United States Department of Agriculture

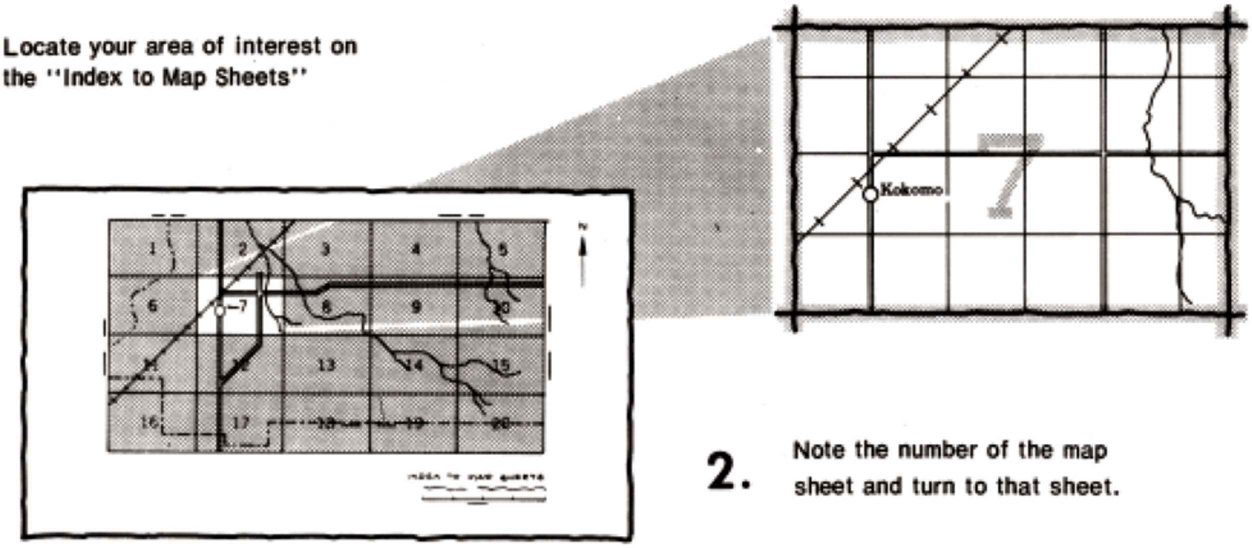
Soil Conservation Service

In Cooperation with Kentucky Department for Natural Resources and Environmental Protection and Kentucky Agricultural Experiment Station

Soil Survey of Boyle and Mercer Counties Kentucky

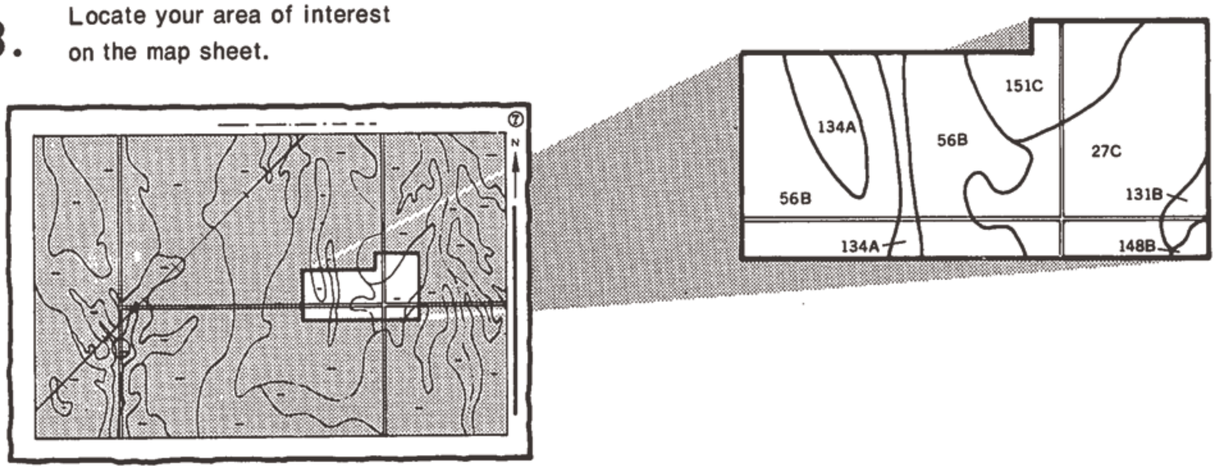
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

