MATERIALS

Chapter

INDEXES

Subject

Table of Contents

Date Issued

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MATERIALS	Chapter INTRODUCTION
	Subject Design of This Guidance Manual

Summary: Provided are a description of the design of this guidance manual and an explanation of the most effective ways of locating information in the manual.

ORGANIZATION & NUMBERING:

Chapters—The subject matter in the manual is divided into chapters. Each chapter is placed behind a BLUE tab, with the chapter title and the chapter control number (100, 200, 300, etc.) printed on the tab. The chapter title also appears in the upper right-hand corner of the first page of a subject and in the upper left-hand corner of any subsequent page.

Sections—Some chapters are divided into sections. Each section title, instead of chapter title, appears in the upper right-hand corner of the first page of a subject and in the upper left-hand corner of any subsequent page.

Subjects—Chapters and sections are arranged by subjects.

Subject Number—Each subject is assigned a number, which appears in the upper right-hand corner of each page of the subject. For example, Chapter 200 includes subject 203, followed by subject 204, which is divided into section subjects 204-1 and 204-2.

"MAT" Prefix—Preceding each subject number, this prefix stands for the manual title Materials.

Subject Title—The title of a subject appears in the upper right-hand corner of the first page of a subject and in the upper left-hand corner of any subsequent page.

Date—The latest issuance date of a subject appears at the bottom of each page of the subject. This date agrees with the latest issuance date shown for the subject in the Table of Contents (MAT-01).

Page Numbering—Each subject has its own page numbering, which appears at the bottom of each page.

LOCATING INFORMATION . . . p. 2

LOCATING INFORMATION:

Indexes—To help you quickly find information in the manual, two indexes behind WHITE tabs appear at the front. Each index entry includes the corresponding subject number in the manual where you will find detailed information for the entry.

Table of Contents (MAT-01)—This index lists the titles of the manual's chapters and sections and their subjects, as well as other information, in numerical order. It includes the latest issuance dates of all the subjects. As the manual matures, these dates change.

Alphabetical Index (MAT-02)—This index alphabetically lists key information in the manual. Generally, it directs you to subject titles and to margin, paragraph, and subparagraph headings within subjects. This index is your main tool for finding specific information in the manual.

Table of Exhibits (MAT-9900)—This index lists the manual's exhibits. It includes the latest issuance date of each exhibit. As the exhibits are revised, the issuance dates change.

CROSS-REFERENCES IN MANUAL:

Subject Numbers in Parentheses—When you see a subject number in parentheses within the narrative on a page, refer to that number for more information about the subject.

QUESTIONS:

Whom to Contact—If you have any questions about the content of the manual, you may call the Division of Materials at (502) 564-3160.

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MATERIALS	Chapter INTRODUCTION
	Subject Purpose of This Guidance Manual

Summary: Provided is an explanation of the purpose of this guidance manual.

PURPOSE: This manual serves as a guide for conducting day-to-day business as it relates to the use of materials by the Transportation Cabinet.

WHAT THE MANUAL DOES NOT COVER: This manual provides reasonable, uniform policies and procedures that allow sufficient flexibility for solving special problems. It is impractical to attempt to provide in this manual policies and procedures for all situations that may arise. This manual does not answer all questions; it leaves many areas where individual judgment may need to be used.

QUESTIONS: If questions or special problems arise, please contact the Division of Materials.

SUGGESTIONS: The Division of Materials encourages suggestions for new and revised policies and procedures. To submit suggestions, please follow the proper channels to appropriate Cabinet divisions or offices.

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MATERIALS

Chapter

ADMINISTRATION

Subject

Organization, Function, & Jurisdiction

Summary: Described are the organization, function, and jurisdiction of the Division of Materials.

ORGANIZATION: The Division of Materials has the ultimate responsibility in all matters involving the use of materials. It is divided into one administrative branch and three engineering branches headed by transportation engineering branch managers, all with direct responsibility to the director. The engineering branches are as follows:

- The Structural Materials Branch is divided into four sections: Aggregate, Chemical, Concrete and Cement, and Physical Properties Testing.
- The Geotechnical Branch is divided into six sections: Construction; Drilling and Instrumentation; Engineering Geology; Landslide; Soil Survey and Test; and Structure Foundation.
- The Asphalt Branch is divided into three sections: Asphalt Mixtures, Asphalt Field Operations, and Liquid Asphalt.

Each highway district has a materials laboratory supervised by a district materials engineer who is responsible for the oversight of all materials activity within the district. With direct responsibility to the district's transportation engineering branch manager of Construction and Materials, the district materials engineer is to enforce and carry out the materials policy established by the division.

FUNCTION: The Division of Materials is responsible for the materials engineering and geotechnical engineering required for the design, construction, and maintenance of the roads and bridges in the state highway system. Engineering assurance testing is required on all materials used in road and bridge construction to assure specification compliance. Geotechnical engineering provided by the division is required for the design of roadways, structures, and slide correction.

FUNCTION (cont.) . . . p. 2

FUNCTION (cont.): Division staff members develop standards and specifications for materials, establish test procedures that determine compliance with specifications, and coordinate testing conducted at the project sites. Division personnel provide format review and qualification testing in the areas of aggregate testing, grading inspection and testing, asphalt-mixture testing, bridge-coating inspection, and concrete testing.

JURISDICTION: The responsibility of the division extends to materials used or submitted for use in state-aided or federal-aided highway construction or in state-aided highway maintenance.

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MATERIALS	Chapter ADMINISTRATION
	Subject Small Quantities Acceptance Policy

Summary: Referenced is the policy regarding small quantities acceptance.

POLICY: The Materials Field Sampling and Testing Manual outlines provisions for waiving the normal sampling and testing requirements for small quantities or miscellaneous materials while providing for their acceptance on the basis of visual inspections or certifications. These are intended to provide a practical approach to acceptance, which should reduce testing costs and provide for better utilization of available inspectors.

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MATERIALS	Chapter ADMINISTRATION
	Subject Guidance Manuals

Summary: Provided is a list of manuals prepared by the Division of Materials.

DIVISION GUIDANCE MANUALS:

The Division of Materials prepares manuals outlining standard procedures for sampling, testing, and control of materials. The manuals are as follows:

- Materials Field Sampling and Testing Manual
- Kentucky Methods Manual
- Geotechnical Manual
- Concrete Manual
- Precast/Prestressed Concrete Manual
- List of Approved Materials
- Aggregate Source Book
- Division of Materials Guidance Manual

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MATERIALS	Section LABORATORY ACCREDITATION & EQUIPMENT CALIBRATION
	Subject Laboratory Accreditation

Summary: Explained is the accreditation of the Division of Materials laboratories.

DIVISION OF MATERIALS LABORATORY ACCREDITATION: The Division of Materials is to maintain "Accredited" status under the AASHTO (American Association of State Highway and Transportation Officials) Accreditation Program (AAP). The division obtains accredited status by passing on-site inspection of equipment and demonstration of test procedures, participation in all appropriate proficiency sample testing, and maintenance of a quality system conforming to AASHTO R18. The division is responsible for overseeing the statewide laboratory qualification program and for accrediting district materials laboratories.

DISTRICT LABORATORY ACCREDITATION: To maintain an accredited status, each district materials laboratory must successfully pass an annual inspection by Division of Materials personnel. During the inspection the division inspectors review equipment and calibration documentation. Throughout the year the district materials engineer (DME) is responsible for equipment verifications and calibrations at the specified frequencies. The "Division of Materials Accreditation Reports" binder contains all of the required information for calibration frequencies, procedures, and documentation. In addition, the DME is responsible for the inspection and accreditation of all other laboratories within the district, performing acceptance testing for the Department of Highways, including contractor and consultant laboratories.

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MATERIALS	Section LABORATORY ACCREDITATION & EQUIPMENT CALIBRATION
	Subject Equipment Calibration

Summary: Discussed are the procedures for calibrating materials equipment in the districts.

PROCEDURES: Division of Materials personnel from both the Central Office and the district offices play a role in the calibration of district equipment:

- Master Thermometers: Each district materials laboratory is equipped with two "master" thermometers, which are used to calibrate all other thermometers in the district laboratory and all thermometers in the contractor and consultant laboratories. These two thermometers are used only for the calibration of other thermometers, not for testing purposes. One of these thermometers is used for high-temperature calibrations and has a range of at least 90^{o}-390^{o}F. The other thermometer is to be used for low-temperature calibrations and has a range of at least 66^{o}-80^{o}F. The division's Liquid Asphalt Section calibrates the two master thermometers annually. Thermometers not considered as masters are verified/calibrated annually by the district materials engineer (DME).

- Compression Machines, Speedy Moisture Testers, Wet Film Thickness Gages, and State-Owned Balances-Weights: Representatives of the division make annual visits to each district laboratory for the purpose of checking these apparatuses. The DME is responsible for making arrangements for bringing the field apparatus into the district laboratory so that it will be available for checking during these annual visits. Reports documenting the equipment checks are distributed to the DME and to the division.

PROCEDURES (cont.) . . . p. 2

PROCEDURES
(cont.):

- Concrete Air Meters: The DME is responsible for having meters calibrated and for performing necessary maintenance, such as cleaning and replacement of gaskets, at least once annually. The instructions for calibration, initial pressure line, and aggregate correction factors are provided and retained with each apparatus.

- Sand Equivalent Apparatus: A representative of the Aggregate Section conducts an annual check of the apparatuses assigned to the district laboratories to check timer, solution level, etc.

- New Equipment: New equipment is required to be calibrated/verified prior to placing in service.

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MATERIALS	Chapter ASPHALT BRANCH
	Subject Overview

Summary: Described is an overview of the Asphalt Branch.

OVERVIEW: The Asphalt Branch is responsible for the testing and approval of asphalt-related materials used on Department of Highways projects. The Asphalt Branch provides technical assistance and training concerning asphalt-related topics to others within the department, industry, Federal Highway Administration (FHWA), and academia.

The Asphalt Branch consists of three sections: Liquid Asphalt, Asphalt Mixtures Testing, and Asphalt Field Operations.

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MATERIALS	Chapter ASPHALT BRANCH
	Subject Liquid Asphalt Section

Summary: Detailed are the responsibilities of the Liquid Asphalt Section.

FUNCTION: The Liquid Asphalt Section is responsible for the testing, approval, and acceptance of all liquid asphalt materials, crack and joint sealers, and numerous miscellaneous materials used on Department of Highways projects.

RESPONSIBILITIES: The primary responsibilities of the section include, but are not limited to, the following:

- Ensuring that producers of liquid asphalt material conform, as applicable, to the requirements of Kentucky Method (KM) 444—Performance-Graded (PG) Asphalt Binder Approved Supplier Certification (ASC) Program—or KM 445—Emulsified Asphalt Supplier Certification (EASC) Program

  - Reviewing the quality-control plans for the suppliers
  - Performing inspections of the testing facilities and terminals
  - Annually testing quality-control samples

- Ensuring that producers of joint and miscellaneous material conform to the applicable specifications by verifying the certification of the material

  - Testing, evaluating, and accepting the joint, waterproofing, and miscellaneous materials listed on pages 5 and 6 of this chapter

- Performing acceptance, certification, verification, or informational testing on liquid asphalt and joint and miscellaneous materials and reporting the results and recommended actions to the appropriate parties

RESPONSIBILITIES (cont.) . . . p. 2

RESPONSIBILITIES (cont.):

- Receiving and testing samples obtained at the project site according to the Materials Field Sampling and Testing Manual and the appropriate portions of Division 800 of the Department of Highways Standard Specifications for Road and Bridge Construction

  Note: When a sample fails to satisfy the specification requirements, the material represented by that sample may or may not be subject to a price adjustment or removal from the project. Section personnel make recommendations to the appropriate parties regarding the acceptability of, and pay factor for, such material.

- Routinely performing tests on materials that are the responsibility of other sections within the Division of Materials (such materials include filter fabric, asphalt pipe coating, geotextile fabrics, epoxies, and asphalt-fiber joint fillers)

- Testing asphalt removers and truck-bed release agents

- Inspecting and approving source terminals, refineries, laboratories, and testing personnel and verifying the quality-control procedures for the certification of materials

  Before an asphalt terminal is allowed to ship material to projects, the section inspects the facility for several items, including, but not limited to, the following:

  - Storage and shipping tank capacity
  - Sampling valves
  - Annual certification of scales
  - Required records for shipping and testing
  - Laboratory facilities
  - Expertise of testing personnel

RESPONSIBILITIES (cont.) . . . p. 3

RESPONSIBILITIES (cont.):

Terminals desiring to certify their own products for immediate use must be inspected and approved annually by the section. At the beginning of each construction season, the terminals must furnish the section with a complete set of compliance test data and one sample of material for each product and grade produced. Section personnel evaluate the supplied material, laboratory equipment, testing procedures, and testing records.

- Providing technical assistance and training to others within the Department of Highways, industry, Federal Highway Administration (FHWA), academia, and other specialized/professional personnel. This assistance may concern the testing and approval of materials, use of these materials, investigations of failures, or specifications.

- Meeting with others within the department, industry, FHWA, academia, and other specialized/professional personnel to discuss and evaluate policies, manuals, methods, specifications, equipment, and research activities

  - Soliciting input
  - Interpreting requirements
  - Explaining revisions
  - Introducing new strategies regarding these items

- Maintaining AASHTO (American Association of State Highway and Transportation Officials) accreditation for all applicable tests for liquid and emulsified asphalt

  The accreditation process involves several steps, including the following:

  - Establishing, implementing, and maintaining a quality system that complies with the requirements of AASHTO R 18, Recommended Practice for Establishing and Implementing a Quality System for Construction Materials Testing Laboratories

RESPONSIBILITIES (cont.) . . . p. 4

RESPONSIBILITIES (cont.):

- Receiving the required on-site assessments and quality system evaluations as conducted by the AASHTO Materials Reference Laboratory (AMRL)
- Participating in all required AMRL proficiency sample programs
- Providing qualified personnel meeting the applicable criteria

- Testing (when possible), evaluating, and recommending action regarding new products

- Researching a certain product's performance or deficiency and recommending improvements or corrections to the product or changes in the methods of evaluation; also researching to develop new specifications or test methods or justify changes in current specifications or test methods

- Writing, reviewing, and recommending changes to policies and procedures, manuals, methods, and specifications concerning the testing of liquid-asphalt, joint, and waterproofing materials

  The section provides the necessary revisions to the liquid-asphalt-related items in the Materials Field Sampling and Testing Manual, Kentucky Methods, and Standard Specifications for Road and Bridge Construction. In conjunction with the Divisions of Operations and Purchases, the section reviews and recommends revisions to various price contracts for liquid-asphalt-related materials.

- Reviewing proposed revisions to liquid-asphalt-related AASHTO and ASTM (American Society for Testing and Materials) standards and providing recommendations regarding the changes and acceptance of the standards

- Maintaining the department's List of Approved Materials for all asphalt-related products (due to the multiple, various materials for which the section is responsible, the List of Approved Materials requires frequent and detailed attention in this area)

ASPHALT-RELATED MATERIALS . . . p. 5

ASPHALT-RELATED MATERIALS:

The asphalt-related materials tested, evaluated, and accepted by the Liquid Asphalt Section include, but are not limited to, the items listed below (the applicable test methods are indicated in parentheses):

• Performance-graded (PG) asphalt binders (AASHTO M 320, R 28, R 29, T 44, T 48, T 240, T 301, T 313, T 314, T 315)	PG 64-22 PG 70-22 PG 76-22
• Liquid asphalt materials (AASHTO T 44, T 50, T 55, T 59, T 72, T 78, T 79, T 182; ASTM D 5, D 402, D 2042)	KP-2 KP-4 Primer L
• Emulsified asphalt materials (AASHTO M 140, T 49, T 50, T 51, T 53, T 59, T 72)	AE-200 HFMS-2 HFRS-2 RS-1 RS-2 & CRS-2 CRS-2P SS-1 SS-1h

The specification requirements and test methods for the products listed above are outlined in Section 806 of the Department of Highways Standard Specifications for Road and Bridge Construction, a Special Provision, or a Special Note included in the project proposal. The primary uses for these products are found in Division 400 of the Standard Specifications.

