

APPENDIX "B"

ASPHALT CONCRETE PAVEMENT FOR STREET AND DRIVEWAY CONSTRUCTION

The work covered by these specifications consists of furnishing all labor, equipment and materials and in performing all operations in connection with the construction of asphalt concrete pavement in accordance with these specifications and the applicable improvement drawings.

The asphaltic concrete pavement work shall consist of multiple layers of asphaltic concrete with or without granular base and subbase courses, constructed on a prepared subgrade in conformity with the lines, grades, and cross sections shown on the plans. A string-line or automatic grade control device shall be used.

The data included herewith is based upon the general soil conditions which exist in the area. These general soil conditions, representing approximately 75 percent of the soils in the are, are clayey overburden soils, described as lean to moderately plastic silty clays, classified according to the Unified Soil Classification System as CL soils. Any site which is made up of soils substantially different should be evaluated independently by a qualified Geotechnical Engineer (see Article 5 in Subdivision Regulations - Definitions Section). This work should consist of drilling, testing and an engineering evaluation of all field and laboratory data in light of the proposed design. Examples of substantially different soil conditions are the very silty clays or clayey silts along the flood plain of the Licking and Ohio Rivers, the clayey sands, the silty fine sands, the fine to medium sands and the fine to coarse sands and gravels of the flood plain of the Ohio River such as the Belleview Bottoms in Boone County, the loess type deposits, clayey sands, silty sands and sandy clays of the Ft. Wright area and the "fat" waxy looking clays in Boone County.

All references to the Kentucky Transportation Cabinet Standard Specifications For Road And Bridge Construction shall apply to the current edition including current supplemental specifications.

ITEM 1.0 GRADING

This term shall consist of all grading above or below subgrade elevations of whatever nature required to bring the street to proper subgrade elevations including necessary excavation for curb, gutter, sidewalk, construction of embankments, excavation and proper sloping of all cuts, and other work incidental thereto.

- 1.1 EXCAVATIONS: All excavations shall be made to approximate grade or subgrade elevations consistent with approved plans. Excavations shall not be steeper than a cut slope of 2.5 horizontal to 1 vertical.
- 1.2 EXCAVATION BELOW SUBGRADE: Whenever excavations below subgrade elevation to remove spongy or unstable material, organic matter or other materials is required, the contractor shall remove same and shall replace with compactable soils as per Item 1.3. The excavation can be backfilled with soils that were removed provided they are clean clayey soils free of organic matter and other deleterious material, aerated and dried to near optimum moisture content or clean clayey borrow soils that have moisture contents near optimum moisture content.
- 1.3 CONSTRUCTION OF EMBANKMENT: All surface vegetation and heavy root system shall be removed to eliminate all vegetation from the area upon which the embankment is to be constructed. Soils so removed shall not be used in construction of embankment. These materials shall be stockpiled and respread across scarified areas after the scarified areas have been brought to within inches of finished grade.

Embankments shall be constructed of approved soils to approximate subgrade elevation in

shallow level layers, 6 to 8 inches, within three (3) percent of optimum moisture content on the dry side of the curve or within four (4) percent of optimum moisture content on the wet side of the curve, compacted with an appropriate type of compaction equipment to a density not less than 95% percent of maximum density, as determined by the standard Proctor moisture-density test (ASTM D698-78 or AASHTO T-99) or 87% percent of maximum density as determined by the modified Proctor moisture-density test (ASTM D1557-58-78 or AASHTO T-180). All soils placed in areas involving public improvements shall be constructed to slopes no steeper than 2.5 horizontal to 1 vertical and flatter where possible for ease of maintenance.

A recognized testing laboratory shall be required to run moisture-density tests (ASTM D698-78 or ASTM D1557-78) and field density tests (ASTM D1556-64 or ASTM D2922-78) to determine the percent compaction. The cost of all such testing shall be at the expense of the developer.

- 1.4 BACKFILL: All individual lifts of compacted soils from the top of bedding to four (4) feet from top of subgrade shall be inspected independently by a qualified Geotechnical Engineer; and individual lifts of compacted soils from four (4) feet deep to top of subgrade shall be tested.

Backfill depth that is two feet or less from the top of proper bedding (one foot maximum above top of pipe or conduit) shall be backfilled with controlled-low-strength-material (CLSM, flowable fill) or compacted and tested dense grade aggregate (per current KYTC Standard Specifications) to the top of subgrade.

