KENTUCKY DEPARTMENT OF HIGHWAYS
WARRANTS FOR SELECTING ASPHALT MIXTURES AND COMPACTION OPTIONS

1. ESAL Class

1.1 MAINLINE/DRIVING LANES

Calculate the 20-yr. ESALs for the project. Determine the ESAL Class corresponding to the 20-yr. ESAL calculation from the following table:

ESAL Class	20-yr. ESALs (millions)
2	<3
3	3 to <30
4	≥30

1.2 SHOULDERS

1.2.1 When selecting the ESAL Class for asphalt mixtures for shoulder applications, specify one Class lower than that specified for the corresponding mainline mixture. When the mainline mixture is an ESAL Class 2 mix, specify ESAL Class 2 for the corresponding shoulder mixture also.

1.2.2 Specify a different ESAL Class for a particular shoulder mixture when deemed necessary due to specialty applications or other considerations.

2. Generic mixture description

Determine the generic mixture description from the location of the mixture in the pavement structure. The generic mixture description will be ASPHALT BASE (ASPH BASE), ASPHALT BINDER (ASPH BIND), or ASPHALT SURFACE (ASPH SURF).

3. Nominal-maximum size of the mixture

3.1 ASPHALT BASE

3.1.1 Specify asphalt base mixtures according to the following table:

ESAL Class/ESAL range (millions)	Nominal-max. size (in.)	Lift thickness range (in.)
Class 4 Class 3 (10 to <30)	1.50	4.50 - 5.00
Class 3 (3 to <10) Class 2 (1 to <3)	1.00	3.00 - 4.50
Class 2 (<1)	0.75	2.25 - 3.50

3.1.2 When possible, specify the lift thickness of base courses to the thinner end of the lift thickness range, utilizing additional lifts, to facilitate placement operations. For the initial asphalt base course on new construction projects, specify a minimum lift thickness of 3.0 inches to establish a sound paving platform for subsequent base lifts.

3.1.3 Select a different size of asphalt mixture for the uppermost base course when deemed necessary to satisfy the total pavement thickness. Document the basis for the exception in the project file and on the pavement design.

3.2 ASPHALT BINDER

When selecting an asphalt binder mixture, specify a 0.50-in. nominal-maximum size mixture, at a lift thickness between 1.50 and 2.25 in., for all ESAL Classes.

3.3 ASPHALT SURFACE

3.3.1 When selecting an asphalt surface mixture for projects in Districts # 4 through # 12, specify a 0.38-in. nominal-maximum size mixture, at a minimum lift thickness of 1.25 in. when Compaction Option A of Subsection 402.03.02 D) 4) of the *Standard Specifications* applies or at a minimum lift thickness of 1.00 in. when Compaction Option B of Subsection 402.03.02 D) 4) of the *Standard Specifications* applies, for any ESAL Class and polish-resistant aggregate type.

3.3.2 When selecting an asphalt surface mixture for projects in Districts # 1 through # 3, specify a 0.50-in. nominal-maximum size mixture, at a minimum lift thickness of 1.50 in., for mixtures of any ESAL Class requiring Type A or B polish-resistant aggregate. For projects in Districts # 1 through # 3 with mixtures of any ESAL Class requiring Type D aggregate, select a 0.38-in. nominal-maximum size mixture as specified in Subsection 3.3.1 of these warrants.

3.3.3 When selecting an asphalt surface mixture for a shoulder application that corresponds to a 0.50-in. nominal-maximum size mainline mixture, specify a 0.50-in. nominal-maximum size mixture at a minimum lift thickness of 1.50 in. for the shoulder application as well.

3.3.4 Select a different size of asphalt mixture for surface courses for special applications on a project-specific basis.