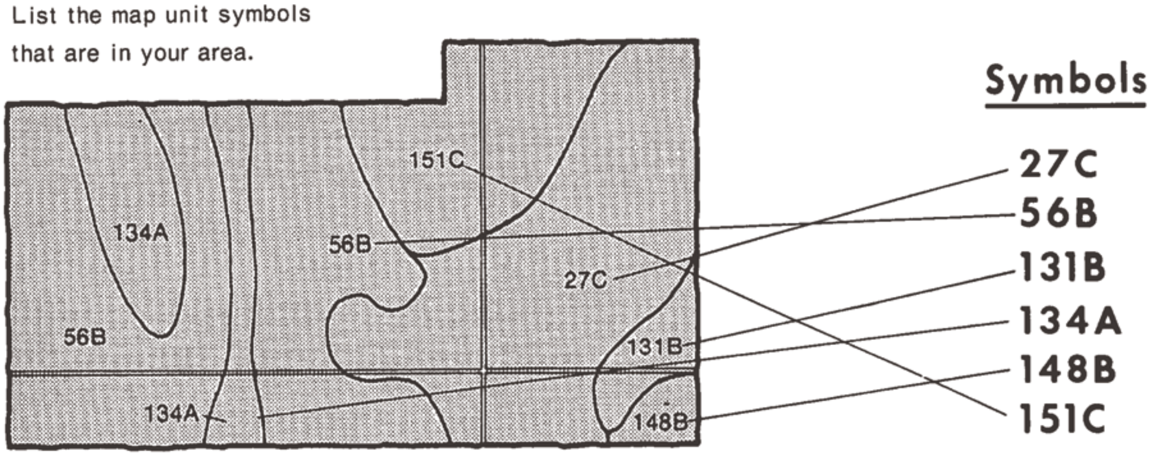


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

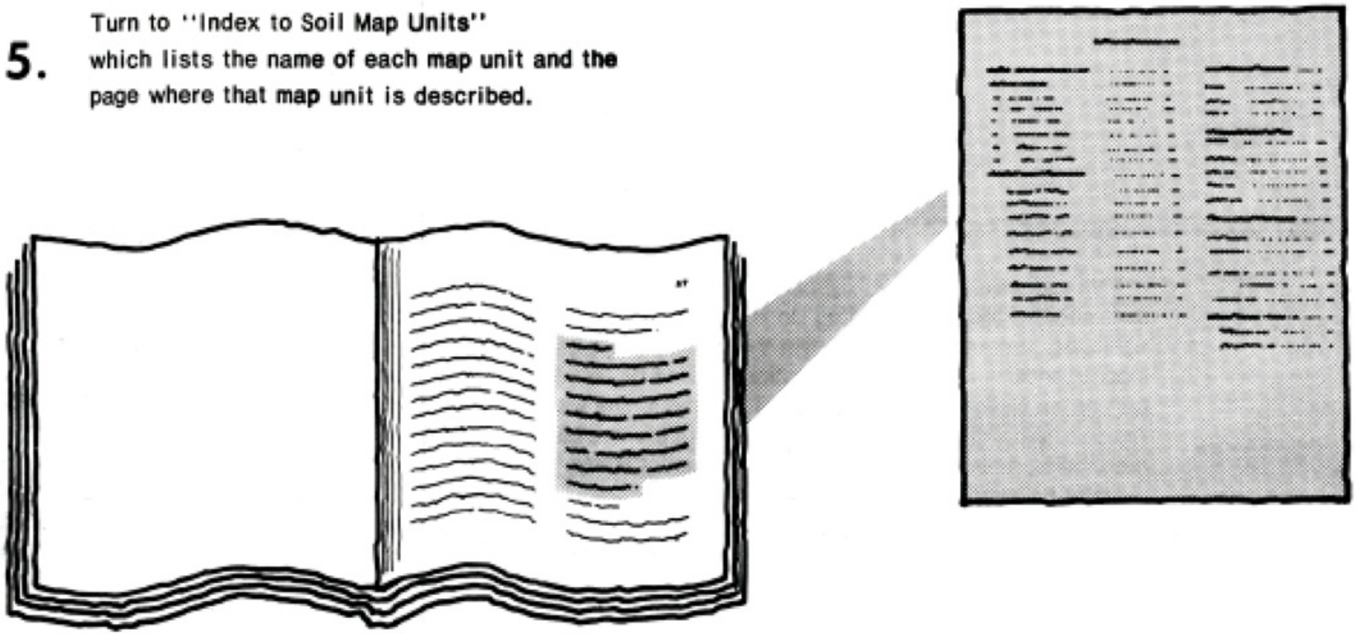


4. List the map unit symbols that are in your area.

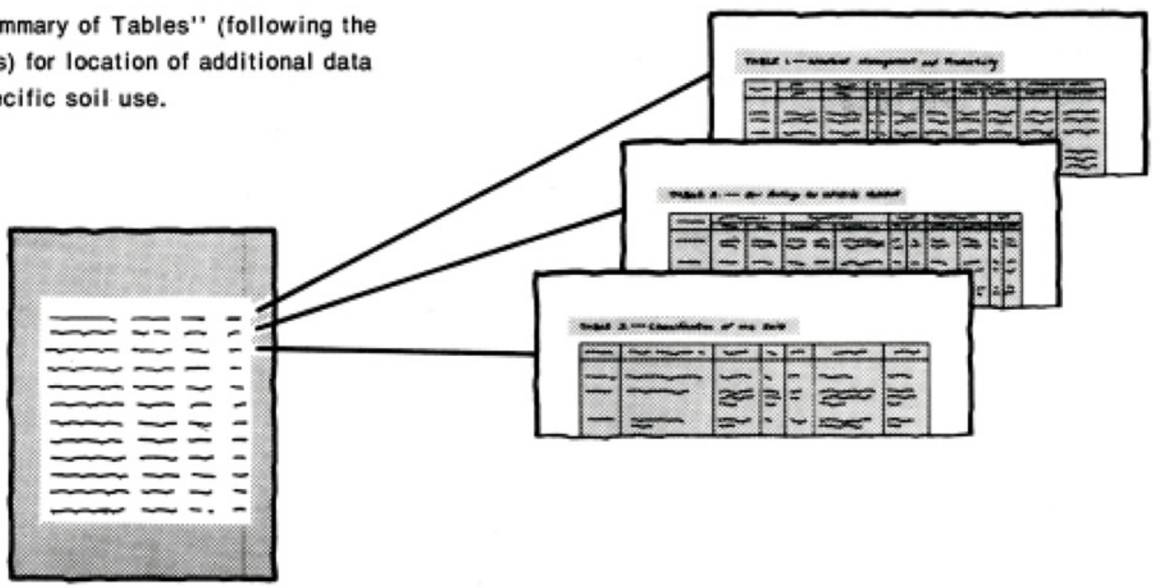


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1974 to 1978. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979. This survey was made cooperatively by the Soil Conservation Service and the Kentucky Natural Resources and Environmental Cabinet and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Boyle County Conservation District and the Mercer County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: The Governor Owsley Mansion at Danville, Kentucky, in an area of Maury silt loam, 2 to 6 percent slopes.