Backfill depth that is greater than two feet from the top of proper bedding (one foot maximum above top of pipe or conduit) shall be backfilled with controlled-low-strength-material (CLSM, flowable fill) to the top of subgrade, or backfilled with clayey or granular soils compacted to the densities stated in Item 1.3. All individual lifts of compacted soils must be tested independently by a qualified Geotechnical Engineer from the top of the bedding to the top of the subgrade. Verification of the inspection and testing shall be made to the proper inspecting authority prior to the placement of any pavement, and all copies of all reports of the inspection and testing shall be submitted to the accepting legislative body for record. Failure to provide the proper verification shall result in the removal of backfill and replacement per this specification.

Backfill of utility trenches whose centerline of the utility is greater than three feet from the edge of pavement and within the street right-of-way shall be backfilled with controlled-low-strength-material (CLSM, flowable fill) to the top of subgrade, or backfilled with clayey or granular soils compacted to the densities stated in Item 1.3.

- 1.5 SUBGRADE: The subgrade is defined as the top one (1) foot of the soil profile at finished grade prior to placing the pavement. This top one (1) foot of soil will consist of: (a) compacted fill placed for embankments and as outlined in Item 1.3; (b) undisturbed soils in the transitional areas from cut to fill immediately below the topsoil; or (c) undisturbed soils at depths greater than 3 feet below the original ground surface in cut areas. The top one (1) foot of subgrade shall be compacted to 98 percent of maximum density as determined by the standard Proctor moisture-density test (ASTM D687-78 or AASHTO T-99) or 90% percent of maximum density as determined by the modified Proctor moisture-density test (ASTM 1557-78 or AASHTO T-180) within two (2) percent of optimum moisture content on the dry side of the curve or four (4) percent of optimum moisture content on the wet side of the curve immediately prior to placing the pavement. In transitional areas from cut to fill, the soils have been subject to the seasonal changes of freezing and thawing and wetting and drying. These soils will exist at moisture contents well above optimum moisture content and at densities on the order of 60 to 80 percent of maximum density (ASTM D698-78). These soils shall be scarified, aerated and dried in order to obtain the specified percent compaction for subgrade. Soils in cut areas, 3 feet below original grade, will exist at moisture contents above optimum moisture content and at densities on the order of 90 percent of maximum density (ASTM D698-78). These soils shall be scarified, aerated, and dried in order to obtain the specified percent compaction for

subgrade.

Subgrade Underdrainage Systems - In order to maintain maximum densities of subgrade comprised of clayey and granular soils, four inch (4") minimum perforated pipe underdrainage systems shall be installed and connected to an approved storm sewer systems at each of the following locations and in accord with the relating details on Page C.17 in Appendix "C":

1. Interconnecting street catch basins opposite each other at the sump and catch basins at entrance to cul-de-sacs.
2. Extending from any street catch basin perpendicular for full width beneath street pavement.
3. Extending perpendicular from any street catch basin to any water line trench within the right-of-way.
4. Extending from any street catch basin when excavations within subgrade are replaced with clean granular soils.
5. Extending from any street catch basin to intercept a water table generated from a natural spring or other damaging discharge observed during grading operations.

All connections to catch basins shall be inspected and approved by the proper inspection authority.

Any soft or yielding areas, resulting from high moisture content that are encountered at the time of construction shall be scarified, aerated, and dried to reduce the moisture content nearer to optimum moisture content, then recompacted to the specified density.

The subgrade shall be shaped to plan elevation and cross section. Immediately prior to placing the concrete, the subgrade shall be checked for conformity with the cross section shown on the plans by means of an approved template on the side forms. If necessary, the materials shall be removed or added as required, to bring all portions of the subgrade to correct elevations. The subgrade shall be thoroughly compacted and again checked with the template. Concrete shall not be placed on any parts of the subgrade which have not been checked for correct elevation. The subgrade shall be clean of loose or wet material prior to placing pavement.

Prior to placing the pavement, the Contractor shall proof roll the compacted subgrade with a fully loaded single axle dump truck. The Inspector shall observe the proof rolling for consistency. Areas which are subject to excessive pumping or rutting shall be reworked and recompacted as described above. All subgrade testing shall be made not more than 48 hours prior to placement of pavement, unless extreme weather conditions dictate retesting (rain, freezing temperature, excessive temperature, etc.). The appropriate Inspector shall be contacted not less than twenty four (24) hours prior to placement of materials.