4. Polish-resistant aggregate designation

4.1 Determine the polish-resistant aggregate designation, or "Type," for asphalt surface mixtures placed on mainline/driving lane applications from the following table:

Facility category/Traffic count	Polish-resistant aggregate designation
All Interstates; Parkways with average daily traffic (ADT) ≥5,000; and all other roads with ADT >15,000	Type A
Parkways with ADT <5,000 and all other roads with ADT between 5,000 and 15,000	Type B
All roads with ADT <5,000	Type D

4.2 The traffic volumes displayed are for two-lane roadways. For four-lane roads, determine the equivalent two-lane volumes for the outside lanes from the table below. For six lanes or more, divide the total ADT by the number of lanes in one direction.

Two-lane ADT	Four-lane equivalent
5,000	5,600
15,000	22,000

4.3 Require a higher "Type" of polish-resistant aggregate when warranted by design, materials, or traffic and safety considerations. Exceptions for the use of a lower "Type" may be granted with the approval of the State Highway Engineer.

4.4 For asphalt base and asphalt binder mixtures, specify a Type D aggregate designation. For asphalt surface mixtures placed on shoulders or other such applications not requiring polish-resistant aggregate, also specify Type D.

5. Performance-graded (PG) binder designation

5.1 Specify PG 76-22 for mainline pavement on all Interstate applications and ESAL Class 4 facilities (20-yr. ESALs ≥30 million). Specify PG 76-22 binder only in the top four to five inches of the pavement structure.

5.2 Specify PG 64-22 for all other mainline pavement and all shoulder applications.

5.3 For demonstrated locations of severe rutting, such as intersections or truck-climbing lanes, the required PG binder may be increased by one or more grades when approved by the State Highway Engineer. For example, if the required binder is PG 64-22 and the pavement is a demonstrated location of severe rutting, the PG of the binder may be increased to PG 76-22.

5.4 Consider the use of other methods for modification of PG binders and techniques for pavement reinforcement on a project-specific basis. Examples of other applications include the use of fibers, paving fabrics, geogrids, stress-absorbing membrane interlayers, etc.

5.5 PG 58-22 binder may be used as the virgin binder in mixtures containing recycled asphalt pavement (RAP).

5.6 Specify PG 70-22 binder for special applications on a project-specific basis.

6. Bid item nomenclature

6.1 Specify the bid item for asphalt mixtures consisting of five parts as selected according to Sections 1 through 5, respectively.

6.2 For example, a CL2 ASPH BASE 1.00D PG64-22 corresponds to a 1.00-in. nominal-maximum size base course, ESAL Class 2, with no polish-resistant aggregate required and containing PG 64-22.

6.3 Likewise, a CL4 ASPH SURF 0.38A PG76-22 corresponds to a 0.38-in. nominal-maximum size surface course, ESAL Class 4, with "Type A" polish-resistant aggregate required and containing PG 76-22.

7. Combining bid items

7.1 When more than one bid item exists for asphalt base, asphalt binder, or asphalt surface, and one or more of those bid items corresponds to a quantity of less than 1000 tons, combine the quantities into single bid items of each type of mixture using the higher ESAL Class, polish-resistant aggregate type, and PG binder.

7.2 Do not follow this policy when both of the following apply: (1) the bid item(s) with a quantity of less than 1000 tons occurs on one or more crossroads; and (2) the ESAL Class, polish-resistant aggregate type, or PG binder of any of these crossroads is higher than the ESAL Class, polish-resistant aggregate type, or PG binder of the main route on which the majority of the construction is occurring.

8. Bid item selection list

8.1 Attachment 1 to this document, *Hot-Mix Asphalt (HMA) Bid Item Selection List*, presents a catalog of asphalt mixture bid items that the proper utilization of these warrants will logically produce. Any asphalt mixture bid item specified for use on a Department project must originate from this list.

8.2 Requests to specify any asphalt mixture bid item not listed on Attachment 1, *Hot-Mix Asphalt (HMA) Bid Item Selection List*, should be submitted to the Division of Materials for review. Recurring requests to specify a given bid item with substantial justification may result in adding that bid item to Attachment 1, *Hot-Mix Asphalt (HMA) Bid Item Selection List*.