SEALS & MISCELLANEOUS MATERIALS:

The joint, waterproofing, and miscellaneous materials tested, evaluated, and accepted by the Liquid Asphalt Section include, but are not limited to, the following items (the applicable test methods are indicated in parentheses):

- Butyl rubber sealant (AASHTO M 198, T 47, T 51, T 53, T 111, T 229; ASTM D 4, D 92, D 217)
- Rubber gaskets (AASHTO M 315; ASTM D 395(B), D 412, D 471, D 2240)
- Hot-poured, elastic joint sealers (ASTM D 5329, D 6690 {Type II})
- Preformed, compression joint sealers (ASTM D 412, D 471, D 573, D 2240, D2628, KM 64-409)

SEALS & MISCELLANEOUS MATERIALS (cont.) . . . p. 6

SEALS & MISCELLANEOUS MATERIALS (cont.):

- Preformed, expansion joint strip seals (ASTM D 412, D 471, D 573, D 2240, D 5973)
- Asphalt mastic (AASHTO T 111, T 229; ASTM D 217; KM 64-415, KM 64-416)
- Non-sag and self-leveling silicone sealant (ASTM C 639, C 661, C 679, C 792, D 412, D 2202, D 5329, D 5893)
- Rapid-cure silicone joint sealant (ASTM C 679, C 719, C 792, D 412, D 5329)
- Geotextile fabrics (ASTM D 4632)
- Traffic loop encapsulant (ASTM C 679, D 412, D 1875, D2240; KM 64-446, KM 64-447)
- Fiberglass, waterproofing membrane (ASTM D 146, E 96)
- Asphalt mop coat (ASTM D 449, D 2398; AASHTO T 44, T 48, T 49, T 51)
- Asphalt primer (ASTM D 41; AASHTO T 44, T 49, T 55, T 72)
- Asphalt pipe coatings (AASHTO M 190, T 44, T 47, T 48, T 49, T 53, T 229)

The specification requirements and test methods for some of the products listed above are outlined in Sections 806, 807, 808, 835, and 843 of the Department of Highways Standard Specifications for Road and Bridge Construction, a Special Provision, or a Special Note included in the project proposal.

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MATERIALS	Chapter ASPHALT BRANCH
	Subject Asphalt Mixtures Testing Section

Summary: Explained are the responsibilities of the Asphalt Mixtures Testing Section.

RESPONSIBILITIES: The primary responsibilities of the section are as follows:

- The section tests and evaluates asphalt mixtures as submitted by the contractor for review.

  The purpose of this testing is to ensure the quality of the asphalt mixtures proposed for use by the particular contractor. In those instances when a mix design and department verification are required, as described in Kentucky Method (KM) 421, Establishing the Job-Mix Formula of Asphalt Mixtures by the Contractor, the contractor submits the following items to the section for evaluation:

  - Job-mix formula (JMF)
  - Aggregate and asphalt binder samples
  - Laboratory mix design or plant-produced mixture data
  - Volumetric specimens and maximum specific gravity samples (a “one-point check”)

  The section performs tests on the above mixtures according to the appropriate methods—normally AASHTO MP 2, Superpave Volumetric Mix Design; and AASHTO PP 28, Superpave Volumetric Design for Hot-Mix Asphalt (HMA)—and usually completes a moisture-susceptibility test according to American Society for Testing and Materials (ASTM) D 4867, Effect of Moisture on Asphalt Concrete Paving Mixtures.

RESPONSIBILITIES (cont.) . . . p. 2

RESPONSIBILITIES (cont.):

A volumetric analysis completed with a Superpave Gyratory Compactor in conformance with MP 2 and PP 28 involves the actual manufacture of cylindrical specimens of asphalt mixture that subsequently undergo unit-weight tests. The analysis includes additional tests, such as the theoretical maximum specific gravity analysis as described in AASHTO T 209, Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures, in order to calculate the percentage of air voids and voids-in-the-mineral aggregate (VMA).

The moisture-susceptibility test involves subjecting a set of specimens to vacuum saturation and a freeze-thaw cycle and then comparing the retained strength of those specimens to an identical set that has not been vacuum-saturated or frozen. This tensile strength ratio (TSR) must satisfy a minimum value to ensure that the potential for the mixture to "strip" in the presence of water during the life of the pavement is minimized. Liquid antistripping additives must often be utilized in order to increase the TSR of an asphalt mixture to an acceptable level.

The aforementioned tests constitute a laboratory mix design analysis of an asphalt mixture received by the Asphalt Mixtures Testing Section. Given the proper performance of each of these tests and collection of the appropriate data, the mixture is then ready for a mathematical analysis and comparison with the contractor's laboratory design as described in KM 443, Verifying a Contractor's Laboratory Mix Design.

- The section generates "Asphalt-Mixture-Design Results" forms, or "MixPack" spreadsheets, for distribution to the appropriate department and industry personnel following these steps:

  1. The section completes a mathematical analysis of the mixture properties in the mix design process. PP 28, D 4867, and all other related methods contain instructions for the necessary calculations. The section then compares the mixture to the contractor's design to ensure compliance with the applicable portions of KM 443. If KM 443 is satisfied, the verification of the contractor's design is successful and complete, and the mixture is considered acceptable for use.

RESPONSIBILITIES (cont.) . . . p. 3

RESPONSIBILITIES (cont.):

2. The section generates an "Asphalt-Mixture-Design Results" form, or "MixPack" spreadsheet, detailing the mixture's acceptability or unacceptability. The report is a computer spreadsheet containing the following information:

   - § "Design Data" sheet indicating the project information, aggregate sources and sizes, asphalt binder source and grade, mixture gradation, and calculation of all required volumetric properties
   - § "Rand. #'s" sheet indicating the random sampling tonnages for each sublot, required mixture criteria, a summary of the mixture property data, and any applicable comments
   - § "1-Pt. Check" sheet containing the results of the volumetric specimens and maximum specific gravity samples produced by the contractor and tested by the department
   - § "Graphs" sheet containing the mixture property curves at different asphalt binder contents for the critical properties
   - § "0.45 Power Chart" sheet indicating the mixture gradation as compared to the control points for that nominal-maximum aggregate size
   - § "TSR" sheet containing the detailed results from the moisture-susceptibility analysis

3. The section distributes this "MixPack" report via electronic mail to the appropriate department and contractor personnel, namely the Superpave Mix Design Technologist (SMDT) who submitted the contractor's laboratory design, the appropriate district materials engineer, and the appropriate field representative from the Asphalt Field Operations Section of the Asphalt Branch. Section personnel also maintain a detailed record of the results from all tests performed during the analysis of the mixture.

4. In addition to developing and distributing the "MixPack" program for department and contractor personnel to use in calculating and recording the results of laboratory mix design testing, the section maintains and revises this spreadsheet, ensuring that the latest version of "MixPack" functions properly, correctly reflects the current specifications, and is available on the Division of Materials' Web site.

RESPONSIBILITIES (cont.) . . . p. 4

RESPONSIBILITIES (cont.):

- The section tests various experimental asphalt mixtures for informational or research purposes. On occasion, the section researches a certain mixture's performance or deficiency and recommends improvements or corrections to the mixture or changes in the methods of evaluation. Also, the section performs research to develop new specifications or test methods or to justify changes in current specifications or test methods.

- The section tests selected asphalt mixtures in the asphalt pavement analyzer (APA) to evaluate potential rutting susceptibility. By performing these analyses, section personnel gain experience with this relatively new and complicated device and compile a database of APA-test results to be used in the future development of a maximum-rut-depth specification. Such a specification would likely be applied to projects on the most heavily loaded facilities in the state, namely equivalent single axle load (ESAL) Class 3 and 4 mixtures.

- The section tests asphalt mixture samples to determine the asphalt binder content and gradation or to recover the asphalt binder according to the following.

  For asphalt binder content, the section uses one of the following:

  - KM 405, Extraction of Binder from Asphalt Paving Mixtures
  - KM 437, Determination of Asphalt Binder Content of Asphalt Mixtures Using the Nuclear Asphalt Content Gauge or
  - AASHTO T 308, Determining the Asphalt Content of Hot Mix Asphalt (HMA) by the Ignition Method

  For gradation, the section uses one of the following:

  - KM 433, Wet-Sieve Analysis of Aggregates Used in Asphalt Mixtures
  - KM 620, Wet Sieve Analysis of Fine and Coarse Aggregate

  For recovering asphalt binder, the section uses:

  - AASHTO T 170, Recovery of Asphalt from Solution by Absorption Method

RESPONSIBILITIES (cont.) . . . p. 5

RESPONSIBILITIES (cont.):

For further analyses, the section uses:

- ASTM D 5404, Recovery of Asphalt from Solution Using the Rotary Evaporator

- The section tests cores extracted from existing pavements. In most cases, the section tests the cores for informational purposes according to AASHTO T 166, Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens, for the determination of density. Other tests on cores may include the following:

  - Maximum specific gravity determinations on the mixture(s) comprising the cores according to T 209
  - Asphalt binder content determinations according to KM 405
  - Extracted-gradation determinations according to KM 433 or KM 620
  - Recovery of the asphalt binder in the core according to T 170

- The section maintains AASHTO accreditation for all applicable tests for asphalt mixtures. The accreditation process involves the following steps:

  1. Establishing, implementing, and maintaining a quality system that complies with the requirements of R 18
  2. Receiving the required on-site assessments and quality system evaluations as conducted by AASHTO Materials Reference Laboratory (AMRL)
  3. Participating in all required AMRL proficiency sample programs
  4. Providing qualified personnel meeting the applicable criteria

- To satisfy the federal requirement regarding qualified laboratories, the section inspects the district materials facilities for compliance with the division's in-house accreditation procedures. This inspection includes calibrating/verifying all applicable testing equipment and evaluating the district's quality system documentation. Section personnel also evaluate the district's documentation regarding the inspection of the contractor laboratories in that district to ensure compliance with those accreditation procedures.

RESPONSIBILITIES (cont.) . . . p. 6

RESPONSIBILITIES (cont.):

- The section provides technical assistance and training to others within the department, industry, FHWA, academia, and other specialized/professional personnel. This assistance may concern the testing and approval of asphalt mixtures, investigations of failures, or specifications. This training normally concerns the testing of asphalt mixtures provided to new employees or occasionally to department or industry personnel.

  The section also participates in the Superpave Plant Technologist (SPT) and SMDT personnel qualification courses conducted in partnership with the department, Plantmix Asphalt Industry of Kentucky, and Kentucky Transportation Center. Section personnel develop course materials, provide classroom instruction, and serve as laboratory-skills monitors for these courses.

- Section personnel meet with others within the department, industry, FHWA, academia, and other specialized/professional personnel to discuss and evaluate policies, manuals, methods, specifications, equipment, and research activities. Section personnel may solicit input, interpret requirements, explain revisions, or introduce new strategies regarding these items.

- Section personnel write, review, and recommend changes to policies and procedures, manuals, methods, and specifications concerning the testing of asphalt mixtures and also provide the necessary revisions to the asphalt-mixture-related items in the List of Approved Materials, Kentucky Methods, and Standard Specifications.

- The section reviews proposed revisions to asphalt-mixture-related AASHTO and ASTM standards. Section personnel provide recommendations regarding the changes and acceptance of the standards.

- The section administers the annual cooperative testing program involving the district, contractor, and private laboratories that perform asphalt-mixture design, acceptance, or verification testing for department projects.

RESPONSIBILITIES (cont.) . . . p. 7

RESPONSIBILITIES (cont.):

This program offers the opportunity for these laboratories to compare their equipment and practices with those of other laboratories. This information proves helpful to the section when attempting to evaluate and verify mixtures. This program also assists in the identification of malfunctioning equipment or systems that lead to inconsistent or incorrect results.

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MATERIALS	Chapter ASPHALT BRANCH
	Subject Asphalt Field Operations Section

Summary: Described are the responsibilities of the Asphalt Field Operations Section.

RESPONSIBILITIES: The primary responsibilities of the section include, but are not limited to, the following:

- Providing technical assistance, guidance, and training to others within the Department of Highways, industry, Federal Highway Administration (FHWA), academia, and other specialized/professional personnel

  This assistance may concern the operation and design of asphalt-mixing plants, process-control/acceptance/ verification testing of asphalt mixtures, adjustment of the mixture ingredients, investigations of mixture or pavement failures, or specifications. Section personnel are responsible for explaining and transferring new technology, procedures, and policies to department and industry personnel. The section also participates in the Superpave Plant Technologist (SPT) and Superpave Mix Design Technologist (SMDT) qualification courses conducted in partnership with the department, Plantmix Asphalt Industry of Kentucky, and Kentucky Transportation Center. Section personnel develop course materials, provide classroom instruction, and serve as laboratory-skills monitors for these courses.

- Investigating concerns or failures regarding asphalt mixtures at the mixing plant, paving site, or in the completed pavement

  When problems with, or failures of, asphalt mixtures arise at the mixing plant, paving site, or completed pavement, the section will advise and assist in the investigation of the concerns. Section personnel will often provide recommendations for corrective actions or adjustments.

RESPONSIBILITIES (cont.) . . . p. 2

RESPONSIBILITIES (cont.):

- Inspecting and approving asphalt-mixing plants prior to initial use on department projects

  The contractor is to submit the Contractor's Master Certification of Asphalt Concrete Mixing Plant and Related Equipment form (Exhibit 01) for initial approval. Annually thereafter, the contractor is to submit the Annual Certification for Previously Approved Asphalt Mixing Plant and Related Equipment form (Exhibit 02) to the district materials engineer (DME). The DME also obtains a copy of all necessary batching and truck scale certifications from the contractor.

  Personnel from the section, in conjunction with the DME, grant an initial plant approval, inspect the plant annually for specification compliance, and ensure all deficiencies are corrected. Any major deficiencies will be cause for disapproval of the asphalt-mixing plant on department projects until the necessary corrections are completed.

  For the initial approval of an asphalt-mixing plant, the section issues the TC 64-416 form, Annual Asphalt Mixing Plant Inspection (Exhibit 03), after the plant has been inspected. Also, the section notifies the contractor, affected district(s), and Division of Purchases of the initial approval for the asphalt-mixing plant.

  For the annual approval of the plant, the DME issues the TC 64-416A form, Asphalt Mixing Plant Acceptance (Exhibit 04), based on the contractor's Annual Certification for Previously Approved Asphalt Mixing Plant and Related Equipment form. The section issues the TC 64-416 form after the asphalt-mixing plant has been inspected and approved.

  The section distributes the certification and approval forms to the DME and contractor. The contractor posts the approval form at the asphalt-mixing plant. Section personnel also maintain a detailed record of all asphalt-mixing plants approved for department use.

