4.1.2. (new)	**4.1.2.** Clean and lubricate the curved surfaces of the socket and spherical portion of the upper bearing block every six months. Check for any visible wear on the spherical portion of the upper bearing block during the cleaning and lubrication. Any noticeable wear is cause for replacement of the upper bearing block. The lubricant shall be conventional motor oil.

5.9.79 Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration (Kansas Test Method KT-79)

Section	Change
2.3.	~~**2.3** KT-49; Method for Obtaining and Testing Drilled Cores~~
~~2.4.~~3.	Renumbered 2.4. to 2.3.
2.3. thru 9.	All sections below 2.3. renumbered
3. (new)	**3. TERMINOLOGY** **3.1.** Sample: Set of three cylinders taken from the same concrete batch at the same time. **3.2.** Specimen: One cylinder of the set of cylinders to be tested.
~~4.1.~~ 5.1.	Prepare 3 specimens per sample~~s~~ per mix design. Each specimen is to be tested separately. The ~~samples~~ specimens shall be 4" x 8" (100mm X 200mm) cylinders cast at time of mixing.
~~5.1.~~ 6.1.	...See ~~**5.6.4.**~~ for transportation requirements.
~~5.3.~~ 6.3	...Samples are to remain in the curing environment until specified in section ~~6~~7.3. of this test method.
~~6.2.~~ 7.2.	During the test, the air temperature around the specimens shall be maintained in the range of ~~20 to 25ºC (68 to 77ºF)~~ 68 to 77ºF (20 to 25ºC). As the unit is portable, testing the specimens in the room they are stored in is ideal.
~~6.3.~~ 7.3.	**1.1.** Remove the specimens from curing environment, blot off excess water with damp towel/sponge to SSD condition, and transfer specimen to specimen holder. If ~~samples~~ specimens are stored in lime-saturated water storage tanks, clean off excess lime residue from ~~sample~~ specimen prior to testing. If several samples are to be tested, be sure that the ~~samples~~ specimens are not allowed to dry out excessively before completion of the testing. It is recommended that only one set of three ~~samples is~~ specimens are removed from the curing environment at any given time.
~~6.5.~~ 7.5.	Repeat step ~~6~~7.4 for the 90, 180, and 270 degree marks.
~~6.6~~ 7.6.	Repeat steps ~~6~~7.4 and ~~6~~7.5 for the same specimen for a total of eight readings.

~~6.7.~~ 7.7.	Repeat steps ~~6~~7.4 to ~~6~~7.6 for the remaining two specimens in the sample set.
~~7.1.~~ 8.1.	Calculate an average resistivity for each specimen. Calculate ~~percent relative standard deviation (%RSD)~~ the coefficient of variation (COV) for each ~~sample~~ specimen. If ~~%RSD~~ the COV is above 7.5%, fully immerse the ~~sample~~ specimen in a water bath ~~(20 to 25ºC (68 to 77ºF))~~68 to 77ºF (20 to 25ºC) for two (2) hours, then repeat the test. If ~~%RSD~~ the COV on second test is below 7.5%, use second test to calculate ~~sample~~ specimen average and complete ~~7~~8.2 and ~~7~~8.3. If ~~%RSD~~ the COV on second test is greater than 7.5%, use all 16 readings for ~~sample~~ the specimens to calculate ~~sample~~ specimen average.
~~7.2.~~ 8.2.	Calculate an average resistivity for the ~~set of~~ sample~~s~~ by averaging the average ~~resistivities~~ resistivity **(~~7~~8.1)** of the three specimens tested.
~~8.~~ 9.	Removed references to cores.
~~8.1.11.~~ 9.1.11.	Test results, reported as the surface resistivity measured from ~~7~~8.2 or ~~7~~8.3 if a correction factor is applied.

5.9.80 UNCOMPACTED VOID CONTENT OF COARSE AGGREGATE MICROWAVE OVEN METHOD (Kansas Test Method KT-80)

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc
4.1.	**NOTE:** Density of water varies based on temperature. Since the water bath temperature is fixed at 77 ± 2°F (25 ± 1°C), use the specified value of 0.99704 g/mL. For tests not restrained by the 77 ± 2°F (25 ± 1°C) requirement, select the proper density for water from **KT-15, Table 1**. Divide the value given in the table by 1000 for g/mL.

5.9.84 SAMPLING NUTS, BOLTS AND WASHERS (Kansas Test Method KT-84)

Section	Change
Footer	Corrected Section number

5.9.85 PROCEDURES FOR EVALUATING THE MOVEMENT, ROTATION, AND SOUND GENERATION OF PORTABLE TEMPORARY RUMBLE STRIPS (Kansas Test Method KT-85)

Section	Change
	New method

KT-86 Characterization Of The Air-Void System Of Freshly Mixed Concrete By The Sequential Pressure Method (Super Air Meter, Kansas Test Method KT-86)

Section	Change
Title	**5.9.86 CHARACTERIZATION OF THE AIR-VOID SYSTEM OF FRESHLY MIXED CONCRETE BY THE SEQUENTIAL PRESSURE METHOD (Super Air Meter ~~– SAM~~) (Kansas Test Method KT-86)**
5.10.1.	**ABSOLUTE VOLUME AND PERCENT OF VOIDS IN A UNIT VOLUME OF AGGREGATE**
Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc
5.10.2.	**THEORETICAL SPECIFIC GRAVITY OF A COMBINATION OF AGGREGATES**
Section	Change

Various	Change KT-1, KT-2, etc to KT-01, etc

5.10.03. VOLUME OF ASPHALT MATERIALS

Section	Change
Table 1	13.5°C Column B: value changed to 1.0011
	25.5°C Column A: value changed to 0.9934
	26.0°C Column A: value changed to 0.9931
	70.0°C Column A: value changed to 0.9658
Table 2	81°F Group 2: value changed to 0.9896
	107°F Group 2: value changed to 0.9766
	201°F Group 1: value changed to 0.9452
	203°F Group 0: value changed to 0.9510
	250°F Group 1: value changed to 0.9268
	396°F Group 1: value changed to 0.8738

5.10.4. CALCULATIONS FOR THE MARSHALL MIX DESIGN OF BITUMINOUS MIXTURES

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

Appendix A

Section	Change
Various	Change KT-1, KT-2, etc to KT-01, etc

DIVISION 800 **STONE FOR RIPRAP WASH** **CHECKS & OTHER MISC. USES**	
Acceptance Samples & Tests	500 TONS (500 Mg) or 500 yd^3 (500 m^3). Tests to be done at production site. Type III Stone for Filter Course may be accepted visually

Appendix B

Section	Change
Various	Change KT-1, 2, etc. to KT-01, 02 ...

Div. 300 CEMENT TREATED BASE (CTB) Compressive Strength	
	~~4 sets of three for each normal day's production. One set per lot.~~
Contractor	1 specimen per sublot ~~1 specimen for each day's production.~~
KDOT	1 specimen per sublot

Div. 500 PORTLAND CEMENT CONCRETE PAVEMENT **Individual Aggregates**	

Sieve Analysis of Aggregate (Pg. 1)	1 per project ~~for each individual aggregate~~.
Concrete (continued) Cores (Pg 3)	As required in SS ~~2007~~ 2015 section 501.5g.
Pg. 4	Vibrator Frequency Per Standard Specification 154.2e

Appendix C

Section	Change
Various tables	KT-1, 2, 3 and 6 to KT-01, etc on various tables

Appendix D

Section	Change
5.1.	Change KT-1, 2, etc. to KT-01, 02 ...