- 1.6 **EQUIPMENT FOR COMPACTION OF BACKFILL, EMBANKMENT AND SUBGRADE:** Any compaction equipment capable of producing the required embankment and subgrade densities, without lamination, will be permitted. Clayey type soils shall be compacted with a kneading type compaction equipment, such as a sheepsfoot roller. Cohesionless soils shall be compacted with a vibratory type equipment, such as a vibrating plate or roller. All compaction equipment shall be in good condition and shall be operated efficiently to assure uniform compaction.
- 1.7 **SUBGRADE FOR SIDEWALKS AND DRIVEWAYS:** Subgrade for sidewalks and driveways within the limits of the right-of-way shall comply with Item 1.5. No tests are required unless specified by the inspector.

- 1.8 **EQUIPMENT OPERATED ON STREETS:** The contractor shall be permitted to operate only pneumatic tired equipment over any paved street surfaces and shall be responsible for correcting any damage to street surfaces resulting from the contractor's operation. Paved streets adjacent to new development shall have all loose soil or mud removed at the end of each day's work. Equipment operated on any street, after public dedication and open to general traffic shall be subject to penalties under K.R.S. 189.290 and County Ordinance 620.0.
- 1.9 **UTILITIES:** Special precautions shall be taken by the contractor to avoid damage to existing overhead and underground utilities. Before preceding with the work, the contractor shall confer with all public or private companies, agencies or departments that own or operate utilities in the vicinity of the construction work. The contractor shall be diligent in his efforts to use every possible means to locate existing utilities.
- 1.10 **SOIL DENSITY TESTING:** All soil density testing shall be at the expense of the developer. The results of these tests shall be mailed directly to the developer, design engineer, inspector, and the contractor and the field sheets shall be received by the proper governing agency prior to the placement of pavement. The results of all soil testing shall be compared to the densities, stated in Items 1.3, 1.4, 1.5, and 1.7 of these regulations. Any deficiencies found in construction work must be remedied in the field or resolved between the developer, contractor, and inspector, subject to approval by a qualified licensed Professional Geotechnical Engineer.

ITEM 2.0 PREPARATION OF EXISTING GRANULAR BASE COURSES FOR SURFACING

- 2.1 **DESCRIPTION AND GENERAL REQUIREMENTS:** In areas where granular base course has been placed as a previous stage of street or road construction, the contractor shall blade, shape, and compact the base course in conformance with the required dimensions, line, grade, and cross section to permit completion of the paving work. When directed by the Inspector, additional base course aggregate shall be provided or excess aggregate removed and disposed of, by the Contractor, as to provide conformance with the required roadway section.
- 2.2 **THICKNESS OF SURFACING REQUIRED FOR EXISTING GRANULAR BASE COURSES:** The existing thickness of granular base comprises a portion of the required Design Thickness as specified in Item 4.2 Appendix "B" of these regulations.

ITEM 3.0 ASPHALT PAVEMENT

- 3.1 **DESCRIPTION AND GENERAL REQUIREMENTS:** This item shall consist of furnishing all materials and performing all construction procedures required to build an asphalt pavement, on prepared and approved subgrade, conforming to the requirements of these specifications and to the pavement designs shown on the approved plans. It may include any, or all, but is not necessarily limited to, materials and methods specified under this Item (Item 3) only.

Asphalt pavement shall consist of an asphalt concrete surface course, or courses, constructed on a base course, or courses and/or subbase course designed in compliance with the requirements of Item 4.2 of Appendix "B" of these regulations.

Successive layers of the pavement shall be offset from the edge of the underlying layer, a distance equal to the course thickness of the lower layer, except when abutting existing construction. When the asphalt layers of the pavement abut a building foundation, barrier curb, or similar vertical surface, the abutting surface shall be heavily painted with asphalt prior to construction of the asphalt course. The surface course shall be finished one-fourth (1/4) inch above adjacent flush construction to permit proper compaction.

3.2 MATERIALS AND CONSTRUCTION REQUIREMENTS

- 3.2.1 **ASPHALT CONCRETE SURFACE COURSE:** Asphalt Concrete Surface Course materials and construction shall conform to the current requirements of the Kentucky Transportation Cabinet Standard Specifications for Bituminous Concrete Surface Class 2 Asphalt Surface 0.38D PG 64-22 (Section 401, 402, 403, and 409). Surface course mixture composition shall conform to the requirements Surface Class 2 Asphalt Surface 0.38D PG 64-22 as set forth in Table B-1. Minimum Asphalt Concrete Surface Course Thickness shall be as stated in Table B-2 of these regulations.
- 3.2.2 **ASPHALT CONCRETE BASE COURSE:** Asphalt Concrete Base Course materials and construction shall conform to the current requirements of the Kentucky Transportation Cabinet Standard Specifications for Asphalt Concrete Base Course Class 2 Asphalt Base 1.00D PG 64-22 (Section 401, 402, 403, and 409).