9. Compaction option

9.1 When the plan quantity is 1000 tons or greater of one mixture type, apply Option A of Subsection 402.03.02 D) 4) of the *Standard Specifications* to all individual mixtures placed on driving lanes at a thickness of 1.25 in. or greater for the following:

9.1.1 New construction projects;

9.1.2 Interstate and Parkway projects;

9.1.3 Mixtures containing PG 76-22 or other specialty modifiers; or

9.1.4 Resurfacing projects with mixtures requiring Type A or B polish-resistant aggregate.

9.2 For group jobs, any single pavement/subsection must be 1000 tons or greater before Option A applies.

9.3 Accept other mixtures with quantities of less than 1000 tons; leveling and wedging of any depth; and scratch courses <1.25 in. thick by Option B of Subsection 402.03.02 D) 4) of the *Standard Specifications*. For resurfacing mixtures requiring Type D aggregate, apply Option B density requirements.

9.4 The Department may apply compaction requirements to other mixtures or quantities when deemed necessary because of specialty applications or other considerations. The Division of Highway Design, the Division of Maintenance, or the Division of Materials will recommend special applications to the State Highway Engineer for approval.

9.5 The Department will include a statement in the project proposal indicating whether Option A or Option B of Subsection 402.03.02 D) 4) of the *Standard Specifications* applies.

APPROVED 2/7/09
Mike Hancock, P.E. Date
State Highway Engineer

APPROVED William R. Hanson 3/20/09
For: Jose Sepulveda, P. E. Date
Kentucky Division Administrator, FHWA

KENTUCKY DEPARTMENT OF HIGHWAYS

WARRANTS FOR SELECTING ASPHALT MIXTURES AND COMPACTION OPTIONS

ATTACHMENT 1

HOT-MIX ASPHALT (HMA) BID ITEM SELECTION LIST

Base Mixtures (Item Code)	Binder Mixtures (Item Code)	Surface Mixtures (Item Code)
CL2 ASPH BASE 0.75D PG64-22 (221) CL3 ASPH BASE 0.75D PG64-22 (223) CL4 ASPH BASE 0.75D PG64-22 (226) CL4 ASPH BASE 0.75D PG76-22 (228) CL2 ASPH BASE 1.00D PG64-22 (212) CL3 ASPH BASE 1.00D PG64-22 (214) CL4 ASPH BASE 1.00D PG64-22 (217) CL4 ASPH BASE 1.00D PG76-22 (219) CL2 ASPH BASE 1.50D PG64-22 (203) CL3 ASPH BASE 1.50D PG64-22 (205) CL4 ASPH BASE 1.50D PG64-22 (208) CL4 ASPH BASE 1.50D PG76-22 (210)	CL2 ASPH BIND 0.50D PG64-22 (272) CL3 ASPH BIND 0.50D PG64-22 (274) CL4 ASPH BIND 0.50D PG64-22 (277) CL4 ASPH BIND 0.50D PG76-22 (279)	CL2 ASPH SURF 0.38B PG64-22 (307) CL2 ASPH SURF 0.38D PG64-22 (301) CL3 ASPH SURF 0.38A PG64-22 (385) CL3 ASPH SURF 0.38B PG64-22 (388) CL3 ASPH SURF 0.38D PG64-22 (339) CL4 ASPH SURF 0.38A PG64-22 (23128ES403) CL4 ASPH SURF 0.38A PG76-22 (342) CL4 ASPH SURF 0.38B PG64-22 (23142ES403) CL4 ASPH SURF 0.38B PG76-22 (337) <u>The following bid items are for usage in Districts # 1-3 only:</u> CL2 ASPH SURF 0.50D PG64-22 (309) (bid item above for shoulder applications only) CL3 ASPH SURF 0.50A PG64-22 (330) CL3 ASPH SURF 0.50B PG64-22 (324) CL3 ASPH SURF 0.50D PG64-22 (312) (bid item above for shoulder applications only) CL4 ASPH SURF 0.50A PG64-22 (333) CL4 ASPH SURF 0.50A PG76-22 (335) CL4 ASPH SURF 0.50B PG64-22 (327) CL4 ASPH SURF 0.50B PG76-22 (329)