- Observing and monitoring operations and process-control/acceptance/verification testing at the asphalt-mixing plant, asphalt paving site, and source of the ingredient materials

RESPONSIBILITIES (cont.) . . . p. 3

RESPONSIBILITIES (cont.):

Section personnel ensure that the mixture production, daily plant inspection, sampling, and process-control/acceptance/ verification testing conform to the applicable specification. Sampling frequencies are specified in the Materials Field Sampling and Testing Manual. Testing procedures are located in the applicable Kentucky Method or AASHTO standard. Section personnel discuss any deficiencies encountered with the DME and ensure that corrections are completed promptly.

For plant inspection and process-control/acceptance/verification testing, the section ensures that the operations are performed as described in the following test procedures as applicable:

- § PP 28
- § AASHTO T 2, Sampling of Aggregates
- § AASHTO T 27, Sieve Analysis of Fine and Coarse Aggregates
- § T 308
- § KM 401, Calibrating and Checking Cold-Feed Flow on Asphalt Mixing Plants
- § KM 404, Sampling Liquid Asphalt Materials
- § KM 405
- § KM 407, Sieve Analysis of Aggregate From Asphalt Mixing Plants
- § KM 421
- § KM 425, Sampling Asphalt Mixtures
- § KM 426, Requirements for Process-Control Testing and Inspection of Asphalt Mixtures by the Contractor
- § KM 433
- § KM 434, Determination of Moisture Content in Asphalt Mixtures (Rapid Field Test)
- § KM 435, Acceptance of Asphalt Mixtures by Mixture Property Analysis
- § KM 436, Asphalt Binder Content Determination of Asphalt Mixtures by Plant Recordation
- § KM 437
- § KM 438, Asphalt Binder Content Determination of Asphalt Mixtures Based on the Maximum Specific Gravity
- § KM 442, Coring and Determining Percent of Solid Density of In-Place, Compacted, Asphalt Mixture Courses
- § KM 620

RESPONSIBILITIES (cont.) . . . p. 4

RESPONSIBILITIES (cont.):

- Evaluating, and recommending adjustments to, asphalt mixtures produced at mixing plants

  Section personnel travel to the asphalt-mixing plants producing for major department projects in order to evaluate the properties of those mixtures. The section ensures that the production and properties of the asphalt mixture conform to the applicable specifications. When necessary and appropriate, section personnel recommend or require corrective adjustments to the components of the mixture.

- Meeting with others within the department, industry, FHWA, academia, and other specialized/professional personnel to discuss and evaluate policies, manuals, methods, specifications, equipment, and research activities

  Section personnel may solicit input, interpret requirements, explain revisions, or introduce new strategies regarding these items.

- Writing, reviewing, and recommending changes to policies and procedures, manuals, methods, and specifications concerning the operation of asphalt-mixing plants, production of asphalt mixtures, and process-control/acceptance/verification testing

  The section also provides the necessary revisions to the asphalt-mixture-related items in the List of Approved Materials, Kentucky Methods, and Standard Specifications. Finally, in conjunction with the Divisions of Operations and Purchases, the section reviews and recommends revisions to various price contracts for hot- and cold-mix asphalt materials.

- Maintaining and revising the Asphalt Mixtures Acceptance Workbook (AMAW) for department and contractor personnel to use in calculating and recording the results of process-control/acceptance/verification testing according to the latest specifications

  The section maintains and revises this computer spreadsheet and ensures that the latest version of the AMAW functions correctly, reflects the current specifications, and is available on the Division of Materials' Web-site.

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MATERIALS	Chapter STRUCTURAL MATERIALS BRANCH
	Subject Overview

Summary: Described is an overview of the Structural Materials Branch.

OVERVIEW: The Structural Materials Branch is responsible for the supervision of testing, sampling, and inspection of structure-related materials used on Department of Highways projects.

The Structural Materials Branch consists of four sections:

- Aggregate Section
- Chemical Section
- Concrete and Cement Section
- Physical Properties Testing Section

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MATERIALS	Chapter STRUCTURAL MATERIALS BRANCH
	Subject Aggregate Section

Summary: Detailed are the services of the Aggregate Section.

GENERAL RESPONSIBILITIES: The Aggregate Section is responsible for general supervision and assistance in sampling, testing, and inspecting aggregate materials used by the Department of Highways. The section consists of two units: Laboratory Testing and Field Control.

- The Laboratory Testing Unit performs all tests required for aggregate approval except chemical tests (Chemical Section), plasticity index (Soil Survey & Test Section), and mortar-strength ratio (Concrete & Cement Section).
- The Field Control Unit obtains samples, performs inspections for approval of sources, and conducts periodic inspections of aggregates and operating procedures at sources. The unit also provides assistance and guidance to the district materials engineers (DMEs) in approval of aggregates and monitors the performance of polish-resistant pavements. The DMEs are directly responsible for approval of aggregates used in their districts.

AGGREGATE APPROVAL PROCEDURES: The procedures for aggregate approval include the following:

- Initial inspection of sources to determine their capability to produce aggregates meeting applicable requirements
- Periodic re-inspection of approved sources
- Performance of acceptance tests on finished-product aggregates at designated frequencies
- Review of the quality control program submitted to the division by the source
- Verification that the source has provided a Qualified Aggregate Technician (QAT) and adequate testing equipment to carry out the quality control program

APPROVED SOURCES . . . p. 2

APPROVED SOURCES:

Approved sources are required to perform their own finished product quality control testing. Inspections to determine compliance with quality control requirements are to be conducted by District Materials personnel and the Field Control Unit. Sources not in compliance are to be notified to correct the situation. Failure to maintain an adequate quality control program will result in removal from the List of Approved Materials.

Sources that have not been subjected to initial inspection and approval (that is, “unapproved sources”) may furnish aggregates. However, each quantity proposed for use must be stockpiled, sampled, tested, and approved for special uses only. These uses include concrete pipe, prestressed concrete, skid-resistant mixes, and others deemed to be in the best interest of the Department of Highways.

The frequency of sampling is determined by specific use as designated in the Materials Field Sampling and Testing Manual.

The following pages outline procedures for approval of aggregates. Additional details of the procedures for approving aggregates are provided in the Materials Field Sampling and Testing Manual and the Kentucky Methods Manual.

AGGREGATE SOURCES APPROVAL:

Those sources for which the producers (1) are adequately equipped, (2) have the required QAT, (3) have designated a definite site for production of aggregates, and (4) have provided the Division of Materials with a quality control program for review and acceptance are subject to inspection and testing as necessary to establish and maintain their approved status. Included may be (1) inspecting facilities for crushing, grading, or otherwise processing the aggregates; (2) testing various properties of the parent material and classifying them according to their location, quantity, and observed properties; and (3) performing tests on finished-product aggregates.

AGGREGATE SOURCES APPROVAL (cont.) . . . p. 3

AGGREGATE SOURCES APPROVAL (cont.):

Following initial approval, source approvals are updated (1) when additional parent materials become available or (2) when previously inspected materials appear to change in properties or (3) when the finished product becomes questionable. The incorporation of untested materials, failing materials, and/or waste specifically rejected for incorporation into the finished product shall be a basis for rejection of the product and removal of the source from the List of Approved Materials. This list is updated at least once annually on the basis of finished-product test results.

Acceptance testing is the governing basis for approval of shipments of aggregates used by the Department of Highways.

LEDGEROCK SOURCES APPROVAL:

Sources of aggregates available in the form of ledgerock (limestone, granite, and sandstone) are evaluated for approval only after the proposed quarry face has been freshly shot and sufficiently prepared to permit a reasonable evaluation of the quantity and uniformity of the deposit. The DME or the aggregate producer is to notify the Division of Materials when the site is ready for sampling. At such time a representative from the Field Control Unit inspects the proposed quarry face and, if the face is safe and acceptable, separates it into ledges as dictated by changes in lithology (changes in color, texture, grain size, etc.) and assigns these ledges to the appropriate benches.

At the time of sampling, the representative measures the thickness of the ledges, shale seams, etc., and records the measurements along with a description of each ledge and production bench. From this information the TC 64-600 form, Quarry Report (Exhibit 09), covering each source is to be prepared and made available to the concerned DME and aggregate producer.

The report lists in order from top to bottom the stripping, shale seams, ledges, benches, etc., as they appear in the quarry face. Test results, ledge thickness, ledge descriptions, and other pertinent information are to be shown in the report.

LEDGEROCK SOURCES APPROVAL (cont.) . . . p. 4

LEDGEROCK SOURCES APPROVAL (cont.):

A hand sample of approximately three to nine pounds is to be obtained from each ledge for petrographic examination and evaluation for expansive properties. The sample is to come from a fresh, unweathered section of the face in such a manner that the entire ledge is represented. Samples are not to be obtained on or adjacent to a blast hole. Depending on the ledge thickness or description, it may be necessary to obtain more than one hand sample to represent a ledge.

In some instances—for example, nonaccessible ledges, out-of-state quarries, and job-site quarries—it may be beneficial to the department to test expansive properties on finished-product samples for approval. In such cases, hand samples are not to be obtained, and ledge descriptions and exact footages may not be available for the quarry log.

When any ledge is considered suspect for expansion based on the petrographic examination and exceeds the percentage of bench footage allowed, the bench is restricted from jointed pavement concrete (JPC) use. A concrete beam expansion test is to be performed from material supplied from the questionable bench. Approval for concrete is based upon these test results.

If the beam fails to meet specifications, the bench is restricted from any concrete use on state projects. The producer may propose changing bench elevations or submit a production proposal for dilution or selective quarrying of the suspect bench. A proposal for dilution is subject to approval of the Aggregate Section on the basis of reactive properties and footages of the other ledges contained in the production bench.

After the proposed quarry face and benches have been evaluated, finished-product samples representing each individual bench are to be obtained. When possible, various sizes of aggregates for testing are to be obtained to get a good representation of the benches and method of production. The test results represent these designated benches and are reported on the quarry log.

The department may require that testing be performed by private laboratories, at the aggregate producer's expense, before additional testing is performed by the department.

LEDGEROCK SOURCES APPROVAL (cont.) . . . p. 5

LEDGEROCK SOURCES APPROVAL (cont.):

The quarry report is intended to provide guidance depicting the location and properties of the various ledges or benches. Its purpose is to serve as a reference for the DME, the aggregate producer, and the Aggregate Section when inspecting for necessary stripping or waste materials and recovery of the ledgerock as required to ensure a satisfactory finished product. It is also intended for the use of the department's inspectors in monitoring areas from which aggregates are produced.

The DME periodically inspects sources in the district to determine whether the aggregate is processed from acceptable ledges and informs the Aggregate Section of any apparent change in properties of ledges. Additionally, a representative of the Field Control Unit makes a periodic inspection of all approved sources, at which time ledges are measured and examined. Any that appear to vary significantly in properties from the previous sampling are resampled and tested. An updated quarry report is issued when changes are noted during an inspection.

TESTING SOURCES SAMPLES:

Samples for source approval are tested in the Division of Materials in accordance with testing methods indicated for types of ledgerock in the following chart:

	TYPES OF LEDGE ROCK		
PROPERTY	Limestone/Granite/Sandstone		
Specific Gravity and Absorption	X	X	X
Soundness	X	X	X
Lightweight Particles	X	N/A	X
Wear	X	X	X
Pore Index	X	X	X
Freeze Thaw	X	N/A	N/A
Chemical Analysis	X	X	X
Concrete Beam Expansion Test	X	N/A	N/A
Deleterious Materials Visual Inspection,[1]	X	X	X
Expansive Properties Petrographic Exam and Testing [2]	X	N/A	N/A

[1]A visual inspection and/or test to detect the presence of foreign materials that may cause the parent material to be nonfeasible as a source

[2]Applicable for limestone to be used in JPC

OTHER SOURCES APPROVAL . . . p. 6

OTHER SOURCES APPROVAL: The following discusses approval of types of sources for which ledgerock sampling described herein does not apply. This includes stream or glacial deposits of sand and gravel, conglomerate deposits, slag, and lightweight aggregate sources. Sources of these types are initially approved on the basis of inspection and tests as listed below. Thereafter, the basis of continued approval of these sources is periodic inspection of facilities and testing of materials with primary emphasis on tests from the finished product. The frequency of updating approval of these sources is not less that once annually. Samples will be tested at the Division of Materials for the properties in accordance to the test methods in this table:

Property		Type of Source			
		Sand	Gravel	Slag or Lightweight Aggregate	Conglomerate Coarse Aggregate
Sieve Analysis		X	Not Performed	Not Performed	Not Performed
Percent Crushed		Not Performed	X	Not Performed	X
Specific Gravity & Absorption		X	X	X	X
Pore Index		Not Performed	X	Not Performed	X
Freeze – Thaw		Not Performed	X	X	X
Soundness		X	X	X	X
Lightweight Particles		Not Performed	X	Not Performed	X
Unit Weight		Not Performed	Not Performed	X	Not Performed
Wear		Not Performed	X	X	X
Coal & Lignite		X	X	Not Performed	Not Performed
Sand Equivalent		X	Not Performed	Not Performed	Not Performed
Chemical Analysis		X	X	X	X
Deleterious Materials*		X	X	X	X

*A visual examination and/or test of the parent material or finished aggregate for the presence of excessive quantities of foreign materials that would cause the aggregate to be unacceptable

APPROVAL OF POLISH-RESISTANT AGGREGATE SOURCES:

The Aggregate Section maintains the list of approved and potential polish-resistant aggregate sources. Sources are categorized as Class A or Class B, based on performance history or chemical composition. Unlisted sources may apply for polish-resistant evaluation when specific project criteria regarding average daily traffic, travel speed, and safety considerations are met. These requests are processed by change order through the project engineer.

Aggregates supplied for polish-resistant applications are to meet the applicable requirements in the Standard Specifications for coarse and fine aggregates and the criteria outlined in the Polish-Resistant Aggregate Source List and Guidelines.

Sources on this list have demonstrated satisfactory polish-resistant qualities or satisfactory performance as skid-resistant aggregates for polish-resistant surface mixes. In addition to meeting the list requirements, sampling and testing on a project basis are required. Continued acceptance of individual sources is based on satisfactory field performance.

The Aggregate Section monitors polish-resistant pavements to evaluate and report on aggregate performance and updates the List of Approved Materials as changes occur.

AGGREGATE ACCEPTANCE TESTING & APPROVAL:

Aggregates delivered to construction projects are approved on the basis of acceptance samples and tests at frequencies designated in the Materials Field Sampling and Testing Manual.

For maintenance deliveries, the frequencies for obtaining acceptance samples and tests are determined by the DME.

AGGREGATE ACCEPTANCE TESTING AND APPROVAL (cont.) . . . p. 8

AGGREGATE ACCEPTANCE TESTING & APPROVAL: (cont.)

Acceptance samples are to be obtained as near the point of the aggregate being incorporated into the work as feasible. This is to preclude, insofar as practicable, the possible inclusion of unsatisfactory aggregates brought about by contamination, mishandling, segregation, etc. Acceptance samples for properties such as gradation, minus 200 content, and sand equivalent (subject to significant change after the aggregate is initially produced) are not to be obtained until after the aggregate is delivered to the point of use, unless they are used directly from the source without stockpiling. Compacted aggregate base sampling is to take place from the roadway behind the spreader but before compaction.

Acceptance samples to determine properties not subject to appreciable change may, when deemed necessary, be obtained from finished-product aggregates at the source.

Acceptance testing for gradation, minus 200 wash; specific gravity; absorption; sand equivalent; shale; flat/elongated, uncompacted voids; and percent crushed is generally performed or monitored by the DMEs (or project engineer personnel for the DMEs). Acceptance testing for other specified aggregate properties is generally performed by the section's Laboratory Testing Unit and is supplemented by visual inspection and testing by the DMEs at sources and on the project.

