

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 performing all operations in connection with the construction of asphalt concrete pavement, in accord 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 sub-grade in general conformity with the lines, grades and cross-sections shown on the plans.

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. Except for utility trenches, excavations shall not be steeper than a cut slope of 2.5 horizontal to 1 vertical unless otherwise approved by a qualified/recognized geotechnical engineer.
- 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 comprised of clayey soils including clayey granular soils that exhibit well defined moisture density curves shall be constructed of approved soils to approximate subgrade elevation in shallow level layers, 6 to 8 inches, within two (2) percent of optimum moisture content on the dry side of the curve or within three (3) 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 D698-91 or AASHTO T-99) or 87 percent of maximum density as determined by the modified

Proctor moisture-density test (ASTM D1557-91 or AASHTO T-180). Clean granular soils that do not exhibit a well defined moisture density curve shall be compacted to at least 75 percent relative density (ASTM D4253-95 and ASTM D4254-91) Except as otherwise approved by a Qualified/Recognized Geotechnical Engineer, all soils placed in areas directly impacting public improvements shall be constructed to slopes no steeper than 2.5 (horizontal) to 1 (vertical) and flatter where possible for ease of maintenance.

- 1.4 **BACKFILL:** Clayey soils or granular soils shall be used to backfill utility trenches within the limits of the right of way. Under no conditions shall any backfill be flushed with water to obtain compaction.

Clayey backfill soils for trenches within the limits of the public right of way shall be placed in the shallow level layers, six (6) to eight (8) inches in thickness, and each lift shall be thoroughly and uniformly compacted with kneading-type compaction equipment such as a sheepsfoot roller or self-propelled compactor. Clayey backfill soils beneath pavements and within three (3) feet of the back of curb along either side of pavements shall be moisture-conditioned to within two (2) percent of the optimum moisture content on the dry side of the curve or three (3) percent of the optimum moisture content on the wet side of the curve, and shall be compacted to densities not less than 95 percent of the standard Proctor maximum dry density (ASTM D698-91), or 87 percent of the modified proctor maximum dry density (ASTM D1557-91). Clayey backfill soils within the limits of the right of way greater than three (3) feet beyond the back of curb along either side of pavements shall be moisture conditioned to within three (3) percent of the optimum moisture content on the dry side of the curve or seven (7) percent of the optimum moisture content on the wet side of the curve, and shall be compacted to densities not less than 90 percent of the standard Proctor maximum dry density (ASTM D698-91) or 82 percent of the modified Proctor maximum dry density (ASTM D1557-91).

Granular backfill soils for trenches within the public right of way shall be placed in shallow level layers, six (6) to eight (8) inches in thickness, and each lift shall be thoroughly and uniformly compacted with an appropriate type of compaction equipment. Granular backfill which exhibits a well defined moisture density curve shall be moisture conditioned to within two (2) percent of the optimum moisture content on the dry side of the curve or three (3) percent of the optimum moisture content on the wet side of the curve and shall be compacted to 95 percent of the standard Proctor maximum dry density (ASTM D698-91) or 87 percent of the modified Proctor maximum dry density (ASTM D1557-91). Clean granular soils that do not exhibit a well defined moisture density curve shall be compacted to at least 75 percent relative density (ASTM D4253-95 and ASTM D4254-91).

Controlled Low Strength Material (CLSM) also referred to as flowable fill, flowable mortar or lean mix backfill may be used in place of compacted clayey soils or granular soils to uniformly backfill sewer conduit or utility trenches, catch basins, manholes or other excavations. Material mixture shall conform to the following requirements unless approved as equal.

- (1) Materials and proportions - a) Cement - Type I and II; 0-50 not to exceed 75 pounds per cubic yard (lb/cu.yd.); b) Fly Ash - ASTM C-618 Class "C" or "F";

250 - 400 lb/cu.yd.; c) Concrete Sand; 2600 - 2900 lb/cu.yd.; and d) Water; 400-500 lb/cu.yd. Contractor shall be responsible for determining if proposed mixture is proprietary and indemnify the planning commission or any legislative body from any claims.

- (2) Mixing - Backfill should be transported by mixing truck to ensure proper suspension when placed. Constant agitation is required.
- (3) Construction - Flowable fill is a fluid material. Caution should be used when backfilling pipe that is subject to flotation. Anchoring pipe by placing backfill in 8 to 12-inch lifts until fluid head resides may be necessary. When used to backfill aluminum pipe, adequate separation such as a bituminous coating shall be required. Fill material shall extend from the top of compacted bedding or other backfill to bottom of pavement structure.
- (4) Settlement and hardening - To expedite settlement and hardening, bleed water shall appear on the surface within 5 to 10 minutes after placement. CLSM is not concrete and should not be rated on setting time. The material will achieve density as soon as water leaves the mixture. The time involved until the fill may be paved over varies with permeability of adjacent soils, temperature, humidity, and moisture in these soils. In most conditions, the in place CLSM will be ready to pave over in 2 to 6 hours.
- (5) Excavatable Strength - Minimum of 20 pounds per square inch (psi) at 3 days and 30 psi at 28 days; Maximum of 100 psi at 28 days.
- (6) Flow Test - Fill 3-inch diameter x 6-inch high open-ended cylinder to the top with material and level. Lift cylinder straight up. Material spread should be at least 8-inches in diameter.