Composition requirements of the mixture shall conform to the gradation limits for Asphalt Concrete Base Course set forth in Table B-1. Asphalt content used shall fall within the range shown and shall be approved by the inspector.

3.2.3 CRUSHED AGGREGATE BASE COURSE:

- 3.2.3.1 **DESCRIPTION:** Crushed Aggregate Base Course, when provided for in the approved structural design of the pavement, shall consist of a granular layer constructed on prepared subgrade or subbase in accordance with these specifications and in conformity with the approved dimensions, lines, grades, and cross sections.
- 3.2.3.2 **MATERIALS AND CONSTRUCTION METHODS:** Crushed Aggregate Base Course shall conform to all the current requirements for materials and construction methods of the Kentucky Transportation Cabinet Standard Specifications for Dense Graded Aggregate Base Course as per Section 302.

3.2.4 GRANULAR SUBBASE COURSE:

- 3.2.4.1 **DESCRIPTION:** Subbase, when provided for in the approved structural design of the pavement, shall consist of a granular layer conforming to the following material and construction specifications.
- 3.2.4.2 **MATERIALS AND CONSTRUCTION METHODS:** Crushed Aggregate Subbase Course shall conform to all the current requirements for materials and construction methods of the Kentucky Transportation Cabinet Standard Specifications for Dense Graded Aggregate Subbase Course as per Section 302.
- 3.2.5 **ASPHALT PRIME COAT:** Asphalt Prime Coat shall be applied to the surface of granular courses upon which asphalt base or surface courses will be constructed.

Asphalt Prime shall conform to the Kentucky Transportation Cabinet Standard Specifications requirements for Cutback Asphalt SS-1h as per Section 406. Prime shall be applied to the surface of granular base course at a rate of 0.25 to 0.50 gallons per square yard, as directed by the inspector, in conformance with requirements of the referred to specification.

- 3.2.6 **ASPHALT TACK COAT:** Tack Coat shall consist of SS-1h, meeting the current requirements of the Kentucky Transportation Cabinet Standard Specifications. It shall, when directed by the inspector, be diluted with equal parts of water. Application equipment and procedure shall conform to the requirements of the Kentucky

Transportation Cabinet Standard Specifications for Tack Coats as per Section 406. Tack Coat shall be applied to the surface of asphalt courses that have become dusty or dry from traffic use at a rate of 0.10 gallon per square yard of the diluted SS-1h before the subsequent course is constructed or in other circumstances when the inspector so directs.

ITEM 4.0 DESIGN OF ASPHALT PAVEMENT STRUCTURE

- 4.1 DESCRIPTION: Asphalt pavement structures for subdivision streets shall be designed in conformance with the requirements of this specification. Thickness of the total pavement and of component layers shall be determined on the basis of Street Classification.
- 4.2 PAVEMENT THICKNESS REQUIREMENTS: Thickness of component layers of the pavement for streets within the right-of-way and of the total pavement structure shall be determined as per Table B-2. Where streets are to serve industrial or commercial areas, the pavement design shall be based on a study prepared by the subdivider's engineer projecting the type of vehicles using said streets and traffic volumes, and approved by the planning commission's duly authorized representative.

ITEM 5.0 STRUCTURES ENCOUNTERED IN THE PAVED AREA

- 5.1 MANHOLES AND CATCH BASINS: Manholes and Catch Basins encountered in the areas to be paved shall be raised or lowered to the surface of the new pavement. This includes streets, sidewalks, driveways, patios and parking lots. Catch Basins shall have a granular backfill or controlled-low-strength-material (CLSM) and shall be separated from the pavement and curb by boxing out around basin. Sand is not to be used as a granular backfill. See Appendix "C".

ITEM 6.0 JOINT SEALING COMPOUND

The material used for filling and sealing cracks and/or joints between concrete and/or asphalt shall be W.R. Meadows Sealtight # 164 Hot Pour Rubber Asphalt Sealer or approved equal.

ITEM 7.0 PAVEMENT THICKNESS MEASUREMENTS

Pavement thickness for each type street classification shall be as provided in Table B-2. Streets that are subjected to exceptionally heavy truck traffic shall require a more complete detailed analysis by the subdivider's engineer and approved by the Planning Commission's duly authorized representative.