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soil series

Issued April 1983

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foreword

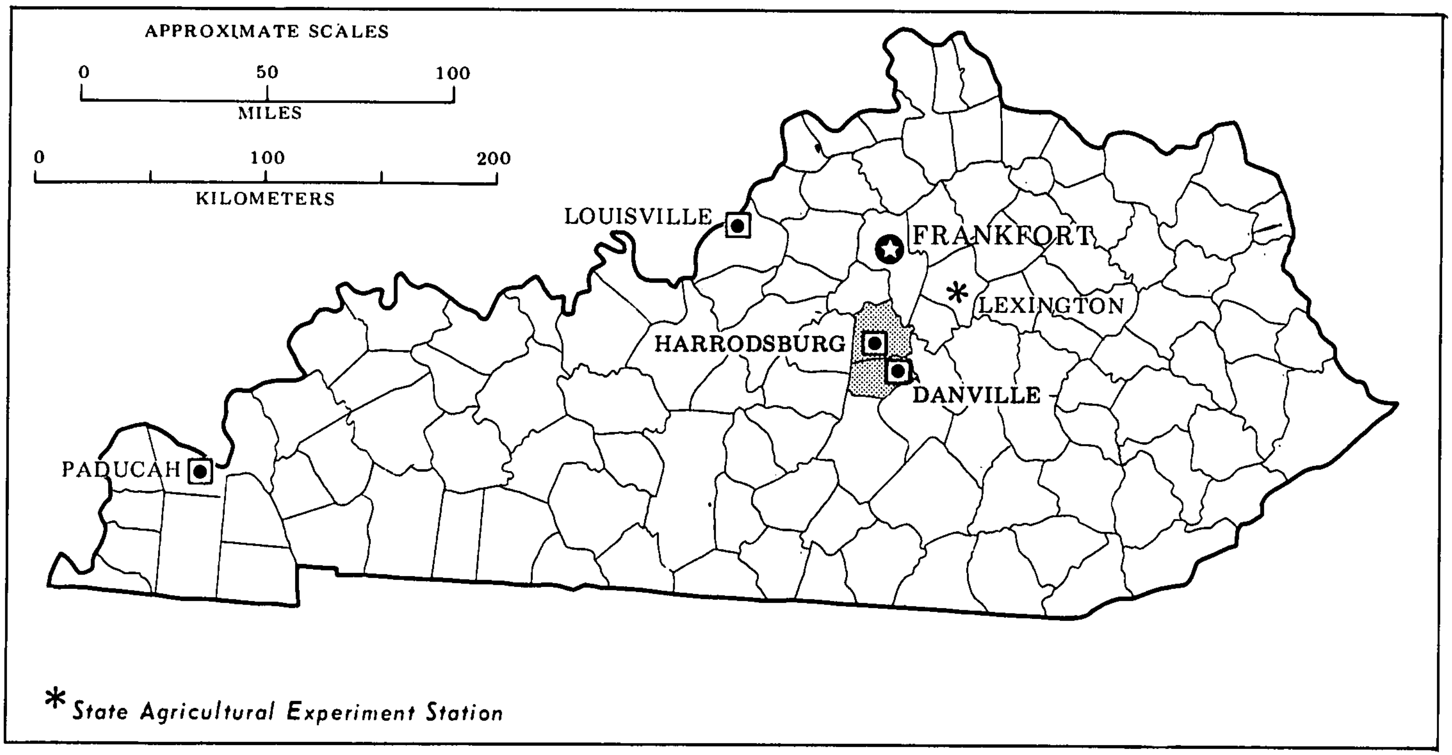
This soil survey contains information that can be used in land-planning programs in Boyle and Mercer Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Eddie L. Wood
State Conservationist
Soil Conservation Service



Location of Boyle and Mercer Counties in Kentucky.

soil survey of

Boyle and Mercer Counties, Kentucky

by William H. Craddock, Soil Conservation Service

soils surveyed by Fred S. Arms, Pamela A. Wood, and William H. Craddock, Soil Conservation Service; Stephen A. Coleman and John A. Kelley, Kentucky Department for Natural Resources and Environmental Protection

United States Department of Agriculture, Soil Conservation Service
in cooperation with
the Kentucky Department for Natural Resources and Environmental Protection and
the Kentucky Agricultural Experiment Station

BOYLE AND MERCER COUNTIES are in the central part of Kentucky. They have a total area of 280,890 acres. Boyle County has a total area of about 183 square miles and a population of 23,300. Danville, the county seat of Boyle County, has a population of 12,038. Mercer County has a total area of about 256 square miles and a population of 18,000. Harrodsburg, the county seat of Mercer County, has a population of 6,749 (*17*).

Mercer County is in the Kentucky Bluegrass Land Resource Area. Boyle County is in the Kentucky Bluegrass and the Highland Rim and Pennyroyal Land Resource Areas (*4*).

The southern part of Boyle County is dissected by streams and is dominantly very steep hillsides and narrow ridges. North Rolling Fork rises in this area and flows westward across the county. This area is mostly used for woodland although corn, tobacco, hay, and pasture are grown on the more nearly level ridgetops and narrow flood plains. The western part of the survey area is dissected by the Chaplin River and its tributaries. The Chaplin River rises in the southern part of Boyle County and flows northward through the survey area. This area is dominantly steep. It has steep to moderately steep hillsides and narrow, rolling and hilly ridgetops. The flood plains are very narrow in the southern part of the survey area and widen as the river flows northward. Terraces begin in this area. The area is mostly used for pasture; however, hay, corn, and tobacco are grown on some of the wider ridgetops and on the flood plains and terraces.

The central part of the survey area is dissected by the Salt River and its tributaries. Like the Chaplin River, the Salt River also rises in the southern part of Boyle County and flows northward through the survey area. This area is dominantly hilly. It has steep to very steep hillsides and undulating to rolling ridgetops. The flood plains are very narrow in the southern part of the survey area and widen as the river flows northward. Terraces begin in this area. The area is mostly used for hay and pasture; however, corn and tobacco are grown on the ridgetops, flood plains, and terraces.

The east-central part of the survey area has karst topography and both surface and subterranean drainage. Many sinks are scattered over the landscape. This area is dominantly undulating to rolling, but some hillsides are steep. It is mainly used for corn, small grains, soybeans, tobacco, and hay, but the steeper slopes are used for pasture.

The eastern part of the survey area is dissected by the tributaries of the Kentucky and Dix Rivers. These rivers serve as the eastern boundary of the two counties. The ridgetops are karst, and some show evidence of old stream deposits. This area has undulating to rolling ridgetops and steep to very steep hillsides. Vertical limestone bluffs are along the rivers. Because of these palisades, only narrow, intermittent flood plains and terraces have developed. The area is dominantly used for woodland and pasture on the steeper slopes and for hay, corn, small grains, soybeans, and tobacco on the ridgetops. The terraces and flood plains along the rivers are mostly used for pasture because they are inaccessible to most row crop machinery. The elevation of the survey area ranges from 483 feet above sea level, which is the normal pool level of the Kentucky River at the Anderson County-Mercer County line, to about 1,364 feet in the southern part of Boyle County at Parksville Knob.

Forest products and limestone are the most important natural resources. The Kentucky River and Herrington Lake provide water for residential and industrial use for both counties. In addition, electricity is generated at Dix Dam on Herrington Lake. Gravel is excavated from the streambed of the North Rolling Fork River and its tributaries and is used in the construction of roads.

Urban and industrial development in Boyle and Mercer Counties have increased rapidly in recent years. Many of the industries are of major importance to the economy. Numerous historical landmarks attract tourists to the area. Herrington Lake is a major recreational site.

A previous soil survey of Mercer County was published in 1930 (*14*). This survey updates the first survey and provides additional information.

general nature of the survey area

This section provides general information about settlement, farming, and climate in Boyle and Mercer Counties.

settlement

Mercer County was formed in 1785 from territory taken from Lincoln County, one of the three original Kentucky counties. The county was named for General Hugh Mercer. Harrodsburg, the county seat, was founded in 1774 by James Harrod and a party of 31 men. It was the first permanent settlement west of the Allegheny Mountains.