FAILING AGGREGATE ACCEPTANCE TESTS:

When failing acceptance tests are encountered, the acceptability of the materials is generally based on the average of the tests, except when statistical acceptance procedures apply. The acceptability of the materials is based on the average test result of all valid samples representing the stockpile or production lot. Where tests are performed during use of the material, failures may provide a basis for discontinuing use of the aggregates to appropriately correct the problem or for evaluating the material incorporated in the work for possible removal, corrective work, or acceptance at a reduced price.

FAILING AGGREGATE ACCEPTANCE TESTS (cont.) . . . p. 9

FAILING AGGREGATE ACCEPTANCE TESTS (cont.):

Where stockpiled aggregates are to be approved on the basis of acceptance testing, three or more tests are performed, as necessary, to determine the characteristics of the stockpile when failures are encountered. A stockpile's showing evidence of excessive variability in properties due to segregation or other cause (to the extent that some samples meet requirements and some do not) is reason to reject a portion or all of the stockpile. Where feasible, a stockpile may require thorough mixing or blending of the materials and retesting for approval.

STOCKPILING AGGREGATES:

When material is to be stockpiled at job sites, other than the source of supply, the producer is to notify the contractor, the DME, and the resident engineer of the location of the aggregate stockpile. The DME and the resident engineer are to inspect the location and inform the producer or contractor of department policy for stockpiling and handling aggregates.

The area in which stockpiles are to be placed is to be thoroughly cleaned of all foreign material and is to be firm and reasonably level. Stockpiles are recommended to be built in layers not to exceed three feet in height, and each layer is to be completed before beginning the next layer.

Aggregates are not to be removed from stockpiles within one foot of the ground until final cleanup of the work, and only then if the aggregates are free from contamination with foreign matter and other aggregates.

It is recommended that source of supply stockpiles, from which aggregates are to be used directly without further stockpiling, be built in accordance to designated standard methods. It is further recommended that a sign be placed on stockpiles that are to be used by the Department of Highways, stating what the size of the material is and that the material is made to Kentucky specifications.

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MATERIALS	Chapter STRUCTURAL MATERIALS BRANCH
	Subject Chemical Section

Summary: Described are the procedures for testing and approving materials by the Chemical Section.

MATERIALS TESTED OR ACCEPTED:

The Chemical Section is responsible for chemical testing and approval of materials used by the Department of Highways. The materials tested or accepted are:

- Aggregate, fine and coarse (chemical analysis)
- Bridge coatings
- Cement (chemical analysis)
- Chlorides, sodium and calcium
- Corrugated metal pipe and slotted drain
- Delineators
- Ductile iron pipe and fittings
- Epoxy resins
- Fertilizers
- Flexible delineator posts
- Fly ash (chemical analysis)
- Glass beads
- Herbicides
- High-strength nuts and bolts (chemical analysis)
- Latex
- Lime—quicklime and hydrated lime
- Pavement markers, raised
- Pavement marking tapes
- Sign sheeting, reflective
- Thermoplastic pavement markings
- Traffic paint
- Variable message signs
- Water

PROCEDURES FOR ACCEPTANCE . . . p. 2

PROCEDURES FOR ACCEPTANCE:

- Aggregate, Fine and Coarse (chemical analysis): The Aggregate Section is responsible for the control and acceptance of all aggregates. Samples submitted to the Chemical Section receive a complete or partial chemical analysis for various chemical elements. The Chemical Section also performs insoluble residue testing on polish-resistant coarse aggregates and aggregates extracted from bituminous concrete. All results are forwarded to the Aggregate Section for necessary action.

- Bridge Coatings: These must have approved-list status before being considered for use on a project. A certification must accompany each batch shipped to the project. Sampling and testing are to be performed according to the Materials Field Sampling and Testing Manual.

- Cement (chemical analysis): The Concrete and Cement Section is responsible for control of cement. Samples submitted to the Chemical Section are analyzed according to the American Society for Testing and Materials (ASTM) for chemical properties. All results are forwarded to the section for necessary action.

- Chlorides, Sodium and Calcium:

  - Sodium chloride–PCT purchases: Sodium chloride used as a pavement de-icer is accepted by certificate of compliance from the producer and random analysis of chemical properties outlined in the Invitation for Bid.
  - Calcium chloride: solid (Type S) or liquid (Type L) used with sodium chloride for snow and ice removal is accepted by certificate of compliance from the producer. Sampling is in accordance to the Materials Field Sampling and Testing Manual.

- Corrugated Metal Pipe and Slotted Drain: Acceptance of corrugated metal pipe is based on a certificate of compliance from an approved fabricator with field sampling and inspection of the bituminous coating and pipe. Pipe fabricators requesting approved-list status must first submit to the Division of Materials a manufacturer's certified analysis and annual guarantee for each type and brand of sheet used in the fabrication of pipe, along with a Quality Control Plan. If these documents conform to American Association of State Highway and Transportation Officials (AASHTO) specifications, a representative from the Chemical Section conducts an inspection of the plant.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 3

PROCEDURES FOR ACCEPTANCE (cont.):

Specific fabrication plant approval procedures are detailed in Kentucky Method 115.

- Delineators: Barrier wall and guardrail delineators are accepted visually by the resident engineer to ensure compliance with Standard Drawings. Button delineators are sampled in accordance with the Materials Field Sampling and Testing Manual and submitted to the Chemical Section for testing and approval.

- Ductile Iron Pipe and Fittings (specifications are contained in proposals/plans): These materials, used in the relocation of water, sewer, and gas lines, are accepted by field inspection of the pipe and a review of manufacturer's certification by project personnel. Inspection procedures are outlined in the Materials Field Sampling and Testing Manual.

- Epoxy Resins: These materials, used for dowel installation, bonding of plastic concrete to hardened concrete, binder in mortar, and sealing of concrete, are accepted on the basis of sampling and testing by the Chemical Section. When evaluated by the section, epoxy products successfully passing all physical and chemical tests required by ASTM are placed in the List of Approved Materials. The materials, when received on a project, are sampled and tested according to the Materials Field Sampling and Testing Manual. Epoxy meeting the requirements of AASHTO for use in sand slurry is accepted by manufacturer certification.

- Fertilizers: Those complying with the Kentucky Fertilizer Law may be accepted on certification. If a fertilizer does not comply with the Kentucky Fertilizer Law, it is sampled according to the Materials Field Sampling and Testing Manual and submitted to the Chemical Section for testing and approval.

- Flexible Delineator Posts: These are accepted on the basis of the manufacturer having approved-list status and a certification that states that the product is the same as tested by the National Transportation Product Evaluation Program (NTPEP).

- Fly Ash (chemical analysis): Samples submitted to the Chemical Section receive the applicable chemical analyses as detailed in ASTM. Sampling procedures are outlined in the Materials Field Sampling and Testing Manual. Results are forwarded to the Concrete and Cement Section for necessary action.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 4

PROCEDURES FOR ACCEPTANCE (cont.):

- Glass Beads: The glass beads for reflective pavement markings are tested for various physical and chemical properties. Sampling and testing criteria are found in the Materials Field Sampling and Testing Manual.

- Herbicides: Although the Department of Highways reserves the right to sample and test herbicides purchased under price contract, they are sampled and submitted for testing only when requested by the district operations engineer (DOE). Material acceptance is based on manufacturer certification.

- High-Strength Nuts and Bolts: The Physical Properties Testing Section is responsible for the control of these products. Samples submitted to the Chemical Section receive the applicable chemical analyses. Sampling procedures are outlined in the Materials Field Sampling and Testing Manual. Results are forwarded to the Physical Properties Testing Section for necessary action.

- Latex: Acceptance of latex is based upon the manufacturer having approved-list status and supplying a certification indicating test data that is within the tolerances provided in the List of Approved Materials. Sampling and testing are performed according to the Materials Field Sampling and Testing Manual.

- Lime—Quicklime and Hydrated Lime: Lime used for soil stabilization is to be supplied from a mill with approved-list status. Sampling and documentation submission are according to the Materials Field Sampling and Testing Manual.

- Pavement Markers, Raised: Markers must have approved-list status prior to use on a project. Instructions regarding inspection, sampling, and documentation are provided in the Materials Field Sampling and Testing Manual.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 5

PROCEDURES FOR ACCEPTANCE (cont.):

- Pavement Marking Tapes: Instructions regarding inspection, sampling, and documentation for permanent and temporary tapes are provided in the Materials Field Sampling and Testing Manual.

  - Permanent striping tape is to meet the requirements of applicable specification. No sample is required. Acceptance is based on a review of test data, a certification statement, and initial reflectance evaluation.
  - Temporary striping tape is to have approved-list status prior to use on a project. No sample is required.

- Sign Sheeting, Reflective: Signs are typically fabricated in commercial sign shops for construction projects. The reflective sheeting used must have approved-list status prior to acceptance. Procedures for inspection and acceptance are outlined in the Materials Field Sampling and Testing Manual.

- Thermoplastic Pavement Markings: The material is to be tested and approved prior to use on a project. Samples are submitted by the manufacturer according to the requirements of the Kentucky Standard Specifications. Project acceptance procedures are outlined in the Materials Field Sampling and Testing Manual.

- Traffic Paint: Both permanent paint and temporary paint are sampled according to the Materials Field Sampling and Testing Manual. Chemical and physical testing of the paint is performed prior to acceptance for payment on a project.

- Variable Message Signs: These signs must have approved- list status prior to use on a project. Sampling procedures are outlined in the Materials Field Sampling and Testing Manual.

- Water: Water is to be sampled and tested for chemical properties when proposed for use in Portland Cement Concrete. Sampling procedures are outlined in the Materials Field Sampling and Testing Manual.

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MATERIALS	Section CONCRETE & CEMENT SECTION
	Subject Concrete

Summary: Described are the responsibilities of the Concrete and Cement Section regarding the use of concrete by the Department of Highways.

RESPONSIBILITIES: The section's primary responsibilities regarding the use of concrete include, but are not limited to, the following:

- Maintaining a concrete field control unit that provides assistance to district and contractors personnel in the design and quality control of concrete
- Supervising the inspection and acceptance of precast and prestressed concrete bridge members
- Supervising the inspection and acceptance of precast concrete products, such as all types of barrier walls, reinforced earth panels, and precast drainage structures
- Approving and maintaining approved products listings for the following materials:
  - Admixtures for concrete
  - Masonry coatings
  - Certified pipe plants
  - Certified precast plants
  - Certified prestressed plants
- Preparing and updating the department's Concrete Manual and Precast and Prestressed Concrete Products Inspector's Manual

RESPONSIBILITIES (cont.) . . . p. 2

RESPONSIBILITIES (cont.):

- Preparing and updating Kentucky Methods related to Portland cement concrete sampling, testing, equipment calibration, and test result evaluation

- Conducting training sessions for concrete plant inspectors and concrete job-site inspectors

- Conducting laboratory trial concrete mixes for the evaluation of project materials when deemed necessary

- Reviewing and making recommendations for proposed specification changes for Portland cement concrete and related concrete materials

- Concrete Field Control Unit—Following is a listing of specific duties of the Concrete Field Control Unit. Most of these involve concrete production and inspection activities for which project and district personnel are directly responsible; thus the duties of the Concrete Field Control Unit are intended to provide assistance or work-related training as may be needed by the responsible personnel. For this unit to provide assistance and training most effectively, it is essential that the personnel assigned to it maintain close communication with the district personnel to determine those areas for which their assistance is most needed. Unit personnel are to:

  - Provide assistance and training to district and contractor personnel establishing mix designs and other inspection and concrete control activities at plants
  - Provide assistance and training in the calibration of continuous mixing concrete units (concrete mobiles)
  - Monitor plant operations, as necessary and possible, to determine the plants continual adequacy to conform to plant equipment requirements and provide the specified concrete mixture
  - Visually observe individual materials components at the plant to be aware of any potential problems associated with non-specification materials; report to the district materials engineer (DME) any problems associated with materials and work with the DME as necessary to resolve problems

RESPONSIBILITIES (cont.) . . . p. 3

RESPONSIBILITIES (cont.):

- Assist project personnel at the job site, providing any advice or training to inspectors in accomplishing compliance with standard sampling, testing, and inspection procedures related to control and acceptance of the concrete mixture
- Observe test equipment being used to determine its adequacy regarding both quantity and mechanical condition to suffice for the work; assist in correcting any deficiencies as possible
- Bring any noted and uncorrected deficiencies for items above to the attention of appropriate project or district personnel
- Offer project personnel any advice that could result in an improved in-place project
- Coordinate with DME in determining that concrete plant inspection requirements are met, including (1) equipment approval inspections to assure that the batching plants meet the applicable specification requirements and (2) periodic checks of plant scales and water meters

Other responsibilities of the Concrete and Cement Section are:

- Approval of Concrete Batch Plants

  - All concrete batch plants are to be inspected for conformance to the applicable requirements of the department's Standard Specifications for Road and Bridge Construction. Applicable requirements for any individual project are those specifications that are current on the date the proposal for bids is advertised. For the purpose of assigning responsibility for inspection and approval of the concrete batch plants, the terms Initial Inspection and Approval and Normal Inspection and Approval apply as follows:

    - Initial Inspection and Approval applies to concrete batch plants that have never furnished concrete to departmental projects or that have not furnished any concrete within five preceding construction seasons.
    - Normal Inspection and Approval applies to all inspections and/or approvals not described as Initial Inspection and Approval.

RESPONSIBILITIES (cont.) . . . p. 4

RESPONSIBILITIES (cont.):

- Initial Inspection and Approval—Initial inspection and approval of concrete batch plants are the responsibility of the DME, with assistance from Central Office personnel upon request. The TC 64-602 form, Concrete Plant Checklist (Exhibit 06), will be completed during the inspection, with one copy furnished to the DME and one copy to the Concrete and Cement Section.
- Normal Inspection and Approval—Normal inspection and approval are the responsibility of the DME. The DME, or designated representative, is to be present at the plant when scales and water measuring devices are being checked for accuracy. The plant facilities are to be reviewed during the scale check to determine whether there have been changes since the initial inspection and approval.
- Plant Approval—The procedure for approval of concrete plants for use on an individual project is as follows:

  - The DME receives a request for approval of a plant, the TC 63-2 form, Central or Truck Mixing of Concrete (Exhibit 07).
  - If inspection reports on the TC 64-602 form and the TC 64-316 form, Scale Report for Concrete Plants (Exhibit 08), indicate that the plant is currently approved and that scale and water-measuring device inspections are current within six months, the DME signs the TC 63-2 form and forwards it to the Division of Materials for final approval.
  - If the plant is not currently approved, the DME or the Division of Materials makes an inspection to determine the plant's conformity prior to signing the TC 63-2 form.
  - If the scale and water-measuring device inspection is not current within six months, the DME is to notify the plant representative and obtain a satisfactory inspection report, TC 64-316, prior to signing the TC 63-2 form.