Upon completion of all asphalt courses, cores shall be taken at approximately 300 foot intervals alternating lanes, to determine pavement thickness. On streets less than 600 feet in length, a minimum of three (3) pavement cores shall be taken. A deviation of the specified thickness of 0.5 inches shall be tolerable. When the pavement thickness is less than the allowable deviation, additional pavement cores shall be taken at 25 foot intervals ahead, and behind, until the specified thickness has been measured. The depth of the total deviation shall be determined by averaging all deficient cores. The length of the deficient area shall be determined by distance between the two farthest deficient cores plus 25 feet. The minimum deficient area shall be 25 feet in length times the lane width.

When the pavement thickness is less than the specified allowable deviation, the developer shall have the following options:

1. Remove the pavement, lower the subgrade to County specifications, retest the subgrade and replace the pavement.
2. After having satisfied all other County specifications pertaining to pavement construction (i.e., fill density testing, subgrade testing, etc.), the developer shall pay the appropriate Legislative Body a portion of the contract price. The contract price will be figured using the given variables below.

The Boone County Public Works Department will annually update and keep on file an average price per square yard on asphalt and Portland cement concrete pavements. This price per square yard, shall be used in determining the contract price.

When determining the contract price, the minimum deficient area to be used will be 25 linear feet, each lane being separate.

PAVEMENT DEFICIENCY

Deficiency in Thickness Determined by Core s (inches)	Proportional Part of Contract Price Due to Appropriate Legislative Body
0.00" to .50"	
0.51 to 0.60"	10%
0.61 to 0.70"	20%
0.71 to 0.80"	30%
0.81 to 0.90"	40%
0.91" to 1.00"	50%

The minimum thickness allowed under this option is as follows:

<u>Designed Depth</u>	<u>Minimum Thickness</u>
9.0"	8.0"
10.0"	9.0"
11.0"	10.0"

Any pavement that has a thickness deficiency of more than the 1" deviation will have to be replaced, as stated in Option #1.

TABLE B-1
TABLE OF COMPOSITION LIMITS FOR BITUMINOUS CONCRETE

Sieve Size	Percent Passing by Weight	
	Class 2 Asphalt Base 1.00D PG 64-22	Class 2 Asphalt Surface 0.38D PG 64-22
1-1/2 inch	100	
1 inch	90-100	
3/4 inch	<90	
1/2 inch		100
3/8 inch		90-100
No. 4		<90
No. 8	19-45	32-67
No. 200	1-7	2-10
Asphalt Content (1)	Min. 3.5	Min. 5.3

- (1) See KYTC Standard Specifications 403.03.03 C) 2).
- (2) Compact asphalt mixtures by Option B in accordance with Sections 402 and 403 of the KYTC Standard Specifications.
- (3) Asphalt mixtures using reclaimed materials shall be in accordance with Section 409 of the KYTC Standard Specifications. Use of recycled asphalt shingles is limited to 3% (even when combined with reclaimed asphalt pavement).

TABLE B-2
THICKNESS REQUIREMENTS FOR ASPHALT PAVED STREETS

STREET CLASSIFICATION	PAVEMENT DESIGN				
	TOTAL MINIMUM THICKNESS (Method 1)		TOTAL MINIMUM THICKNESS (Method 2)		
	SURFACE (inch)	BASE (inch)	SURFACE (inch)	BASE (inch)	GRANULAR SUBBASE (inch)
Local	1-1/2	2 @ 3-3/4"	1-1/2	3-1/2	9
Sub-Collector	1-1/2	2 @ 4-1/4"	1-1/2	4-1/2	10
Collector	1-1/2	2 @ 4-3/4"	1-1/2	5-1/2	11

NOTES:

- (1) Methods 1 and 2 will produce approximately the same pavement quality and strength.
- (2) Selection of the method shall be at the design of engineer's option.
- (3) Designations pertinent to surface and binder and base courses used in this table correspond to the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction:

Surface and Binder (State Highway Designation Section 401, 402, 403, and 409)

Base (State Highway Designation Sections 401, 402, 403, and 409) -- Each layer of bituminous concrete base shall be constructed to a compacted thickness no less than three inches nor more than five inches, unless otherwise directed by the inspector.

Granular base or granular subbase for Method 2 shall conform to composition limits specified in Sections 3.2.3 and 3.2.4. Each layer of granular base or subbase shall be constructed to a compacted thickness no less than three inches nor more than eight inches, unless otherwise directed by the inspector.

- (4) Where streets are to serve industrial areas, the pavement thickness shall be a minimum of 11 inches and all streets, including curb designed streets, shall have ditch lines with flow lines at an elevation lower than the street subgrade. Streets serving commercial areas, the pavement thickness shall be a minimum of 10 inches.
- (5) Arterial streets shall be based on requirements of the Kentucky Transportation Cabinet.