Boyle County was formed in 1842 from territory taken from Mercer County. The county was named for John Boyle. Danville, the county seat, was laid out by Walker Daniel in 1781 and was originally named Boiling Spring. Danville was the site of 10 constitutional conventions that resulted in separation from Virginia and the formation of the commonwealth of Kentucky (*28*).

farming

According to the Bureau of Census (*27*), 91.9 percent of the soils in Boyle County and 82.6 percent in Mercer County were used for farming in 1974. This was a decrease in usage of about 6 percent in Boyle County and 7 percent in Mercer County from 1969. In 1974 there were 757 farms in Boyle County. This was a decrease from 882 farms in 1969 and 1,307 farms in 1940. The size of the average farm in Boyle County, however, increased from about 130 acres in 1969 to about 142 acres in 1974. In 1974 there were 1,071 farms in Mercer County. This was a decrease from 1,313 farms in 1969 and 1,932 farms in 1940. The size of the average farm in Mercer County increased from about 113 acres in 1969 to about 126 acres in 1974.

According to the Bureau of Census, there were about 75 percent owner operators, 16 percent part owner operators, and 9 percent tenant operators in Boyle County in 1974 and about 72 percent owner operators, 20 percent part owner operators, and 8 percent tenant operators in Mercer County. For both counties this was a slight percentage decrease in owner and tenant operators from 1969 and a slight percentage increase in part owner operators.

The main farm enterprises in Boyle and Mercer Counties are the raising of row crops, hay, pasture, and livestock and livestock products. A minor enterprise of significance in Boyle County is forest products. Corn and wheat are the principal grain crops; however, acreages of soybeans and sorghum have increased from 1969. Oats are grown for grain and hay, and barley is grown for grain and for a green manure cover crop. Burley tobacco makes up about 80 percent of the total value of crops sold in the survey area (fig. 1). Potatoes, vegetables, sweet corn, melons, berries, apples, peaches, and pears make up only a small percentage of the total farm products.

Alfalfa, red clover, Korean lespedeza, orchardgrass, Kentucky 31 fescue, and timothy are important hay crops. Kentucky 31 fescue, orchardgrass, and white clover are the most common pasture plants.

The total acreage of cropland, according to the 1974 census, was 25,382 acres in Boyle County and 29,474 acres in Mercer County. For both counties, this is an increase in harvested cropland as compared to 1969.

Livestock enterprises made up about 47 percent of the farm income in the survey area in 1974. Beef cattle and calves, dairy cattle, and hogs are the main livestock enterprises. In both counties from 1969 to 1974, the

Figure 1.—Burley tobacco in an area of Maury silt loam, 2 to 6 percent slopes.

number of beef cattle increased and the number of hogs decreased. In Boyle County the number of dairy cows increased from 1969 to 1974, but in Mercer County the number decreased. Poultry and poultry products and sheep raising are of less significance. Horses and mules are not used much for working on the farms, but race horses and show horses are kept throughout the survey area.

According to the 1974 census, the acreage used for farm woodland decreased in both counties from 1969. The acreage in Boyle County decreased from 14,551 acres to 11,197 acres, and the acreage in Mercer County decreased from 8,552 acres to 7,109 acres. About 4,035 acres of woodland was grazed in Boyle County and 4,868 acres was grazed in Mercer County.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In Boyle and Mercer Counties, summers are hot in the valleys and slightly cooler in the hills. Winters are moderately cold. Rains are fairly heavy and well distributed throughout the year. Snow falls nearly every winter, but the snow cover usually lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Danville, Kentucky in the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 35 degrees F, and the average daily minimum temperature is 25 degrees. The lowest temperature on record, which occurred at Danville on January 25, 1963, is -19 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred at Danville on September 6, 1954, is 104 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 50 inches. Of this, 25 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 3.30 inches at Danville on April 23, 1972. Thunderstorms occur on about 50 days each year, and most occur in summer.

Average seasonal snowfall is 19 inches. The greatest snow depth at any one time during the period of record was 12 inches. On an average of 10 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in winter.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Each map unit is rated for *cultivated crops, woodland,* and *urban uses*. Cultivated crops are those grown extensively in the survey area. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.

The descriptions of the general soil map units follow.

Gently sloping to steep, well drained, moderately deep and deep soils; underlain by interbedded shale, siltstone, and limestone, or limestone

This group consists of well drained, moderately deep and deep soils that have a clayey or loamy surface layer and a clayey subsoil.

The three map units in this group make up about 31 percent of Boyle County and about 58 percent of Mercer County. Most of the acreage is used for pasture, but a few areas are used for cultivated crops and hay. A very few tracts are in woodland. Steepness of slope, moderately slow and slow permeability, and depth to bedrock are the main limitations for most uses.

1. Eden

Steep to sloping, well drained, moderately deep soils that have a clayey subsoil; formed in residuum of weathered interbedded limestone, siltstone, and shale

This map unit of steep to sloping soils is in the northwestern part of Boyle County and in the western part of Mercer County. It is in the Hills of the Bluegrass. Slope ranges from 6 to 30 percent.

This map unit makes up about 2 percent of Boyle County and about 39 percent of Mercer County. It is about 88 percent Eden soils and about 12 percent soils of minor extent.

Eden soils are mostly on steep to sloping hillsides and narrow ridgetops. The surface layer is dark grayish brown silty clay loam, and the subsoil is olive brown clay in the upper part and yellowish brown flaggy clay in the lower part. Eden soils are moderately deep. Permeability is slow.

Of minor extent in this map unit are the deep, well drained Nolin soils on flood plains.

The soils of this map unit are used mainly for pasture. A very few tracts are used for cultivated crops. Most of the acreage has been cleared. Steepness of slope, limestone fragments, and high clay content are the main limitations for farming and most other uses. Depth to bedrock also is a limitation.

These soils are suited to pasture but are poorly suited to cultivated crops because of steepness of slope. They are moderately suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and seedling mortality is a management concern. These soils are poorly suited to urban uses. Steep slopes and the high clay content are limitations that are difficult to overcome. Depth to bedrock also is a limitation, but it can be overcome by proper mechanical procedures.

2. Lowell-Faywood-Eden

Gently sloping to moderately steep, well drained, deep and moderately deep soils that have a clayey subsoil; formed in residuum of weathered limestone or interbedded limestone, siltstone, and shale

This map unit of gently sloping to moderately steep soils is in the north-central part of Boyle County and in the west-central part of Mercer County. It is in the Hills of the Bluegrass. Slope ranges from 2 to 20 percent (fig. 2).