- Approval of Prestressed Beams (I-beams and box beams), Precast and Prestressed Piling, and Prestressed Deck Panels

RESPONSIBILITIES (cont.) . . . p. 5

RESPONSIBILITIES (cont.):

- Plant Inspection Procedures—Prestressed concrete products are inspected at the production plant by Materials representatives in accordance with the procedures as outlined in the Precast/Prestressed Concrete Products Inspector's Manual. Permanent plant inspectors are assigned to those certified prestressed concrete plants that continually supply prestressed bridge members to departmental projects. In general, the scope of inspections to be performed in a prestressed bridge member plant includes the following:

  - Identification, examination, testing, and acceptance of materials
  - Inspecting and recording of tensioning
  - Inspecting of beds and forms prior to concreting
  - Checking of dimensions of members, number, size, and positions of tendons, reinforcing steel, other incorporated materials, openings, blockouts, etc.
  - Regular inspection of batching, mixing, conveying, placing, compacting, finishing, and curing of concrete
  - Observing performance of tests for slump, temperature and air content, and the preparation of concrete specimens for strength testing
  - Inspecting operations of detensioning, product removal from beds, handling, and storing
  - Final inspection of finished product prior to shipment, including monitoring dimensions, camber, blockouts, adequate concrete cover, and finishes
  - Generally observing plant equipment, working conditions, weather conditions, and other items that have the potential for affecting the products

- Documentation of Approval and Field Inspection—Members conforming to specification requirements are stamped with the Kentucky Oval approval stamp prior to shipment. Project engineers inspect all members as received for the presence of the approval stamp. If approval stamp is present and members are free of transportation injuries and all other visible defects, they may be installed.

RESPONSIBILITIES (cont.) . . . p. 6

RESPONSIBILITIES (cont.):

Test results are entered into the Kentucky Materials Information Management System (KMIMS) by the plant inspector in accordance with the Materials Field Sampling and Testing Manual.

- Approval of Precast Non-Prestressed Concrete Products (excluding concrete pipe products)

  - Plant Inspection Procedures—The following precast concrete units are inspected at the production plant by Materials representatives in accordance with procedures as outlined in the Precast/Prestressed Concrete Products Inspector's Manual.

    - Box culverts
    - Precast bridge units
    - Other precast units of significance

  - The general scope of inspections detailed herein applies to production of these products also. However, a permanent plant inspector would not typically be assigned to a facility producing only this type of precast concrete product.
  - Curing Requirements—Precast, non-prestressed, non-post-tensioned items are to be water-cured for three days or rapid-cured with steam or heat overnight (see Subsection 605 of the Standard Specifications). Curing may be discontinued when the acceptance strength is reached as shown by test cylinders. Curing compounds are permitted in lieu of the required wet curing on precast products that do not require bonding with other concrete or masonry coatings.
  - Documentation and Approval Requirements—All daily test reports for slump, air content, and compressive strength are to be thoroughly reviewed, and all products are to be visually inspected for dimensional tolerances and for freedom from cracks, spalls, voids, honeycomb areas, or any other defects prior to affixing the Kentucky Oval approval stamp. No entry is required in KMIMs by the plant inspector. The project engineer enters into KMIMs with an inspection type of visual.

RESPONSIBILITIES (cont.) . . . p. 7

RESPONSIBILITIES (cont.):

- Documentation and Approval Requirements for Concrete Pipe, Manhole Sections, Barrier Walls, Reinforced Earth Face Panels, VSL Retained Earth Face Panels, Doublewall Precast Units, Evergreen Precast Units, Precast Drainage Structures, Traffic Stops, and Right-of-Way Markers (current Standard Specifications and Kentucky Methods)—Products are accepted on certification from the manufacturer. The manufacturer must be on the List of Approved Materials and meet all requirements of the specifications.

- Approved Product Listings

  - Admixtures for Concrete (current Standard Specifications)—Approved lists by brand and product name for each type of admixture for concrete are established and maintained in the List of Approved Materials. Continued inclusion of an admixture on the list is contingent upon satisfactory performance in actual project use and an annual certification containing the following:

    - A statement that the admixture to be furnished during the particular calendar year is of the same composition as that previously approved for inclusion on the approved list
    - A statement that the admixture meets the appropriate requirements of AASHTO M 194 or AASHTO M 154 as applicable
    - A statement that the chloride content (as Cl) does not exceed one percent by weight
    - A statement that notification will be made to the Division of Materials of any changes in composition prior to the furnishing to projects of such material; details governing verification and documentation of approved status of admixtures at the time of use are provided by the department's Materials Field Sampling and Testing Manual.

RESPONSIBILITIES (cont.) . . . p. 8

RESPONSIBILITIES (cont.):

- Masonry Coatings (current Standard Specifications)—An approved list of masonry coatings is maintained in the List of Approved Materials and only those masonry coatings on the approved list are to be accepted for use. Masonry coatings on the approved lists are accepted on the basis of certifications by the manufacturer. The certification should state that the materials are of the same chemical composition as that previously approved.

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MATERIALS	Section CONCRETE & CEMENT SECTION
	Subject Cement

Summary: Explained are the procedures for testing and approval of cement.

CEMENT TESTING/ ACCEPTANCE:

The various cements and cement materials approved for testing and acceptance by this section are as follows:

- Testing and acceptance of Portland cement
- Testing and acceptance of concrete curing compounds
- Testing of concrete cylinders
- Obtaining and testing cores from cement and bituminous concrete pavements and structures
- Testing and acceptance concrete brick, concrete block, clay brick, and other masonry products
- Testing and acceptance of fly ash for use in concrete
- Testing and acceptance of non-shrink grouts
- Testing and acceptance of rapid hardening cementitious materials for concrete repairs
- Testing and acceptance of micro-silica
- Testing and acceptance of ground granulated blast furnace slag
- Testing and acceptance of concrete pipe test
- Skid resistance

PROCEDURES FOR ACCEPTANCE:

Listed are the procedures followed by personnel for acceptance of cement and cement materials.

- Acceptance of Portland cement (the current edition of Kentucky Standard Specifications)

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 2

PROCEDURES FOR ACCEPTANCE (cont.):

- The Department's procedure for acceptance of Portland cement is by certification from cement mills shown on an approved list. The certification is to be signed by an authorized company representative and may be printed or stamped on the bill of lading or on a separate sheet accompanying the bill of lading. In addition to the certification, destination "check" samples are obtained at frequencies set forth in the Materials Field Sampling and Testing Manual. Any cement furnished by an approved mill may be used prior to testing.
- Approved cement mills—Cement to be used by the Kentucky Department of Highways is to be supplied by approved cement mills. Cement from approved mills may be used prior to testing provided each load is accompanied by a bill of lading and a signed certification attesting to the cement type and conformance to the specified ASTM specification.
- Inclusion on approved list—Inclusion on the list of approved cement mills is obtained by submitting to the Division of Materials a 15-pound sample of each type of cement normally produced, along with certified mill test data developed over the previous six months. If testing and a review of the mill test data indicate that the mill is producing uniform cement meeting the requirements of the department's specifications, the cement mill will be placed on the approved list.
- Suspension from approved list—If a cement mill has more than 3 failures out of 30 field "check samples," that cement mill will be suspended from the approved list. The department will confirm that the failures were representative of cement shipped from the mill and not due to job-site contamination. Whenever this action is taken, written notice of such is to be submitted to the mill.
- Field sampling and testing—Cement is to be check-sampled in accordance with the Materials Field Sampling and Testing Manual. A check test is to be performed on the same cement sample whenever an initial test from the sample fails to conform to requirements.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 3

PROCEDURES FOR ACCEPTANCE (cont.):

- Acceptance of concrete curing compounds (current edition of Kentucky Standard Specifications)— Concrete curing compounds are accepted on the basis of testing performed by the Concrete and Cement Section. Samples are obtained at the job-site in accordance with the Materials Field Sampling and Testing Manual.

- Testing of concrete cylinders (current edition of Kentucky Standard Specifications)—The Concrete and Cement Section performs compressive strength testing of cylinders in accordance with ASTM specifications.

- Obtaining and testing cores—The Concrete and Cement Section obtains and tests cores for determination of strength and/or thickness as described below:

  - Cores for thickness of rigid pavement (current edition of Kentucky Standard Specifications)—Cores are obtained and measured in accordance with Kentucky Methods.
  - Cores for thickness of concrete cover over steel reinforcement— Cores for determining the thickness of concrete covering epoxy-coated reinforcement steel are to be taken according to Kentucky Methods.
  - Cores for determining strength of Portland cement concrete—Concrete cores are obtained for compressive strength determination for use in investigating low cylinder results or where the concrete would otherwise be expected to be damaged. Testing of cores for strength is to be in accordance with AASHTO specifications.
  - Cores for thickness of bituminous concrete base (current edition of the Kentucky Standard Specifications)— Cores for this purpose are obtained and measured in accordance with Kentucky Methods.

- Acceptance of masonry products and bricks (current edition of Kentucky Standard Specifications)—The Concrete and Cement Section is responsible for testing and approval of these products. Samples are obtained in accordance with the Materials Field Sampling and Testing Manual and testing is performed as required by the applicable specification.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 4

PROCEDURES FOR ACCEPTANCE (cont.):

- Acceptance of fly ash for use in concrete (the current edition of the Kentucky Standard Specifications)

  - The departmental procedure for acceptance of fly ash requires destination (field) sampling of all fly ash but permits its use prior to completion of testing provided the particular mill and class of fly ash are on the approved list in accordance with the following:

    - Approved fly ash sources—Fly ash used in Kentucky Department of Highways work is to be supplied by approved sources. Fly ash from approved sources may be used prior to testing provided each load is accompanied by a signed certification stating that the fly ash complies with ASTM specifications except as modified by the department's specifications for loss on ignition. Also, each shipment is to be accompanied by the latest actual test results for loss on ignition and fineness.
    - Inclusion on approved list—Fly ash to be used in concrete as a separate ingredient on Kentucky Department of Highways projects must be pre-approved and be shown on the list of approved fly ash sources maintained by the Division of Materials. To gain inclusion on the approved list and be able to furnish fly ash for acceptance on the basis of certification by supplier, the requirements in the Kentucky Standard Specifications must be met.
    - Suspension from approved list—If a fly ash plant has more than 5 failures out of 30 field "check samples" that plant will be suspended from the approved list. The department will confirm that the failures were representative of fly ash shipped from the plant and not due to job-site contamination. Whenever this action is taken, written notice of such is to be submitted to the plant source.
    - Field sampling and testing—Fly ash is to be check-sampled in accordance with the Materials of Field Sampling and Testing Manual. A check test is to be performed on the same fly ash sample whenever an initial test from the sample fails to conform to requirements. Testing is to be according to ASTM specifications.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 5

PROCEDURES FOR ACCEPTANCE (cont.):

- Testing and acceptance of non-shrink grouts (current edition of Kentucky Standard Specifications)

  - Non-shrink grout meeting the requirements of the Kentucky Standard Specifications is placed on the List of Approved Materials. Materials on the list are accepted by certification stating that it is the same material originally submitted for approval and conformance to the Kentucky Standard Specifications.
  - Inclusion on approved list—To gain inclusion on the approved list, a 50-pound bag of the product is to be submitted to the Division of Materials for testing. The product must conform to ASTM 1090, with exceptions stated in the Kentucky Standard Specifications.
  - Suspension from approved list—A brand is to be removed from the approved list if (1) the manufacturer changes formulation, (2) the material performs unsatisfactorily in the field, or (3) the laboratory tests indicate nonconformance with specifications.

- Acceptance of rapid-hardening and very rapid-hardening concrete-patching material—(ASTM specifications with modifications)

  - The Concrete and Cement Section maintains an approved list of rapid-hardening and very rapid-hardening concrete-patching materials, primarily used by the Division of Operations. Only those products on the approved list are allowed to be bid for the annual price contract.
  - Rapid Hardening

    - Specifications for packaged dry, rapid-hardening material for concrete repairs—Cementitious mortars for rapid repairs to hardened hydraulic-cement concrete pavements and structures are to meet ASTM specifications, type: rapid-hardening, with the exceptions listed in the Kentucky Standard Specifications.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 6

PROCEDURES FOR ACCEPTANCE (cont.):

- § The manufacturer is to submit a product data sheet, a material safety data sheet, and actual test data by an independent testing agency (or other state laboratory) showing conformance to the appropriate ASTM specifications.
- § The manufacturer is to submit from regular production a bag of material packed in a regular marketing bag.

q Very Rapid-Hardening

- § Specifications for packaged dry, very rapid-hardening material for concrete repairs: Cementitious mortars for rapid repairs to hardened hydraulic-cement concrete pavements and structures are to meet ASTM specifications, type: very rapid-hardening, with the exceptions listed in the Kentucky Standard Specifications.
- § The manufacturer is to submit a product data sheet, a material safety data sheet, and actual test data by an independent testing agency (or other state laboratory) showing conformance to the following ASTM specifications.
- § The manufacturer is to submit from regular production a bag of material packaged in a regular marketing bag. If the test data submitted for a product above meets the requirements of the specifications and if those test results conducted on the product by the Division of Materials meet the specifications, that product will be placed on the appropriate approved list. The approved lists are used by the Division of Operations for awarding an annual price contract.

q A product will be removed from the approved list if (1) the manufacturer changes the formulation, (2) the material performs unsatisfactorily in use, (3) laboratory testing of product supplied for use indicates nonconformance with specifications, or (4) the department revises the specifications, rendering a product to be in nonconformance

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 7

PROCEDURES FOR ACCEPTANCE (cont.):

- Acceptance of micro-silica for use in concrete (current edition of Kentucky Standard Specifications)

  - The departmental procedure for micro-silica is by certification from the manufacturer and acceptable test results from samples taken in the field (according to the Materials Field Sampling and Testing Manual). The micro-silica manufacturer must be on the List of Approved Materials.
  - Inclusion on approved list—Inclusion on the list of approved micro-silica producers is obtained by submitting to the Division of Materials a sample for testing and by providing evidence of a satisfactory past record and a satisfactory quality control program. Micro-silica must meet AASHTO requirements.
  - Suspension from approved list—A brand shall be removed from the approved list if (1) the manufacturer changes formulation, (2) the material performs unsatisfactorily in the field, or (3) laboratory tests indicate nonconformance with specifications.

- Acceptance of ground granulated blast furnace slag (GGBFS) (current edition of Kentucky Standard Specifications)

  - The departmental procedure for acceptance of GGBFS is by certification from the manufacturer and acceptable test results from samples taken in the field (according to the Materials Field Sampling and Testing Manual). The GGBFS manufacturer must be on the List of Approved Materials.
  - Inclusion on approved list—Inclusion on the list of approved GGBFS producers is obtained by submitting to the Division of Materials a sample for testing and by providing evidence of a satisfactory past record and a satisfactory quality control program. GGBFS must meet ASTM requirements.
  - Suspension from approved list—A brand is to be removed from the approved list if (1) the manufacturer changes formulation, (2) the material performs unsatisfactorily in the field, or (3) laboratory tests indicate nonconformance with specifications.

PROCEDURES FOR ACCEPTANCE (cont.) . . . p. 8

PROCEDURES FOR ACCEPTANCE (cont.):

- Pipe cores: concrete pipe, clay pipe and arch pipe (current edition Kentucky Standard Specifications)

  - Pipe is to conform to all applicable specifications. The individual materials incidental to the manufacture of pipe, such as cement, water, steel reinforcement, and aggregates, are sampled in accordance with the Materials Field Sampling and Testing Manual. The Concrete and Cement Section performs the absorption test and strength tests, checks the steel location, and determines the steel area (on larger pipe).

- Skid-resistance testing as requested by the Aggregate Section

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MATERIALS	Chapter STRUCTURAL MATERIALS BRANCH
	Subject Physical Properties Testing Section

Summary: Explained are the Physical Properties Testing Section's responsibilities for materials tested and accepted for use by the Transportation Cabinet.

