

## Appendix F – Bowling Green / Warren County Pavement Catalog

### Section F.1 Flexible Pavement Thickness Design Procedures

The procedures for designing flexible (asphalt) pavement are listed below:

- 1) For a residential street, estimate the number of houses that will be served by the street. For a loop/cul-de-sac/other low volume street, it will equal the number of houses on that street. For a continuing (through) street, it will equal the number of houses that will use the street when entering / exiting the subdivision.

In residential Subdivisions, there will be a maximum of three street classifications. The Hierarchy will be as follows: Low Volume Streets will be identified. Next, the Local streets that serve them will be identified. Finally, the minor collectors that serve the low volume and local streets will be identified. Typically, only one minor collector will exist and serves as the “spine” of the subdivision, channeling traffic to the main entrance. Transition between different classes of pavements shall be done at intersections or over a distance of 50 feet if not at an intersection.

- 2) For a street that will serve industrial or commercial property, estimate the gross floor area for the development. For Hotels and Motels, estimate the number of rooms. For a Bank, determine if a Drive through will be present and number of bays associated with it. For convenience stores, determine the number of gas pumps.
- 3) Determine the number of Equivalent Axle Loads (ESALs) from Table F-3 for residential streets, and from Table F-4 for commercial/industrial streets.
- 4) Based on CBR (determined from ASTM D 1883, current edition), determine the required Structural Number from Table F-5. If rock roadbed, use a CBR value of 7. The minimum structural numbers are shown in Table F-1. Alternate methods of CBR determination must be approved by the Planning Commission Engineer prior to use. For ASTM D 1883, determine dry unit weight and optimum water content from a Standard Proctor Density Test. The CBR sample shall be within -2% to +1% of Max. Dry Density and 0% to +2% of optimum moisture content.

Table F-1

<b>Street Classification</b>	<b>SN</b>
Low Volume Street	2.0
Local (Residential) Street	2.4
Minor Collector	4.0
Major Collector	4.2
Arterial	4.2
Commercial	4.2
Industrial	4.2

Low Volume Streets are streets that serve 400 ADT (approximately 40 dwelling units) or less.

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In residential subdivisions, the SN for each classification of street will be standardized to provide a maximum of three different pavement designs for the subdivision. Standardization will be based on average SN and adjusted based on good engineering judgment.

- 5) Determine the required thickness of asphalt, DGA/CSB, No. 2 stone, and stabilized subgrade to achieve the required structural number. The Layer coefficients are listed below:

Table F-2

<b>Flexible Pavement Layer</b>	<b>Coeff.</b>
Asphalt	0.44 (0.30 for existing asph.)
DGA / CSB	0.12 (0.10 for existing DGA/CSB)
No. 2 Stone	0.08
Geogrids (within aggregate Layer)	Increase DGA/CSB coefficient to 0.17
Stabilized Subgrade	0.08

Layer Thickness Designs may be specified as one of two categories, Maximum Asphalt Design or Maximum Aggregate Design. Max. Asph. Designs include a minimum DGA/CSB layer of 4 inches, followed by Asphalt Base and Surface to meet the required structural number. Max. Agg. Designs include a ratio of 1/3 asphalt (in inches) to 2/3 aggregate (in inches), in thicknesses to meet the required structural number. Max. Asphalt designs for typically used in soil/rock fill, rock cut situations, modified subgrade, and when a wet subgrade is not a factor. Max. Aggregate designs are used in soil cut situations, curb and gutter, and when wet subgrade will be a factor.

Minimum Asphalt Surface thickness shall be 1 ¼ inch. All other course thicknesses shall be rounded up to the nearest ½ inch.

DGA is used in the aggregate layer in curb and gutter and shoulder/ditch sections in which the aggregate layer does not “daylight” into the ditch. Crushed Stone Base (CSB) is used in the aggregate layer in rock cuts and shoulder/ditch sections in which the aggregate layer “daylights” into the ditch. CSB can be used in place of DGA when wet subgrade is a concern and proper pavement drainage has been included in the shoulder/ditch or curb and gutter design, or at the discretion of the Planning Commission Engineer.