This map unit makes up about 12 percent of Boyle County. It is about 57 percent Lowell soils, 16 percent Faywood soils, 9 percent Eden soils, and about 18 percent soils of minor extent. This unit makes up about 19 percent of Mercer County. It is about 49 percent Lowell soils, 19 percent Faywood soils, 17 percent Eden soils, and about 15 percent soils of minor extent.

Lowell soils are mostly on broad ridgetops, sloping side slopes, benches, and foot slopes. The surface layer is dark grayish brown silt loam, and the subsoil is yellowish brown and light olive brown silty clay or clay. The substratum is light olive brown silty clay. Lowell soils are deep. Permeability is moderately slow.

Faywood soils are mostly on ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Faywood soils are moderately deep. Permeability is moderately slow and slow.

Eden soils are mostly on narrow ridgetops and steep hillsides. The surface layer is dark grayish brown silty clay loam, and the subsoil is olive brown clay in the upper part and yellowish brown flaggy clay in the lower part. Eden soils are moderately deep. Permeability is slow.

Of minor extent in this map unit are the deep, well drained Nolin soils on flood plains; the deep, well drained Elk soils on terraces; and the shallow, well drained Fairmount soils on lower side slopes.

The soils of this map unit are used mainly for pasture (fig. 3); many tracts, however, are used for cultivated crops (fig. 4). Most of the acreage has been cleared. High clay content, depth to bedrock, and steepness of slope are the main limitations for farming and most other uses.

These soils are well suited to hay and pasture and suited to cultivated crops if erosion is adequately controlled. They are also suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and plant competition is a

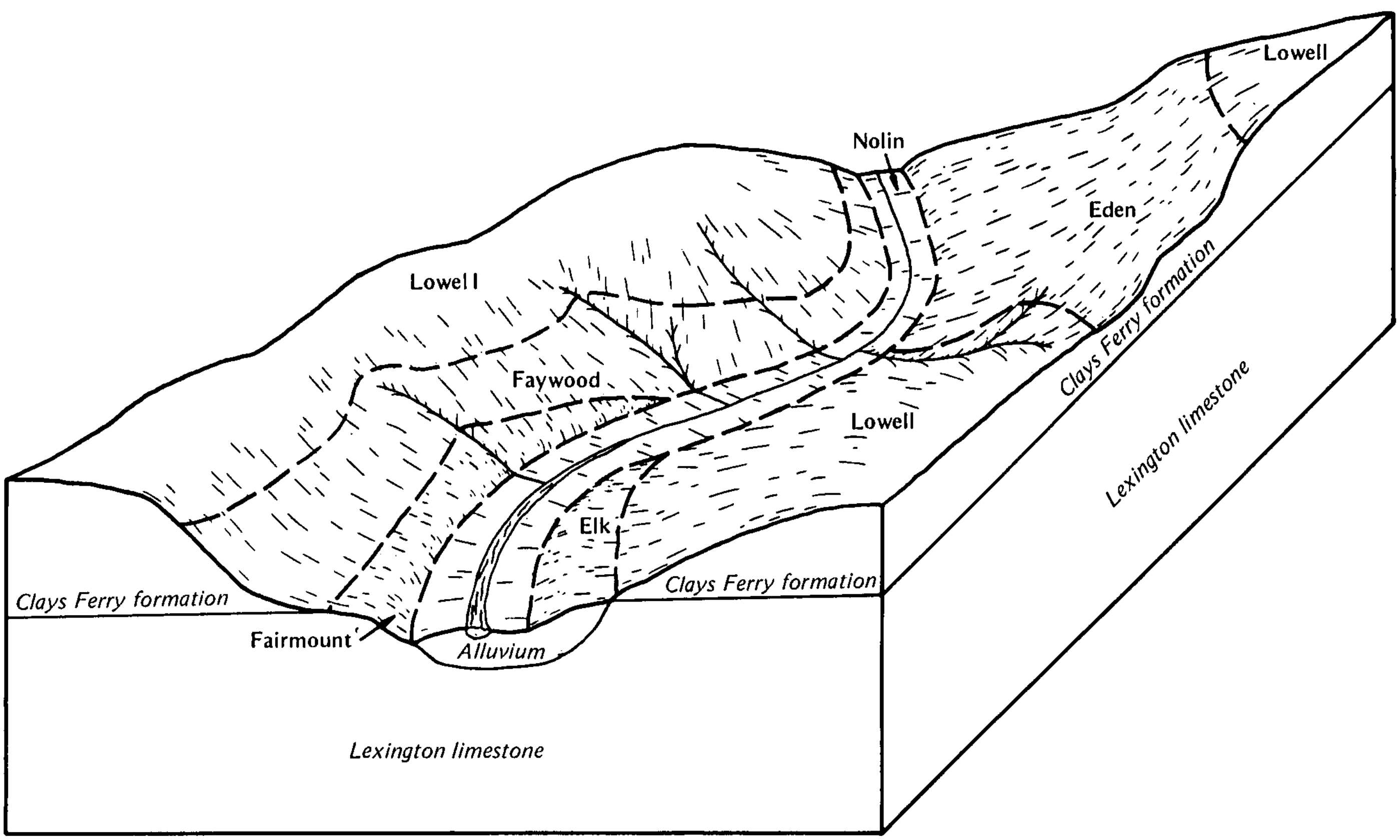


Figure 2.—Typical pattern of soils and underlying material in the Lowell-Faywood-Eden map unit.