Any deviations observed by the inspector in conflict with the above processes shall include adequate findings in accord with Section 7.13 A of these regulations.

- 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 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 comprised of clayey soils or granular soils that exhibit a well defined moisture density curve shall be compacted to 98 percent of maximum density as determined by the standard Proctor moisture-density test (ASTM D698-91 or AASHTO T-99) or 89 percent of maximum density as determined by the modified Proctor moisture-density test (ASTM D1557-91 or AASHTO T-180) within two (2) percent of optimum moisture content on the dry side of the curve or three (3) percent of optimum moisture content on the wet side of the curve immediately prior to placing the pavement. This specification is similar to the compaction requirements in compacted fill areas since the embankment shall be compacted to 95 percent or 87 percent of maximum density as determined by the standard Proctor or modified Proctor moisture-density test,

respectively. Clean granular soils that do not exhibit well-defined moisture density curves shall be compacted to 75 percent relative density (ASTM D4253-95 and ASTM D4254-91). In transitional areas from cut to fill, the soils have been subject to 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 D698-91). These soils shall be scarified, aerated, and dried in order to obtain the specified percent compaction for subgrade. Soils in cut areas, three (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 D698-91). 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 soils, granular soils or other clean granular soils, four (4) - inch minimum perforated pipe underdrainage systems shall be installed and connected to approved storm sewer systems at each of the following locations and in accord with details within Appendix "C":

- (1) interconnecting street catch basins opposite each other and entrance to cul-de-sacs;
- (2) extending from any street catch basin perpendicular for full width beneath street pavement and capped with a clean out;
- (3) extending perpendicular from any street catch basin to any utility trench within the limits of the public right of way;
- (4) extending from any street catch basin when excavations within subgrade are replaced with clean granular soils; and
- (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 street catch basins shall be approved by the inspector. Grout or mortar used shall be in conformance with Section 601 of KYDOT standard specifications.

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 recompact 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 part of the subgrade which has not been checked for correct elevation. The subgrade shall be clean of loose or wet material prior to placing concrete.

Prior to placing the concrete, the Contractor shall proofroll the compacted subgrade with a piece of heavy rubber tired equipment, such as a single-axle dump truck having a minimum gross weight of ten (10) tons or 20,000 lbs. The Inspector shall observe the

proofrolling for consistency. Areas which are subject to excessive pumping or rutting shall be reworked and recompacted as described above.

- 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 or cohesive soils shall be compacted with a kneading type compaction equipment such as a sheepsfoot roller. Cohesionless soils shall be compacted with 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 driveways shall comply with Item 1.5 except soil density tests are not required. Cohesive soils or lean concrete shall be used under driveways (i.e., apron and sidewalk portion of driveway minimum eight (8) feet back of curb for single or two-family or nine (9) feet for multi-family or commercial) provided compaction is performed per Item 1.6. For sidewalks between driveways, subgrade of cohesive soils shall be uniformly compacted per Item 1.6. Cohesionless or granular soils may be used as a base on subgrade for sidewalks provided base thickness does not exceed four (4) inches or thickness equivalent to that of the sidewalk and compacted per Item 1.6.
- 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.
- 1.9 **UTILITIES:** Special precautions shall be taken by the contractor to avoid damage to existing overhead and underground utilities. Before proceeding with 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 TESTS:** Soil density tests, including moisture-density tests (ASTM D698-91 or ASTM D1557-91) and field density tests (ASTM D1556-90 or ASTM D2922-90 or ASTM D4253-95 and ASTM D4254-91, where applicable) are required to determine the percent compaction in accord with the following:
 - (1) Embankments - a minimum of one (1) test for each three (3) feet in elevation per 400 lineal feet or every 2500 cubic yards, or fraction thereof, of embankment section;
 - (2) Backfill utility trenches - a minimum of one (1) test for each two (2) feet in elevation per 100 feet, or fraction thereof, of utility trench open cut beneath street subgrade and within the limits of the public right of way;
and

Where depths of trenches are more than (5) feet and worker safety is at risk, the inspector shall observe the compaction process in layers with an appropriate type of compaction equipment and document observations until worker safety is assured when compaction testing, as required, is resumed.

- (3) Subgrades - a minimum of one (1) test per 100 lineal feet for streets 500 lineal feet or less or one (1) test per 200 lineal feet for streets over 500 lineal feet at each of the following locations, where applicable:
 - (a) compacted fill placed for embankments;
 - (b) undisturbed soils in transitional areas from cut to fill immediately below the topsoil; and
 - (c) undisturbed soils at depths greater than 3 feet below the original ground in cut areas.