- 6) If unstable areas are discovered during the subgrade proof roll test, then stabilize the areas as agreed to by the Developer’s Engineer and Planning Commission Engineer. Subgrade shall be constructed and compacted per Article 6 of the Subdivision Regulations.

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- 7) Pavement at Medians, Traffic Circles, Islands, and other obstacles in the Road shall have 15 foot lanes, or 3 ft more width per lane in such entry areas, and corner radius of 35' at entrances providing multiple wheel path opportunity which would lessen the constant isolated pavement loading associated with single lane travel ways. Also, Structural Number shall be increased by adding 20% to the calculated Structural Number for that street. Increased Structural Number would provide additional strength in these areas which will receive the constant isolated pavement loading. A distance of 50' will be used to transition from median section to road section.
- 8) Pavement Drainage shall be required. The goal is to provide drainage of water that infiltrates the pavement structure. Acceptable methods include, be not limited to:
  - lowering the inlet elevation of curb inlets 1 ¼" and sloping concrete gutter and asphalt surface to match
  - adding weep holes in the upper section of the curb inlets
  - edge drain systems
  - Scratch course of asphalt surface at curb inlet locations to direct water to the inlet. This method shall require milling to remove the scratch course prior to final surface course

Pavement Drainage shall be shown on the Construction plans and approved prior to Construction.

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Table F-3

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Table F-4

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Table F-5

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### Section F.2 Flexible Pavement Mix Design Procedures

All asphalt materials shall meet the specifications for SuperPave mixes as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction.

Asphalt surface mixes shall include a 3/8" nominal maximum aggregate size.

All aggregate materials shall meet the specifications for such mixes as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction.

### Section F.3 Flexible Pavement Plant Testing / Inspection Procedures

All asphalt and aggregate materials shall be sampled, tested and reported to the Planning Commission Engineer per the Plant Testing requirements of the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction. At a minimum, one test should be performed per project with roadways totaling greater than 500 feet in length. Testing shall be completed early during production to allow for adjustments and to communicate results to field personnel inspecting placement. The Developer, the Engineer, Contractors, Third Party Testing Agencies, and Suppliers (collectively known as External Party agents), shall be responsible for all Asphalt and Aggregate Plant testing and any other testing and paperwork needed for acceptance. At the discretion of the Planning Commission, a Quality Assurance check of the sampling and testing may be required if deficiencies are suspected. External Party agents shall be properly certified by the Kentucky Transportation Cabinet or the appropriate trade organization for the work they are performing. A Copy of such certification shall be provided to the Planning Commission Engineer prior to performing the work.

### Section F.4 Flexible Pavement Construction Procedures

All asphalt and aggregate materials shall be placed by methods as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction and Article 6.

### Section F.5 Flexible Pavement Field Inspection Procedures

Planning Commission Staff will provide routine site visits and visual observations of the construction activities throughout the duration of the project. The Developer, the Engineer, Surveyor, Contractors, Third Party Testing Agencies, and Suppliers (collectively known as External Party agents), shall be responsible for all PQI, coring, or Nuclear Density Testing and any other testing and paperwork needed for acceptance. At the discretion of the Planning Commission, a Quality Assurance check of the sampling and testing may be

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required if deficiencies are suspected. External Party agents shall be properly certified by the Kentucky Transportation Cabinet or the appropriate trade organization for the work they are performing. A Copy of such certification shall be provided to the Planning Commission Engineer prior to performing the work.

Nuclear Density Testing shall be required on all DGA/CSB courses and PQI, coring, or Nuclear Density Testing shall be required on all Asphalt Base courses. Asphalt Base Courses shall be compacted to a density equal to minimum 92% solid volume and maximum 96% solid volume. Asphalt Surface testing will not be required.