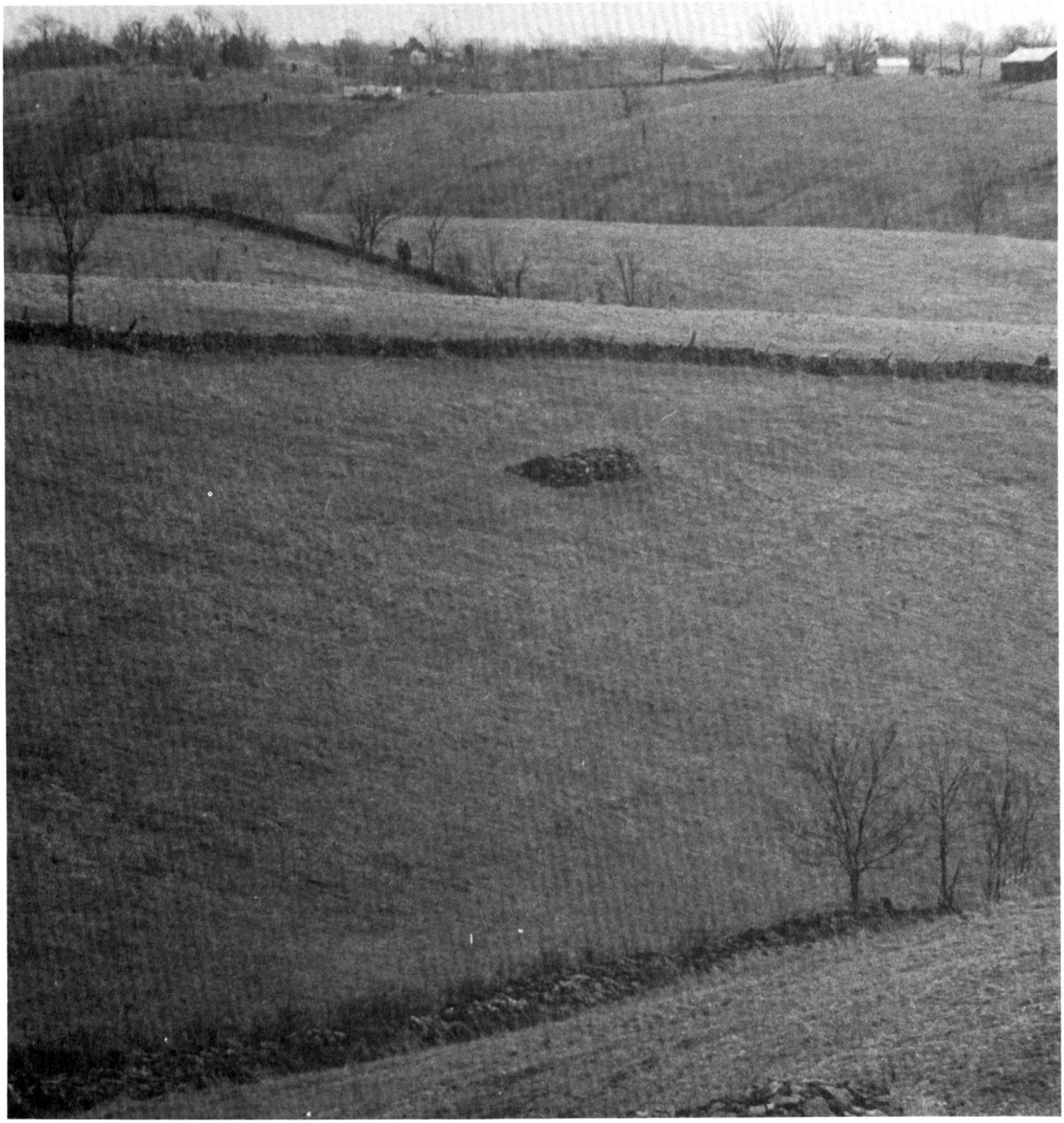


Figure 3.—Eden silty clay loam, 6 to 20 percent slopes, is on the ridgetops and Eden flaggy silty clay is on the steeper areas. These areas are used for pasture. Flagstones removed from the surface were used to construct the rock fences.

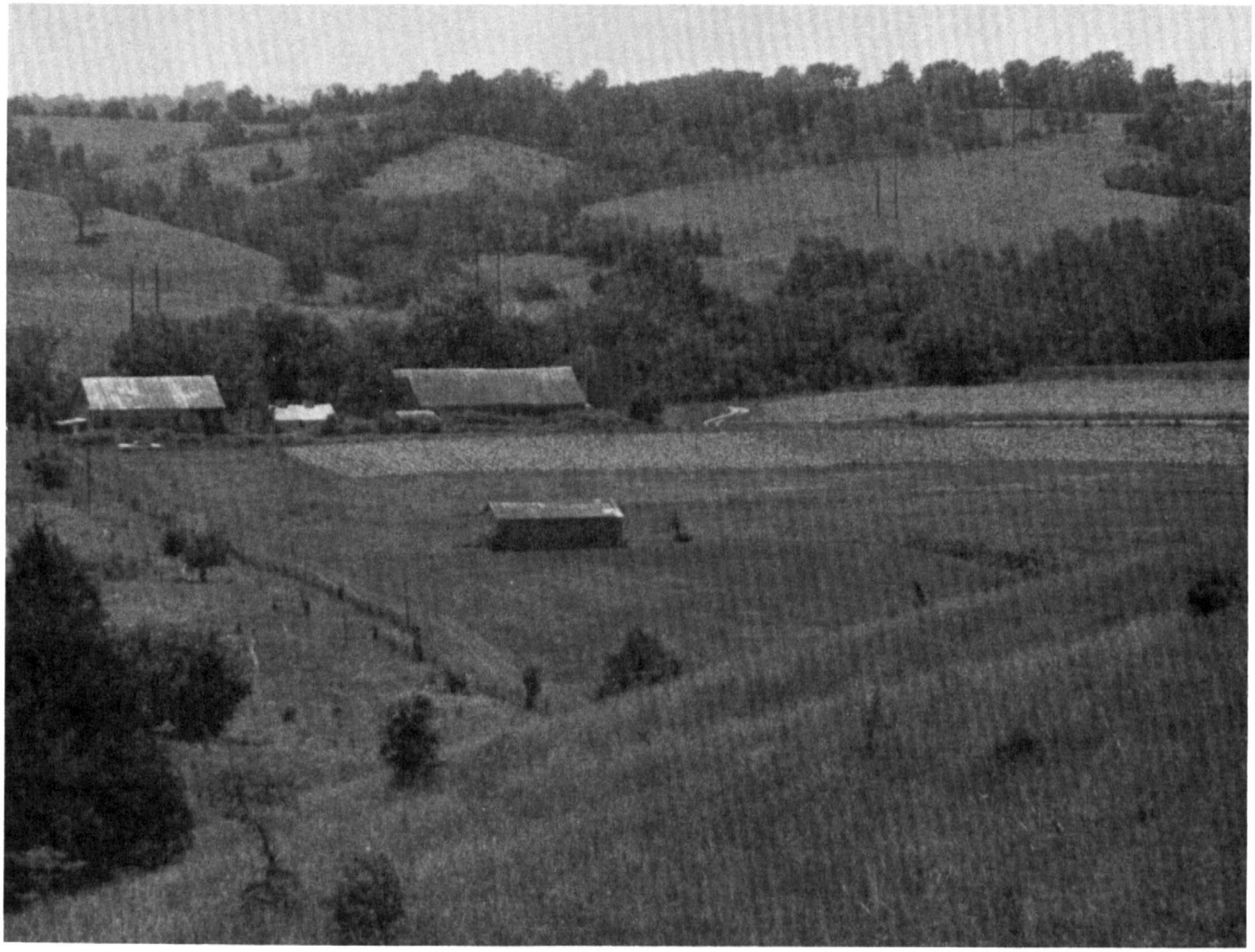


Figure 4.—The tobacco, corn, and hay in the center are in an area of Elk silt loam, 2 to 6 percent slopes. The pasture and trees in the foreground and background are in an area of Eden soils.

management concern. These soils are poorly suited to urban uses because of high clay content, steepness of slope, and depth to bedrock.