MATERIALS: Listed are the materials tested and accepted for Cabinet use:

- Steel Reinforcement for Concrete

  Deformed Reinforcing Bars
  Epoxy Coated Reinforcing Bars
  Prestressing Strand
  Welded Steel Wire Fabric
  Welded Deformed Steel Wire Fabric
  Load Transfer assemblies (Contraction and Expansion)
  Cold Drawn Steel Wire
  Hook Tie Bolts
  Hook tie Bolts with Expansion Anchors
  Mechanical and Welded Splices
  Tie Strips
  Reinforcing Strips

- Pipe (Drainage)

  Corrugated Polyethylene—M 252
  Poly-vinyl Chloride

- Pipe (Entrance, Laterals, etc.):Corrugated Polyethylene—M 294
- Geotechnical Materials

  Geotextiles
  Fin (Edge) Drains
  Fabric-wrapped Backfill Drains
  Geo-grids
  Gabions and Mattresses

MATERIALS (cont.) . . . p. 2

MATERIALS (cont.):

- Miscellaneous Materials

  Guard Rail and Accessories
  Fencing Materials
  Welders Qualification
    Shielded Metal Arc
    Mig
    Tack

- Sign and Delineator Posts
- Handrail
- Bond Breakers (Dowels)
- Gray Iron Castings
- Steel Grates and Frames
- Electric Wiring and Conduit
- Seed
- Treated Timber Products
- Untreated Timber Products
- Modular Glare Screens
- High-Strength Nuts and Bolts
- Coated Chairs and Tie Wire
- Preformed Expansion Joint Fillers
- Cork
- Bituminous Fiber
- Sponge Rubber
- Water Gates

FIELD DUTIES: Field duties include:

- Making periodic inspections at plants that epoxy-coat reinforcing steel to confirm conformance to their quality control assurance programs required in the Standard Specifications
- Investigating high volume marginal material failures at the project site for those items handled by the Physical Properties Testing Section
- Performing periodic inspections at reinforcing steel mills and fabricating shops to verify compliance with quality assurance programs

FIELD DUTIES (cont.) . . . p. 3

FIELD DUTIES (cont.):

- Calibrating, adjusting, and repairing non-metallic thickness testers every six months at the central and district laboratories
- Performing, as needed, the job-site inspection of epoxy-coated dowel bars used in transfer assemblies to assure specification compliance
- Performing pull out test on expansive anchors used in joining old concrete to new concrete
- Performing periodic inspections at cast iron foundries for approval and continued specification compliance

ACCEPTANCE PROCEDURES: The acceptance procedures for materials used by the Cabinet are as follows:

- Steel Reinforcement for Concrete
  - Deformed Reinforcing Bars (Kentucky Standard Specifications)—This material is accepted in accordance with Kentucky Methods Manual by either certification or job-site sampling.
  - Epoxy Coated Reinforcing Bars (Kentucky Standard Specifications)—Coated bars are accepted on the basis of approved quality control procedures performed by the Physical Properties Testing Section. Reinforcing bars to be epoxy-coated are to be in compliance with Kentucky Methods Manual prior to being coated. Epoxy-coaters quality control procedures are to be in conformance with the requirements of the Kentucky Methods Manual.
  - Prestressing Strands (Standard Specifications)—Strand heats are accepted on the basis of tests performed by the Division of Materials. Samples are obtained at the prestressed concrete plant in accordance with the Materials Field Sampling and Testing Manual.
  - Welded Steel Wire Fabric (Kentucky Standard Specifications)—Steel fabric is accepted on the basis of tests performed by the Division of Materials. Samples are obtained at the job site in accordance with the Materials Field Sampling and Testing Manual.

ACCEPTANCE PROCEDURES (cont.) . . . p. 4

ACCEPTANCE PROCEDURES (cont.):

- Welded Deformed Steel Wire Fabric (Kentucky Standard Specifications)—Same acceptance procedures as welded steel wire fabric, Section 64-05.0310(4).
- Load Transfer Assemblies (Standard Specifications)—Load transfer assembly manufacturers wishing to supply assemblies to Cabinet projects are required to submit a drawing of their proposed assembly along with a 4- to 6- foot section of a fabricated assembly for design approval. If the drawing and the assembly incorporate the typical features depicted by the Standard Drawings, the design is approved and the manufacturer is added to an approved list maintained by the Division of Materials. Assemblies of approved design are accepted on the basis of job-site sampling and dimensional and strength tests performed by the Division of Materials. Samples are obtained in accordance with the Materials Field Sampling and Testing Manual.
- Cold Drawn Steel Wire (Standard Specifications)—The wire is accepted on the basis of tests performed by the Division of Materials. Samples are obtained at the job site in accordance with the Materials Field Sampling and Testing Manual.
- Hook Tie-Bolts (Standard Specifications and Standard Drawings)—Hook tie-bolts are accepted on the basis of tests performed by the Division of Materials. Samples are obtained at the job site in accordance with the Materials Field Sampling and Testing Manual.
- Hook Tie-Bolts with Expansion Anchors (Standard Specifications and Standard Drawings)—Hook tie-bolts with expansion anchors are accepted on the basis of tests performed by the Division of Materials. Samples are obtained at the job site in accordance with the Materials Field Sampling and Testing Manual. Additionally, pull-out tests for acceptance are performed after installation of anchors as required by the Materials Field Sampling and Testing Manual.
- Mechanical and Welded Splices (Standard Specifications)—Splices are accepted on the basis of tests performed by the Division of Materials. Samples of completed splices are obtained from the job site in accordance with the Materials Field Sampling and Testing Manual.

ACCEPTANCE PROCEDURES (cont.) . . . p. 5

ACCEPTANCE
PROCEDURES (cont.):

- Tie Strips (Special Provision—Concrete Retaining Walls)—These strips are accepted on the basis of a manufacturer's certification and tests performed by the Division of Materials. Samples are obtained from the precast plant in accordance with the Materials Field Sampling and Testing Manual.
- Reinforcing Strips (Special Provision)—Same acceptance procedures as tie strips, Section 64-05.0310(11), with one exception. Samples are obtained from the job site.

- Pipe (drainage)

  - Corrugated Polyethylene Pipe M 252 (Kentucky Standard Specifications)—M 252 corrugated polyethylene pipe is accepted on the basis of tests performed by the Division of Materials and a certification from the manufacturer stating that the polyethylene materials used in manufacture of the pipe meet the requirements of AASHTO M 252 sample in accordance with the Materials Field Sampling and Testing Manual.
  - Corrugated Polyethylene Pipe M 294 (Standard Specifications and Kentucky Method Manual)—M 294 corrugated polyethylene pipe is accepted on certification from the manufacturer. The manufacturer is to be on the approval list and meet all requirements of the specifications.
  - Poly-vinyl Chloride Pipe (Standard Specifications)—PVC pipe is accepted on the basis of a manufacturer's certification stating that the material meets the specifications as quoted in the project proposal and the specifications.

- Pipe (entrances, laterals, etc.)
- Geotechnical Materials

  - Geotextiles (Kentucky Methods Manual)—Filter fabrics are accepted on the basis of tests performed by the Division of Materials and a manufacturer's certification including test results. Samples are obtained from the job site or from suppliers approved for pretesting in accordance with the Materials Field Sampling and Testing Manual. All pretested rolls are to be identified with a lot number so that approval may be confirmed upon their arrival at the job site.

ACCEPTANCE PROCEDURES (cont.) . . . p. 6

ACCEPTANCE
PROCEDURES (cont.):

- Fin (Edge) Drains (Project Proposal)—This material is accepted on the basis of job-site sampling and a manufacturer's certification.
- Fabric-Wrapped Backfill Drains (Standard Specifications)—This material is accepted on the basis of tests performed on the drain and its fabric cover by the Division of Materials. Samples are submitted by any company wishing to sell its product for use on Cabinet projects. If the drain is approved, it is placed on an approved list maintained by the Division of Materials.
- Geo-grids (Project Proposal)—This material is accepted on the basis of visual inspection and/or job-site sampling and certification by the manufacturer.
- Gabion Baskets and Mattress Units (Standard Specifications)—These materials are accepted on the basis of tests performed by the Division of Materials and visual inspection by the project engineer. Samples are obtained at the job site in accordance with the Materials Field Sampling and Testing Manual.

• Miscellaneous Materials

- Guard Rail and Accessories (Standard Specifications and Standard Operating Procedure for Acceptance of Guardrail Systems)—Guardrail and its component materials are approved on the basis of destination sampling and laboratory testing, or certification where permitted, for each item in accordance with the Materials Field Sampling and Testing Manual. The project engineer is responsible for checking each shipment for conformity to dimensional and zinc coating requirements. Guardrail should be on the Division of Materials' List of Materials of Guardrail Manufacturers. For timber components, see Section 64-05.0350 (11).
- Fencing Materials—Fencing materials are accepted on the basis of tests performed by the Physical Properties Testing Section. Samples are obtained at destination in accordance with the Materials Field Sampling and Testing Manual. For timber posts, see Section 64-05.0350 (11).

ACCEPTANCE PROCEDURES (cont.) . . . p. 7

ACCEPTANCE PROCEDURES (cont.):

- Welders Qualification (Mig, Tack, Shielded Metal Arc) (Standard Specifications and Kentucky Methods Manual)—The Physical Properties Testing Section is responsible for the evaluation of the welded plates submitted for the approval of arc welders. The applicable Kentucky Methods Manual is a modification of AWS D1.5 guidelines. It is important that the welder take the entire test with the plates in position. Vocational schools and their instructors, who are approved by the Physical Properties Testing Section, may observe the preparation and testing of the test plates by the welder. These schools are placed on an approved list maintained by the Division of Materials.
- Welders are approved for two calendar years if they are, at no time, inactive for longer than six months. The welder may complete any Cabinet project on which he of she has begun work during that time. Each approved welder is issued a card showing his or her approved positions and the expiration date of each.

- Sign and Delineator Posts (Standard Specifications)—Sign and delineator posts are accepted on the basis of tests performed by the Division of Materials and a manufacturer's certification. Samples are obtained at the destination in accordance with the Materials Field Sampling and Testing Manual.
- Handrail (Standard Specifications)—All three types of handrail are accepted on the basis of a manufacturer's certification and visual inspection by the project engineer.
- Bond Breakers for Dowels (Standard Specifications)—Bond breakers are accepted on the basis of extensive testing by the Physical Properties Testing Section. After acceptance, the materials are added to the approved list maintained by the Division of Materials.
- Gray Iron Castings (Standard Specifications)—Castings are accepted on the basis of tests performed on samples from the manufacturer and by evaluation of a manufacturer's certification containing test results specific to the lots shipped. Lot numbers are to be cast into the product so that approval may be confirmed when the shipment arrives at the job site.

ACCEPTANCE PROCEDURES (cont.) . . . p. 8

ACCEPTANCE PROCEDURES (cont.):

- Steel Grates and Frames (Standard Specifications)—These materials are accepted by certification from approved sources located on the approved list. To be approved, the steel used is to be tested periodically and the welders are to be qualified to weld on Cabinet projects, see Section 64-06.0350(3).
- Electric Wiring and Conduit (Standard Specifications)—These items are accepted on the basis of job-site sampling and approval by the Division of Traffic. Approvals are reported by the Division of Materials.
- Seed (Standard Specifications)
  - General Information: Seed used on transportation projects must conform to the Kentucky Seed Law and the Standard Specifications for Road and Bridge Construction.
- Treated Timber Products (Standard Specifications)—Treated timber products are accepted on the basis of grade inspections and assays performed either at job site or at the treatment plant by the district materials engineer. Timber treated either within the Commonwealth of Kentucky or within a reasonable driving distance of the Commonwealth of Kentucky will be inspected, tested, and approved by the Division of Materials prior to acceptance for payment. A reasonable driving distance is defined as any location that allows the inspector reasonable time for inspection and round-trip travel time from his or her work station in one working day. Timber companies furnishing timber that is treated outside a reasonable driving distance of the Commonwealth of Kentucky are to contact the Division of Materials at least five days prior to commencing an order.
  - A treated timber inspection consists of the following:
    - Checking dimensions, knots, shakes, splits, cracks, etc., for conformance to specifications
    - Taking cores and checking their assays for conformance to AWPA Standards
    - Stamping approved pieces with the emblem of the testing agency
    - Furnishing a copy of the inspection report to the treatment plant

ACCEPTANCE PROCEDURES (cont.) . . . p. 9

ACCEPTANCE PROCEDURES (cont.):

The project personnel should check all pieces for the presence of either a Kentucky Stamp or that of an inspection agency. Not all guardrail blocks are stamped. If stamp-approved, the timber should be visually inspected for conformance to specifications.

- Untreated Timber Products (Standard Specifications)—Untreated timber is usually inspected and approved at the job site. The project engineer checks pieces for the following: conformity to specifications; dimensions; freedom from defects; grade; species; etc. (See Standard Drawings.)
- Modular Glare Screens (Special Note for Modular Glare Screens)—Modular screens are accepted on the basis of visual inspection and job-site sampling.
- ASTM A 325 Bolts, Nuts, and Washers (Standard Specifications)—These items are accepted on the basis of the following procedure:

  - Inspect bolts for defects
  - Obtain manufacturer's certification containing physical and chemical results and statement that bolts conform to ASTM A 325
  - Submit certification to Central Office Division of Construction Note: If the structural steel has been inspected by a state shop inspector, the Central Office Division of Construction may already have the test report. Check with the Bridge Section.
  - Obtain check sample of bolts from each shipping lot at the frequencies stated in the Materials Field Sampling and Testing Manual
  - Submit sample and two copies of completed Kentucky Shop Coatings and Fasteners Sample Sheet
  - Definition of shipping lot: A shipping lot, for purposes of selecting test samples, is that quantity of bolts of the same nominal size and same nominal length necessary to fill the requirements of a single purchase order. Obtain as many different manufacturer symbols in sample as size of sample will allow.

ACCEPTANCE PROCEDURES (cont.) . . . p. 10

ACCEPTANCE PROCEDURES (cont.):

- Coated Chairs, Plastic Chairs, Bolsters, and Tie Wire (Standard Specifications)—These materials are accepted on the basis of tests performed on samples obtained from the job site. Samples are to be obtained in accordance with the Materials Field Sampling and Testing Manual.
- Preformed Expansion Joint Fillers (Standard Specifications)—Expansion joint fillers are accepted on the basis of tests performed by the Division of Materials. Samples may be obtained from the supplier (for pretesting) or from the job site or prestressed concrete plant. These samples are to be obtained in accordance with the Materials Field Sampling and Testing Manual. When the material has been pretested, it is to be accompanied to the job site by a copy of the TC 64-609 form, Preformed Expansion Joint Materials from Pretested Stock (Exhibit 05). The project engineer then uses the TC 64-609 to verify the lot numbers shipped and their approval.
- Water Gates (Standard Drawings)—Water gates are accepted on the certification by the manufacturer.

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MATERIALS	Chapter STRUCTURAL MATERIALS BRANCH
	Subject Independent Assurance & Materials Certification

Summary: Described are the Independent Assurance and Materials Certification Programs.

INDEPENDENT ASSURANCE PROGRAM:

The Independent Assurance Program establishes guidelines for and supervises the obtaining of independent assurance samples and tests as required by the Federal Highway Administration (FHWA). District Materials Engineers are responsible for obtaining samples and performing such tests as required under the Independent Assurance Program and may be assisted by Division of Materials personnel as necessary. The program prepares for each federal-aid project a guide detailing the number and type of samples and tests required for each, based on a review of the project's plans and proposal.