Methods further defined in Article 6.

### Section F.6 Rigid Pavement Thickness Design Procedures

The procedures for designing rigid (concrete) pavement are listed below:

All concrete pavement designs shall meet the specifications for rigid pavement as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction. Designs will be reviewed and approved by the Planning Commission Engineer on a case by case basis.

### Section F.7 Rigid Pavement Mix Design Procedures

All concrete materials shall meet the specifications for such mixes as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction.

All aggregate materials shall meet the specifications for such mixes as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction.

### Section F.8 Rigid Pavement Plant Testing / Inspection Procedures

All concrete and aggregate materials shall be sampled, tested and reported to the Planning Commission Engineer per the Plant Testing requirements of the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction. At a minimum, one test should be performed per project with roadways totaling greater than 500 feet in length. Testing shall be completed early during production to allow for adjustments and to communicate results to field personnel inspecting placement. The Developer, the Engineer, Contractors, Third Party Testing Agencies, and Suppliers (collectively known as External Party agents), shall be responsible for all Concrete and Aggregate Plant testing and any other testing and paperwork needed for acceptance. At the discretion of the Planning Commission, a Quality



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Assurance check of the sampling and testing may be required if deficiencies are suspected. External Party agents shall be properly certified by the Kentucky Transportation Cabinet or the appropriate trade organization for the work they are performing. A Copy of such certification shall be provided to the Planning Commission Engineer prior to performing the work.

### Section F.9 Rigid Pavement Construction Procedures

All concrete and aggregate materials shall be placed by methods as defined by the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction and Article 6.

### Section F.10 Rigid Pavement Field Inspection Procedures

Planning Commission Staff will provide routine site visits and visual observations of the construction activities throughout the duration of the project. The Developer, the Engineer, Surveyor, Contractors, Third Party Testing Agencies, and Suppliers (collectively known as External Party agents), shall be responsible for all Nuclear Density Testing and any other testing and paperwork needed for acceptance. At the discretion of the Planning Commission, a Quality Assurance check of the sampling and testing may be required if deficiencies are suspected. External Party agents shall be properly certified by the Kentucky Transportation Cabinet or the appropriate trade organization for the work they are performing. A Copy of such certification shall be provided to the Planning Commission Engineer prior to performing the work.

Nuclear Density Testing shall be required on all DGA/CSB courses.

Methods further defined in Article 6.

### Section F.11 Other Pavement Types (brick, pavers, etc.)

Other pavement types shall be designed, constructed, and approved on a case by case basis by the Designer and Planning Commission Engineer.

### Section F.12 Pavement Acceptance

All Flexible pavement asphalt and aggregate materials testing and inspection shall be evaluated by the Planning Commission Engineer per the requirements of the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction. The goal is to produce asphalt and aggregate in place that meets the specification of 100% lot pay adjustment schedule value ranges for Option A and B mixtures as defined in Section 402 of the current Edition of the Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction. However, Asphalt and Aggregate materials will be considered acceptable if the test results determine

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the material is within the specifications of 90% lot pay adjustment schedule value ranges. Asphalt and Aggregate materials determined during the required testing to be out of specification shall require adjustment at the Plant or the Field to produce material in place within specification. The materials shall then be retested for compliance. Materials that continue to be out of specification shall be evaluated by the Planning Commission Engineer, City/County Engineer, Engineer, and Contractor per the procedures defined in Kentucky Method KM 64-448-04 and/or an extended warranty period shall be negotiated by the Developer and City/County Engineer prior to acceptance. Rigid and other Pavements shall be evaluated and accepted by similar methods.

### Section F.13 Pavement Design Submittal Folder

A Pavement Design Folder shall be submitted to the Planning Commission Engineer for approval. The Folder shall include the following information: Project Identification, Preparer qualifications, Design Calculations, Geotechnical Information, Final Pavement Design Summary with typical Section, and any other information related to the Design.