3. Eden-Lowell

Steep to gently sloping, well drained, moderately deep and deep soils that have a clayey subsoil; formed in residuum of weathered interbedded limestone, siltstone, and shale

This map unit of steep to gently sloping soils is in the northwestern and central parts of Boyle County. It is in the Hills of the Bluegrass. Slope ranges from 2 to 30 percent (fig. 5).

This map unit makes up about 17 percent of Boyle County. It is about 45 percent Eden soils, 40 percent Lowell soils, and about 15 percent soils of minor extent.

Eden soils are mostly on narrow ridges and steep hillsides. The surface layer is dark grayish brown silty clay loam, and the subsoil is olive brown clay in the upper part and yellowish brown flaggy clay in the lower part. Eden soils are moderately deep. Permeability is slow.

Lowell soils are mostly on broad ridges, sloping side slopes, benches, and foot slopes. The surface layer is dark grayish brown silt loam, and the subsoil is yellowish brown and light olive brown silty clay or clay. The substratum is light olive brown silty clay. Lowell soils are deep. Permeability is moderately slow.

Of minor extent in this map unit are the deep, well drained Nolin soils and the deep, somewhat poorly drained Newark soils on flood plains; the deep, well drained Elk soils on terraces; and the shallow, well drained Fairmount soils and the moderately deep, well drained Faywood soils on upland side slopes.

The soils of this map unit are used mainly for pasture. Most of the acreage has been cleared. The gently sloping soils in this unit are suited to cultivated crops. Some of these soils are used for cultivated crops. Steep slopes, limestone fragments, and high clay content are the main limitations for farming and most other uses. Depth to bedrock also is a limitation.

These soils are well suited to pasture and hay and are suited to cultivated crops if erosion is adequately controlled. They are also suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and seedling mortality is a management concern. These soils are poorly suited to urban uses. Steep slopes and high clay content are limitations that are difficult to overcome. Depth to bedrock is a limitation, but it can be overcome by proper mechanical procedures.

Nearly level to very steep, well drained, deep to shallow soils on karst uplands; underlain by limestone

This group consists of well drained, deep to shallow soils that have a loamy surface layer and a loamy or clayey subsoil.

The seven map units of this group make up about 41 percent of Boyle County and about 42 percent of Mercer County. Most of the acreage is used for cultivated crops, hay, and pasture. Some tracts are wooded. Moderately slow and slow permeability, steepness of slope, depth to bedrock, and rock outcrop are the main limitations for most uses.

4. Maury-McAfee-Fairmount

Nearly level to very steep, well drained, deep to shallow soils that have a clayey subsoil; formed in residuum of weathered limestone

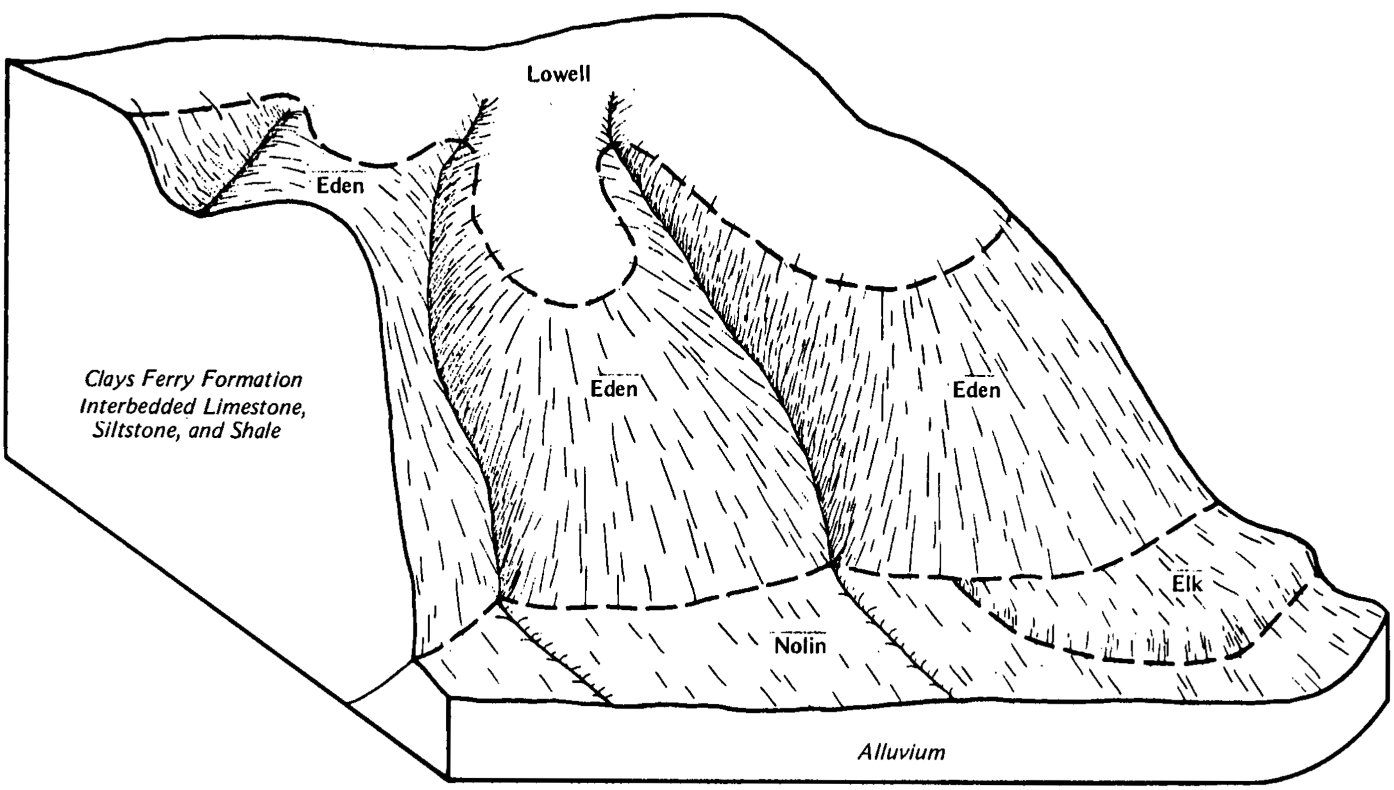


Figure 5.—Typical pattern of soils and underlying material in the Eden-Lowell map unit.