The FHWA requires an independent sampling and testing program, in addition to an acceptance sampling and testing program, that prescribes policies, procedures, and guidelines relating to sampling and testing of materials and construction in federal-aid highway projects that meet the requirements. Each state highway agency is to have a sampling and testing program that will provide adequate assurance that the materials and workmanship incorporated in each federal-aid highway project are in reasonably close conformity with the requirements of the approved plans and specifications, including approved changes. The program shall have provisions for acceptance and independent assurance samples and tests that shall be developed by the state and approved by the FHWA.

INDEPENDENT ASSURANCE PROGRAM (cont.) . . . p. 2

INDEPENDENT ASSURANCE PROGRAM (cont.):

The following is intended to provide an outline of the provisions covered by the FHWA and the bureau's procedures for complying with the independent assurance sampling and testing portion thereof. Detailed requirements for both the acceptance and independent sampling and testing programs are provided in the Materials Field Sampling and Testing Manual.

DEFINITIONS:

Project—A specific section of a highway route together with all appurtenances and construction to be performed thereon under one or more contracts

Process Control Samples and Tests—All of the samples taken and tested for the purpose of controlling the production of materials proposed for incorporation into the project

Acceptance Samples and Tests—All of the samples and tests used for determining the quality and acceptability of the materials and workmanship that have been or are being incorporated into the project

Independent Assurance Samples and Tests—Samples, tests, or other procedures performed by state personnel who do not normally have direct responsibility for process control and acceptance sampling and testing

OBJECTIVE OF SAMPLES & TESTS:

The results obtained by acceptance sampling and testing are intended as aids in detection and prevention of any significant discrepancies caused by (1) procedural errors in sampling or testing, (2) sampling and testing equipment malfunction or erroneous calibration, or (3) other sources of erroneous results that would lead to misrepresenting the true nature of the material or construction operation controlled by sampling and testing.

SAMPLING & TESTING PROGRAM:

Use of Independent Testing Personnel and Equipment—The independent assurance samples and tests shall be performed by state personnel who have no direct responsibility for the process control and acceptance sampling and testing and who use the same type of equipment (but not the same equipment) used for acceptance sampling and testing.

SAMPLING & TESTING PROGRAM (cont.) . . . p. 3

SAMPLING & TESTING PROGRAM (cont.):

For each type of assurance sample and test required for a project, the initial test shall be obtained as provided above. Thereafter, not more than 20 percent of the remaining required assurance tests may be obtained by observation of testing as hereinafter described. If independent sampling and testing equipment is unavailable, the above procedures may be modified as necessary.

NOTE: The provision requiring use of independent testing equipment applies only to equipment that is generally used for field-type tests and that may cause significant errors due to possible malfunction or lack of calibration. It does not apply to miscellaneous equipment, which is not critical to the accuracy of results. Also, when the Standard Specifications or Kentucky Methods provides for use of optional sampling and testing equipment and/or procedures to determine the same property for acceptance of a material or construction operation, interchangeable use of such equipment and/or procedures will be considered acceptable. For instance, the use of the volumeter for determining density of soil or dense-graded aggregate will be acceptable for determining assurance densities when acceptance densities are being determined by use of the nuclear meter.

Not more than 20 percent of the required independent assurance samples and tests may be obtained by independent observation of acceptance sampling and testing using project assigned equipment. However, this procedure should be minimized as it does not provide a check on equipment that is a significant part of the objective of obtaining assurance tests or provide a complete basis for comparison of results of acceptance and assurance tests as required under Section 64-11.0142.

Comparison of Acceptance and Independent Assurance Results—A requirement of the Federal-Aid Highway Program Manual is that the independent assurance sampling and testing program shall provide for the comparison of results between acceptance and assurance tests. These comparisons, along with appropriate and timely corrections of excessive discrepancies when encountered, are essential to ensure the objective of the assurance sampling and testing program as a means of determining reliability of the acceptance results and elimination of erroneous results.

SAMPLING & TESTING PROGAM (cont.) . . . p. 4

SAMPLING & TESTING PROGRAM (cont.):

To provide a sound basis for comparing results, it is essential that samples and tests for both independent assurance and acceptance tests be obtained at the same time and from material at the same point in the production process so as to eliminate apparent discrepancies due to inherent materials variability.

The personnel responsible for obtaining the assurance results will also be responsible for determining, in their judgement and in accordance with the Kentucky Methods Manual, whether compared results are favorable and for properly documenting and distributing the outcome of this determination in as timely a manner as feasible. It is especially essential that the project engineer or other personnel responsible for acceptance testing should be notified as soon as unfavorable comparisons are determined so that in the event the acceptance testing is erroneous, that person will be alerted of the need for corrections. When possible, immediate corrections of procedures or equipment found to be erroneous should be implemented cooperatively by both acceptance and assurance testing personnel, especially where materials appear borderline with respect to specified properties and where the acceptability of the material may become questionable.

Personnel Responsible for Obtaining Independent Assurance Samples and Tests— Ordinarily, the district materials engineer will be responsible for obtaining independent assurance samples and tests with the district to which he or she is assigned. Representatives of the Division of Materials may be designated to obtain certain assurance tests or may assist the district materials engineer in obtaining these tests.

Taking and Testing of Independent Assurance Samples—The Materials Field Sampling and Testing Manual designates the type of sampling and testing and the frequency for the various materials and construction operations that are subject to assurance testing.

In general the required assurance tests will be limited to naturally occurring materials and mixtures containing processed aggregates.

SAMPLING & TESTING PROGAM (cont.) . . . p. 5

SAMPLING & TESTING PROGRAM (cont.):

Assurance samples should be taken from completed mixtures and tested for those requirements that are applicable to the combination of materials.

The frequency of obtaining independent assurance tests may vary for individual projects or phases of projects in accordance with job conditions, such as the uniformity of materials at the source, the methods and equipment used, and weather conditions. Unless otherwise provided, independent assurance testing will not be required where acceptance tests are not a project requirement and the required number of independent assurance tests will not exceed the number of acceptance tests performed.

MATERIALS CERTIFICATION PROGRAM:

The Materials Certification Program is responsible for establishing and conducting the review of project plans and files necessary for preparing a certification of materials for each construction project as hereinafter described:

After completion of each construction project, the Department's policy requires that the Director of the Division of Construction be provided a certification covering materials (and/or construction operations controlled by testing) that documents their being in reasonably close conformity with specification requirements and that testing and/or other approval was performed in accordance with established procedures. Exceptions to the certification are to be noted on the certification or attached thereto. Additionally, the Federal Highway Administration (FHWA) requires a comparable certification to be submitted to the division administrator for all federal-aid projects exclusive of those constructed under the Secondary Road Plan.

Submission of the final certification to the Division of Construction and the FHWA (as applicable) is the responsibility of the Director of the Division of Materials. The TC 64-5 form, Certification of Materials (Exhibit 10), is the final certification submitted to the Director of Construction when federal aid is not involved. The TC 64-1 form, Certification of Materials (Exhibit 11), is the certification submitted to both the Director of Construction and the FHWA (as applicable) for projects involving federal aid.

RESPONSIBILITIES OF THE PROJECT ENGINEER . . . p. 6

RESPONSIBILITIES OF THE PROJECT ENGINEER:

The project engineer is responsible for ensuring that all materials used on projects to which he or she is assigned are in reasonable conformity with specification requirements prior to their incorporation into the work and that testing or other means of determining material conformity are performed in accordance with established procedures. On completion of each project and review of project documentation by the District Materials Engineer, it is required that the Project Engineer notify the Division of Materials by using the Project Engineer's Notice of Satisfactory Completion of Materials Approval, located at the bottom of the last page of the Kentucky Materials Information Management System (KMIMS) project certification of materials printout (Exhibit 12).

When the acceptable status of materials incorporated into the work is questionable due to test failures or insufficient or uncompleted tests or other approvals, the project engineer should either:

- Defer notification until such time as any further testing or corrective actions such as deductions or corrective work are completed or
- Include a note accompanying the last page of the KMIMS printout on the project certification of materials, explaining the status of any discrepancies (exceptions).

Adherence to the above should serve to prevent submission of final certifications prior to completion of all testing and any required corrective work or deduction that may be assessed due to non-specification materials.

RESPONSIBILITIES OF THE DISTRICT MATERIALS ENGINEER:

It is the responsibility of the District Materials Engineer to review the project documentation to assure that the Project Engineer has thoroughly complied with the department's testing requirements. This review is intended to spot errors or omissions that should be corrected prior to notifying the Division of Materials. Normally, the District Branch Manager for Construction is delegated the responsibility to sign the notification for the district and to forward it and the Final Contractor's Work Estimate and any exceptions to the Division of Materials.

MATERIALS CERTIFICATION . . . p. 7

MATERIALS CERTIFICATION (cont.):

The final certification of materials is prepared by the Materials Certification Program and is based on review of following:

- Final Contractor's Work Estimate
- Computer files containing data relative to materials tested by the district laboratories or at the project site, etc.
- Plans and proposals for individual projects for possible omissions and exceptions

The intent of this review is to document the basis of acceptance of all materials incorporated into the work, including:

- Any corrective work or materials allowed to remain in the completed project but accepted at unit-price reduction
- Any materials that received less than the department's usual requirements for testing or approval prior to submission of the final certification of materials

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MATERIALS	Chapter GEOTECHNICAL BRANCH
	Subject Policies & Procedures

Summary: The policies and procedures for the Geotechnical Branch are provided in the Geotechnical Manual, available under separate cover from the Office of Policy and Budget, Policy and Procedures Development Branch.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Overview

Summary: Provided is an overview of the nuclear density-moisture gage.

REGULATIONS: Kentucky Administrative Regulation 902 KAR 100 applies to the possession or use of radioactive material and is administered by the Cabinet for Health Services under the authority of KRS 211.840 to KRS 211.852.

The Division of Materials follows the lead of the Division of Construction, which is licensed under the provisions of 902 KAR 100 to possess and use nuclear density-moisture gages. All gages are assigned and issued by the Division of Construction under the authority of this license.

Note: The nuclear density-moisture gage utilizes radioactive sources and is potentially dangerous if used improperly.

NUCLEAR DENSITY-MOISTURE GAGE: The nuclear density-moisture gage is a very important and critical piece of equipment in the areas of field testing and job control. The gage is a versatile tool with the ability to perform equally well on soil, aggregates, and both bituminous and cement concrete.

The following guidelines, instructions, and information conform with applicable provisions of 902 KAR 100. It is considered mandatory that all personnel who use, transport, or handle a nuclear density-moisture gage or those who authorize the use, transportation, or handling of a gage be thoroughly familiar with these requirements.

NUCLEAR DENSITY-MOISTURE GAGE (cont.) . . . p. 2

NUCLEAR
DENSITY-MOISTURE
GAGE (cont.):

It is important that personnel in all offices—the Division of Materials through the district construction office to the materials engineer's office—be knowledgeable of and fulfill their responsibilities with respect to the care and handling of nuclear density-moisture gages. The gage operator is the last link in this chain; however, the operator's job is the most important of all. The safety and welfare of the operator are paramount and take precedence over all other considerations. The operator is urged to take all training serious and to be aware of not only his or her own responsibilities but also those of his or her supervisor insofar as they impact the gage and its use. The operator should know how the thermoluminescence dosimeter (TLD) badges are handled, how the gage is transported and stored, how the gage is maintained and operated, how the records and data are kept, and what the correct procedures are in case of an accident. If the gage operator thinks that safety has been compromised, he or she has the right to refuse to operate the gage until questions have been resolved. If the gage operator has reason to think safety concerns have not been addressed satisfactorily by immediate supervisor(s), there are names and numbers listed herein that the operator may call. This procedure departs somewhat from the normal chain of command; however, it is a measure of the possible seriousness of the situation.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Operation of a Gage

Summary: Identified are the responsibilities of those involved in the operation of a gage.

MATERIALS RSO, RESPONSIBILITIES:

The radiation safety officer (RSO) is responsible for implementing the radiation safety program and ensuring that radiation safety activities are performed in accordance with approved procedures and regulatory requirements. Responsibilities of the RSO include ensuring that:

- Radioactive materials possessed under the license conform to the materials listed on the license
- Use of the devices, particularly in the field, is only by individuals authorized by the license
- All users wear personnel monitoring equipment, such as thermoluminescence dosimeters (TLD), when required, and reports of personnel exposure are reviewed in a timely manner
- Gages are properly secured against unauthorized removal at all times when they are not in use
- Proper authorities are promptly notified in case of accident or damage to gages, fire, or theft
- Audits are performed at least annually to ensure that:
  - The licensee is abiding by the regulations of the Cabinet of Health Services and the Department of Transportation (DOT) and by the terms and conditions of the license (e.g., periodic leak tests, inventories, and use limited to trained, approved users)

MATERIALS RSO RESPONSIBILITIES (cont.) . . . p. 2

MATERIALS RSO RESPONSIBILITIES (cont.):

- The licensee's radiation protection program content and implementation achieve occupational doses and doses to members of the public that are as low as reasonably achievable (ALARA) (see 902 KAR 100:019, Section 2)
- The licensee maintains required records with all required information (e.g., records of personnel exposure, receipt, transfer, and disposal of radioactive material; gage user training) sufficient to comply with Cabinet for Health Services requirements

- Results of audits, identification of deficiencies, and recommendations for change are documented and maintained for at least three years, provided to management for review, and prompt action is taken to correct deficiencies

- Audit results and corrective actions are communicated to all personnel who use radioactive material, regardless of their locations or the licenses under which they normally work

- All incidents, accidents, and personnel exposure to radiation in excess of ALARA limits are investigated and reported to the Cabinet for Health Services and other authorities, as appropriate, within required time limits

- Radioactive material is transported in accordance with all applicable DOT requirements

- Copies of regulations 902 KAR 100 are maintained, new or amended regulations are reviewed, and license procedures are reviewed as needed to comply with Cabinet for Health Services regulations

- The license is amended whenever there are changes in licensed activities, responsible individuals, or information or commitments provided to the Cabinet for Health Services in the licensing process

DISTRICT RSO, CONSTRUCTION**:** The district RSO through the Transportation Engineer Branch Manager (TEBM) for Construction is responsible for the following:

DISTRICT RSO, CONSTRUCTION (cont.) . . . p. 3

DISTRICT RSO, CONSTRUCTION (cont.):

- Making the quarterly collection of exposed TLDs from the materials engineer's office and dispensing of the replacements

  Note: It is necessary that the district return the collected TLDs to the Central Office Division of Construction within 10 days after the receipt of the replacements.

- Making training accessible to and/or providing training to the materials engineer and the gage operators

- Distributing safety-related information to involved personnel and conducting follow-up reviews to see that the information is utilized

- Supervising the use and handling of the district's gages and ensuring that safety procedures are being followed

- Making periodic field checks of the materials engineer's office and the gage operators to see that proper records are being maintained and correct safety procedures are being followed

- Ensuring that the materials engineer has sufficient number of trained operators and adequate transportation available to meet inspection responsibilities

DISTRICT MATERIALS ENGINEER:

The District Materials Engineer (DME) through the RSOs for both Materials and Construction is responsible for the following:

- Having a thorough knowledge of the use, care, storage, and transportation of the nuclear gage and a reasonable knowledge and understanding of the operator's manual

- Ensuring that an adequate number of trained operators are available to meet the responsibilities of the office

  Note: Temporary employees are not to be used in this job

- Impressing upon the operators that the cost of a gage (about $5,000) makes the gage one of the most expensive pieces of equipment assigned to the office and that its function makes it one of the most critical

DISTRICT MATERIALS ENGINEER (cont.) . . . p. 4

DISTRICT MATERIALS ENGINEER (cont.):

- Assigning responsible personnel that have been certified to operate the gage

  Note: It is very important that the operator be well informed in maintenance and care of the gage. Careless handling cannot be tolerated.