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. The results of all soil testing shall be compared to the densities, stated in Items 1.3, 1.4, and 1.5 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/recognized geotechnical engineer.

Any deviations observed by the inspector in conflict with frequency of soil density testing shall include findings in accord with Section 7.13 A of these regulations.

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 aggregates 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 a prepared and approved subgrade, conforming to the requirements of these specifications and to the pavement design shown on the approved plans. It may include any, or all, but is not necessarily limited to, materials and methods specified under 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.

3.2.1 ASPHALT CONCRETE SURFACE COURSE: Asphalt Concrete Surface Course materials and construction shall conform to the current requirements of the Kentucky Department of Transportation, Bureau of Highways, for Asphalt Concrete Surface and Binder (Section 401, 402). Surface course mixture composition shall conform to the requirements Surface and Binder as set forth in Table B-1. Minimum Asphalt Concrete Surface, Binder and Bases Courses Thickness shall be as stated in Table B-2 of these regulations. In order to prevent unnecessary damage to final asphalt concrete pavement from new building development, bituminous surface course application shall be delayed not less than nine (9) and no more than eighteen (18) months after completion of the asphalt base course unless otherwise approved by the planning commission's duly authorized representative. Prior to final paving, asphalt base course shall be checked for damage and repairs made, where necessary.

3.2.2 ASPHALT CONCRETE BASE COURSE: Asphalt Concrete Base Course materials and construction shall conform to the current requirements of the Kentucky Department of Transportation, Bureau of Highways, Specifications for Asphalt Concrete Base Course (Section 401, 403).

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 accord 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 Department of Transportation for Dense Graded Aggregate Base Course as per Section 303.

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 Department of Transportation for Dense Graded Aggregate Subbase Course as per Section 303.

- 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 Department of Transportation requirements for Cutback Asphalt Emulsion Primer Type L, as per Section 407. 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 Department of Transportation. 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 Department of Transportation for Tack Coats as per Section 407. 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 gallons 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 per Table B-2. Where streets are to serve industrial or commercial areas, pavement design shall be based on a study prepared by the subdivider's engineer projecting type of vehicles using said streets and traffic volumes, and approved by the planning commission's duly authorized representative.

ITEM 5.0 ADJUSTING MANHOLE TOPS

- 5.1 DESCRIPTION: The contractor shall raise or lower existing manhole tops to coincide with the finished grade elevation of the paving.

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.

TABLE B-1
TABLE OF COMPOSITION LIMITS FOR BITUMINOUS CONCRETE

SIEVE SIZE	PERCENT PASSING BY WEIGHT		
	BASE	BINDER	SURFACE
1-1/2 inch	100		
1 inch	(2)		
3/4 inch	70 - 98	100	
1/2 inch	--	--	100
3/8 inch	44 - 76	57 - 85	80 - 100
No. 4	30 - 58	37 - 68	55 - 80
No. 8	21 - 45	25 - 52	35 - 60
No. 16	14 - 35	15 - 38	22 - 46
No. 50	5 - 20	5 - 20	5 - 21
No. 100	3 - 10	3 - 10	3 - 14
No. 200	--	--	2 - 7
Asphalt Content (1)	3.5 - 6.5	4.0 - 7.0	4 - 8

- (1) Percent by weight of the total mixture.
- (2) When the specified thickness of the Base course is 2 inches or less, either 100 percent of the aggregate shall pass the 1-inch sieve or the Contractor may request in writing to use Bituminous Concrete Binder. When the Contractor elects to use bituminous concrete binder in lieu of bituminous concrete base, all requirements for thickness and compaction (or density) will apply, the same as if bituminous concrete base was used.

TABLE B-2
THICKNESS REQUIREMENTS FOR ASPHALT PAVED STREETS

STREET CLASSIFICATION	PAVEMENT THICKNESS				
	TOTAL MINIMUM THICKNESS (METHOD 1)		TOTAL MINIMUM THICKNESS (METHOD 2)		
	SURFACE (INCH)	BASE (INCH)	SURFACE (INCH)	BASE (INCH)	GRANULAR SUBBASE (INCH)
Local (6)	2	2 @ 3"	2	3	6
Subcollector (7)	2	2 @ 3-1/2"	2	4	8
Collector	2	2 @ 4"	2	5	8

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 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 Sections 401, 402).

Base (State Highway Designation Sections 401, 403) -- 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 3.0, A., 3. and 3.0, A., 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 or commercial areas, the pavement design shall be based on a study prepared by the subdivider's engineer projecting the type of vehicles using the street and traffic volumes, approved by the planning commission's duly authorized representative.
5. Arterial streets shall be based on requirements of the Kentucky Department of Transportation.
6. Pavement thickness alternatives (Method 1 or 2) for local streets include courts and cul-de-sacs serving 50 lots or less.
7. Pavement thickness alternatives (Method 1 or 2) for subcollector streets include local streets serving more than 50 lots.