- Seeing that proper warning labels are in place on shipping containers used for transporting gages and also on those in storage

- Obtaining or receiving replacement TLDs from the district office, retrieving exposed TLDs from the operators, and returning them to the district office

  Note: This must be done in time for the district office to return the badges to the Division of Construction within 10 days.

- Being absolutely sure that any person assigned to operate the nuclear gage is assigned a current TLD monitor

GAGE OPERATOR: The gage operator under the direction of the DME must be:

- Certified for gage operation and knowledgeable of maintenance, storage, transporting, and operation of the gage

- Trained in biological effects and radiological health requirements

- Trained in emergency procedures and recommended procedures for use

- Thoroughly familiar with and willing to comply with the appropriate operator's manual

- Informed as to the current density testing requirements and procedures by studying job specifications and sampling and testing manuals and by seeking advice from knowledgeable individuals

- At least 19 years old

Note: All operators are to have a minimum of 4 hours training prior to being assigned a TLD and being allowed to operate the gages.

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MATERIALS	Section NUCLEAR GAGE
	Subject Care of a Gage

Summary: Explained are the guidelines for the care of a nuclear density-moisture gage.

GUIDELINES: The care of a gage is extremely important, and these guidelines are to be followed:

- The gage is to be kept clean, and preventive maintenance is to be performed frequently. After use in a dusty area, the gage is to be wiped with a clean dry cloth. If the gage is used on dense graded aggregate (DGA) or plastic concrete, source is to be retracted to shielded position so the bottom may be wiped clean with a damp cloth after each test to prevent build-up of material on the bottom of the gage.

- When the gage is in use on bituminous concrete, care is to be taken to remove all sticky material from the gage base. Various solvents may be used to soften and remove asphalt. Mineral spirits and WD 40 are recommended by the manufacturer. These solvents are to be used sparingly and are not to be used on the top shell of the gage. Stubborn deposits may require the use of a putty knife; therefore, great care should be taken to avoid marring the base.

- The gage is to be handled the same as any electronic instrument. The gage is sturdy, but unnecessary roughness may cause gage performance to be compromised.

- The Troxler gages are moisture resistant; however, care should be exercised to keep them as dry as possible.

- The gage is to always be locked in a secure place when not in use.

  Note: <u>The source rod should never be touched. If necessary to clean, the source rod should be swabbed with a cloth tied to a stick.</u>

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MATERIALS	Section NUCLEAR GAGE
	Subject Storage of a Gage

Summary: Discussed is the storage of a nuclear density-moisture gage.

STORAGE OF A GAGE:

When not in use, the gage is to be stored in an unused area at least 15 feet away from an occupied area and kept under lock and key at all times. The storage area for the gage must be dry, ventilated, and secure. Appropriate warning signs are to be posted in the area where the gage is stored. Posted along with radiation warning signs should be the following note to firefighters:

"ALL RADIOACTIVE MATERIALS ARE SEALED AND IN TUNGSTEN STEEL CONTAINERS. PREMISES MAY BE ENTERED UNDER EMERGENCY CONDITIONS."

This note is to be prepared by the materials engineer's office. It is to be written in bold letters and placed in conspicuous locations. As many notes as deemed necessary are to be posted.

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MATERIALS	Section NUCLEAR GAGE
	Subject Transportation of a Gage

Summary: Detailed are the guidelines regarding transport of a nuclear density-moisture gage.

TRANSPORTING OF A GAGE:

Extreme care and precautions are to be exercised in the transportation of nuclear gages, especially from the storage site to the place of operations. These precautions include, but are not limited to, the following:

- Radiation yellow II warning labels are to be permanently affixed to transport cases.
- A gage is to be under lock and key at all times when unattended.
- A gage is to be placed in a padded container and properly secured at all times while in transit.
- For transport of a gage in a pickup truck, the padded container is to be in the bed of the truck, next to the tailgate.
- A gage should NEVER be transported in the cab of a truck or in the passenger area of a sedan. If the mode of transportation is a suburban or similar type of vehicle, the gage may be transported in the rear seat provided it is at least four feet from all passengers.
- A gage should NEVER be transported without the following transport papers:
  - Emergency Procedures
  - Shippers Declaration of Dangerous Goods
  - Hazardous Materials Permit

Note: These documents, which are available from the radiation safety officer (RSO), are included with every gage and may be found in the case. They are to be removed from the case and carried in the cab of the truck within arm's reach of the driver.

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MATERIALS	Section NUCLEAR GAGE
	Subject Repair of a Gage

Summary: Outlined are the procedures for the repair of a nuclear density-moisture gage.

REPAIR OF A GAGE:

In case of a gage malfunction or failure, the recommended procedures are as follows:

- If the gage will operate, but there is reason to believe it is out of range:

  1. Place the gage on its reference standard
  2. Take five standard counts and compare them to the ones you have logged previously
  3. If they appear normal, place the gage on the test square in the materials engineer's office
  4. Take five readings of both moisture and density

  If the average of the new readings appear normal, then the gage is ready for use.

- If the gage will not operate, contact the radiation safety officer (RSO) for Materials and arrange for delivery of the gage to the RSO for repair. The RSO can arrange for the loan of another gage until the faulty one is repaired.

- When the gage is returned to the Division of Materials, only the reference standard is to be included, since accessories are subject to being lost.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Thermoluminescent Dosimeter

Summary: Explained is the proper use of thermoluminescent dosimeter (TLD).

USE OF TLD: The proper use of the TLD is as follows:

- TLDs are not transferable and must not be used by more than one person in any quarterly period. The information obtained from a TLD, which was used by more than one individual in any quarterly period, is worthless. It would compromise the purpose for distributing and tracking the TLDs. Furthermore, an individual could undergo exposure to radiation without any way of measuring the exposure.
- All TLDs are assigned with the operator's name imprinted on the badge.
- TLDs are used to measure exposure to occupational radiation.
- When not being worn, the film badge should be stored in a neutral area. Avoid badge contact with washing machines, TVs, medical x-rays, computers, and heat. Do not take the badge home; leave it at the office.
- A printout containing data showing TLD distribution within the Division of Materials, along with replacement TLDs, is sent quarterly to the Division of Materials by the Division of Construction radiation safety officer (RSO). The current status of the TLDs is reviewed and updated by the division RSO and noted on the printout. The printout is returned to the Division of Construction within ten days, along with all exposed TLDs for the previous quarter. The district RSOs perform this function for the crews of the Division of Materials.
- A note of explanation is included on the printout for any TLD lost or destroyed in the field.

USE OF TLD (cont.) . . . p. 2

USE OF TLD (cont.):

- All changes in requests including appropriate names are written on the printout.

- Additional or replacement TLDs may be obtained at any time without waiting until the end of a quarter. Requests may be made over the telephone with confirmation in writing.

Note: Never store TLDs in close proximity to nuclear gages.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Daily Log Sheet & Field Logbook

Summary: Given is the policy regarding the daily log sheet and field logbook.

DAILY LOG SHEET & FIELD LOGBOOK:

Regulations require that daily log sheets indicating gage usage be kept. These log sheets are available from the Division of Materials radiation safety officer (RSO) in spreadsheet form. They are to be completed by the operator twice a month and filed by the District of Materials Engineer (DME). Copies of the log sheets are to be sent to the Division of Materials RSO.

The operator also maintains a field logbook for each gage. Each time a standard count is made, it should be noted in the logbook, along with anything else the operator deems necessary.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Radiation Levels

Summary: Explained are the established radiation levels.

GENERAL INFORMATION: Radiation levels are available in the Troxler Nuclear Gage Training Manual and the Instructional Manual furnished with the gage. Both are incorporated here as a reference.

OCCUPATIONAL EXPOSURE LIMITS: In recognition of the dangers posed by overexposure to radiation, both the United States Nuclear Regulatory Commission (USNRC) and Kentucky have adopted a set of maximum or upper level occupational exposure guidelines for lifetime, yearly, and quarterly radiation doses.

The total permissible lifetime dose, as set forth in the regulations, depends on an individual's age and is given by the general formula 5(N-18) rems, where N is the age at the individual's last birthday. This formula is based on current federal regulations, prohibiting occupational exposure to workers under the age of 18. The yearly occupational exposure limit is 5 rem/year, or 5,000 mrem/year; and the quarterly limit is just one-forth of the yearly limit, or 1.25 rem.

Note: The Department of Highways does not permit anyone under the age of 19 to operate a nuclear gage.

U.S.N.R.C. AND AGREEMENT STATE
MAXIMUM OCCUPATIONAL LIMITS OF EXPOSURE

PORTION	QUARTERLY
Whole Body	1,250 mrem
Extremities	18,750 mrem
Skin of Whole Body	7,500 mrem

OCCUPATIONAL EXPOSURE LIMITS (cont.) . . . p. 2

OCCUPATIONAL EXPOSURE LIMITS (cont.):

The themoluminescent dosimeter (TLD) manufacturer provides the Division of Construction a record by district of all individuals listed in the previously discussed printout. This record covers a calendar year and is updated each quarter. It provides the following information:

- Radiation exposure readout from the used TLDs for the most current expired quarter
- Cumulative total of radiation exposure for the current calendar year, as well as permanent exposure for each individual

This record is available at any time upon request. In addition, if this record shows that an operator received an unusual dose of radiation during the year, he or she will receive immediate notification.

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MATERIALS	Chapter NUCLEAR DENSITY-MOISTURE GAGES
	Subject Emergency Procedures

Summary*:* Described are the emergency procedures in case of a radiation accident.

GENERAL INFORMATION**:** Copies of this portion of the manual are to be furnished to all individuals that may need them on short notice.

A copy of the emergency procedures, as outlined in the appropriate operator's manual, is issued with each gage and is to be carried in the operator's transporting vehicle at all times. Copies are available from both Division of Materials and Division of Construction radiation safety officers (RSOs).

ACTIONS FOR RADIATION EMERGENCY:

- Remove all people from accident area
- Render life-saving first aid
- Call medical assistance and emergency vehicle
- Call appropriate radiation personnel
- Obtain name, address, and phone number of persons at scene
- Restrict access to incident area and rope off, or otherwise isolate, the area to keep people at least 15 feet away

Report an accident to the District Construction Office, the Division of Materials, or the State Health Department, Radiological Safety Division. Be prepared to give the following information:

- The exact condition of the gage, as near as possible
- The exact location of the gage
- Any steps taken to prevent exposure of personnel to the radioactive source
- The names of personnel that might have been exposed or were involved in the accident
- What happened, as specific as possible

ACTIONS FOR RADIATION EMERGENCY (cont.) . . . p. 2

ACTIONS FOR RADIATION EMERGENCY (cont.):

In the event there is damage to the gage involving the contractor's personnel or any persons other than those on the District Materials Engineer's crew, obtain the following:

- The information required in the section above
- Sufficient information to identify the vehicle involved, if any, such as make, model, serial number, license number, truck number, or any other identifying marks or numbers
- The name of the insurance company involved
- The name of the Project Superintendent or other personnel with sufficient authority to act for the involved company

If the source rod may be retracted (shielded) and the base of the gage is undamaged, the gage is to be transported in an approved container by car or truck to the Division of Materials.

If the base of the gage is damaged and/or it is not possible to properly retract (shield) the source rod, the gage must not be moved by district personnel until approval has been issued by the Department of Health Services, Radiation Branch.

RADIATION EMERGENCY ASSISTANCE:

With reference to the nuclear density gage, these instructions apply if the base is ruptured and the source capsule is exposed or if a reasonable expectation of this type of situation exists.

EMERGENCY TELEPHONE NUMBERS:

In the event of a radiation emergency during normal office hours of 8:00 a.m. to 4:30 p.m. Eastern Time, call the following:

- Central Office, Division of Materials, 502-564-3160, David Quarles, RSO
- Central Office, Division of Construction, 502-564-4780, MG. Ramsey, RSO
- Health Services Cabinet—24 hour emergency number 502- 564-7815, Radiation Control Branch

- After work hours, on weekends, during holidays, etc., contact the following:

  David Quarles at home—502-227-8132
  M.G. Ramsey at home—502-223-1760 or Pager: 800-999-2220-0374

EMERGENCY TELEPHONE NUMBERS (cont.) . . . p. 3

EMERGENCY TELEPHONE NUMBERS (cont.):

If necessary, call the nearest Kentucky State Police post at the following numbers:

Post 1	Mayfield	(270) 856-3721
Post 2	Madisonville	(270) 676-3313
Post 3	Bowling Green	(270) 782-2010
Post 4	Elizabethtown	(270) 765-6118
Post 5	LaGrange	(502) 222-0151
Post 6	Dry Ridge	(859) 428-1212
Post 7	Richmond	(859) 623-2404
Post 8	Morehead	(606) 784-4127
Post 9	Pikeville	(606) 437-7311
Post 10	Harlan	(606) 573-3131
Post 11	London	(606) 878-6622
Post 12	Frankfort	(502) 227-2221
Post 13	Hazard	(606) 439-2343
Post 14	Ashland	(606) 928-6421
Post 15	Columbia	(502) 384-4796
Post 16	Henderson	(270) 826-3312

EMERGENCY TELEPHONE NUMBERS (cont.) . . . p.4

EMERGENCY TELPHONE NUMBERS (cont.):

The following is a list of telephone numbers for the 12 Department of Highway District Offices. Normal operating hours are 8:00 a.m. to 4:30 p.m. local time.

Dist. 1	Paducah	(270) 858-2431
Dist. 2	Madisonville	(270) 824-7080
Dist. 3	Bowling Green	(270) 746-7898
Dist. 4	Elizabethtown	(270) 766-5066
Dist. 5	Louisville	(502) 367-6411
Dist. 6	Covington	(859) 341-2700
Dist. 7	Lexington	(859) 246-2355
Dist. 8	Somerset	(606) 677-4017
Dist. 9	Flemingsburg	(606) 845-2551
Dist. 10	Jackson	(606) 666-8841
Dist. 11	Manchester	(606) 598-2145
Dist. 12	Pikeville	(606) 437-9691

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MATERIALS	Chapter EXHIBITS
	Subject Table of Exhibits

FORM TITLE	FORM NUMBER	EXHIBIT NUMBER
Contractor's Master Certification of Asphalt Concrete Mixing Plant and Related Equipment	None	1 (11 pages)
Annual Certification for Previously Approved Asphalt Mixing Plant and Related Equipment	None	2 (4 pages)
Annual Asphalt Mixing Plant Inspection	TC 64-416	3 (1 page)
Asphalt Mixing Plant Acceptance	TC 64-416A	4 (1 page)
Performed Expansion Joint Material from Pretested Stock	TC 64-609	5 (1 page)
Concrete Plant Checklist	TC 64-602	6 (3 pages)
Central or Truck Mixing of Concrete	TC 63-2	7 (1 page)
Scale Report for Concrete Plants	TC 64-316	8 (2 pages)
Quarry Report	TC 64-600	9 (2 page)
Certification of Materials	TC 64-5	10 (1 page)
Certification of Materials	TC 64-1	11 (1 page)
Project Certification of Materials	None	12 (1 page)

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