This map unit of nearly level to very steep soils is in the central part of Mercer County. It is in the Inner Bluegrass. Slope ranges from 0 to 60 percent.

This map unit makes up about 22 percent of Mercer County. It is about 36 percent Maury soils, 32 percent McAfee soils, 11 percent Fairmount soils, and about 21 percent soils of minor extent and Rock outcrop.

Maury soils are mostly on karst ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part. Maury soils are deep. Permeability is moderate to moderately rapid.

McAfee soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown clay in the upper part and reddish brown clay in the lower part. McAfee soils are moderately deep. Permeability is moderately slow.

Fairmount soils are mostly on narrow ridgetops and hillsides. The surface layer is very dark grayish brown flaggy silty clay loam, and the subsoil is dark yellowish brown flaggy silty clay. Fairmount soils are shallow. Permeability is slow to moderately slow.

Of minor extent in this map unit are the deep, well drained Caleast soils on karst ridgetops and side slopes; the deep, well drained Nolin soils on flood plains; and the deep, well drained Elk soils on terraces. Rock outcrop also occurs as part of a complex with the Fairmount and McAfee soils.

The soils of this map unit are mainly used for cultivated crops and pasture. Most of the acreage has been cleared. Depth to bedrock, steepness of slope, limestone fragments, rock outcrop, and high clay content are the main limitations for most uses.

On the broader ridgetops these soils are well suited to cultivated crops and to pasture and hay if erosion is controlled. The sloping to steep soils are suited to hay and pasture but are not suited to cultivated crops. Slope, depth to rock, and the hazard of erosion are the main limitations. These soils are suited to woodland production, but restricted use of equipment and the hazard of erosion are limitations. Plant competition also is a management concern. These soils are poorly suited to urban uses because of high clay content, depth to bedrock, rock outcrop, and steepness of slope.

5. Fairmount-McAfee-Maury

Very steep to nearly level, well drained, shallow to deep soils that have a clayey subsoil; formed in residuum of weathered limestone

This map unit of very steep to nearly level soils is in the eastern part of Mercer County. It is in the Inner Bluegrass. Slope ranges from 0 to 60 percent.

This map unit makes up about 10 percent of Mercer County. It is about 45 percent Fairmount soils, 29 percent McAfee soils, 13 percent Maury soils, and about 13 percent soils of minor extent and Rock outcrop.

Fairmount soils are mostly on narrow ridgetops and steep hillsides. The surface layer is very dark grayish brown flaggy silty clay loam, and the subsoil is dark yellowish brown flaggy silty clay. Fairmount soils are shallow. Permeability is slow to moderately slow.

McAfee soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown and reddish brown clay. McAfee soils are moderately deep. Permeability is moderately slow.

Maury soils are mostly on karst ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part. Maury soils are deep. Permeability is moderate to moderately rapid.

Of minor extent in this map unit are the deep, well drained Chenault soils. They are on higher lying ridgetops that are old, high terraces. Rock outcrop also occurs as part of a complex with the Fairmount and McAfee soils.

The soils of this map unit are mainly used for pasture and woodland; however, some tracts are used for cultivated crops. Steep slopes, limestone fragments, depth to bedrock, Rock outcrop, and high clay content are the main limitations for farming and most other uses.

These soils are suited to pasture. Some tracts are suited to hay, but steepness of slope is a limitation. The soils are not suited to cultivated crops because of steepness of slope, depth to bedrock, Rock outcrop, limestone fragments, and high clay content. If erosion is adequately controlled, however, some of the soils on ridgetops are suited to cultivated crops. These soils are suited to woodland. Productivity is moderate. The hazard of erosion and steep slopes restrict the use of logging equipment. The soils of this unit are poorly suited to urban uses because of depth to bedrock, Rock outcrop, high clay content, and steepness of slope.

6. Chenault-Fairmount-McAfee

Gently sloping to very steep, well drained, deep, shallow, and moderately deep soils that have a loamy or clayey subsoil; formed in residuum of weathered limestone or in old alluvium over limestone

This map unit of gently sloping to very steep soils is in areas scattered along the eastern part of Boyle and Mercer Counties. It is in the Inner Bluegrass. Slope ranges from 2 to 60 percent.

This map unit makes up about 1 percent of Boyle County. It is about 62 percent Chenault soils, 16 percent Fairmount soils, 12 percent McAfee soils, and about 10 percent soils of minor extent. This unit makes up about 6 percent of Mercer County. It is about 34 percent Chenault soils, 34 percent Fairmount soils, 16 percent

McAfee soils, and about 16 percent soils of minor extent and Rock outcrop.

Chenault soils are mostly on karst ridgetops and side slopes on old, high terraces. The surface layer is brown gravelly silt loam, and the subsoil is brown gravelly silty clay loam in the upper part, brown gravelly silty clay loam in the middle part, and dark yellowish brown gravelly clay in the lower part. Chenault soils are deep. Permeability is moderate.

Fairmount soils are mostly on narrow ridgetops and steeper hillsides. The surface layer is very dark grayish brown flaggy silty clay loam, and the subsoil is dark yellowish brown flaggy silty clay. Fairmount soils are shallow. Permeability is slow to moderately slow.

McAfee soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown clay in the upper part and reddish brown clay in the lower part. McAfee soils are moderately deep. Permeability is moderately slow.

Of minor extent in this map unit are the deep, well drained Caleast soils on the upper side slopes and ridgetops. Rock outcrop also occurs as part of a complex with Fairmount and McAfee soils.

The soils of this map unit are mainly used for cultivated crops and pasture. Most of the ridgetops have been cleared. Steep slopes, pebbles, limestone fragments, depth to bedrock, Rock outcrop, and high clay content are the main limitations for farming and most other uses.

These soils are well suited to pasture. Some tracts are suited to hay, but steepness of slope is a limitation. The gently sloping soils on ridgetops are well suited to cultivated crops if erosion is adequately controlled. Productivity is moderate for woodland. The hazard of erosion and restricted use of equipment are limitations on the steep slopes. The less sloping soils, however, are well suited to woodland. Current stands of woodland consist of white oak, Virginia pine, and eastern redcedar. These soils are suited to urban uses, but in some areas the high clay content, steep slopes, depth to bedrock, and Rock outcrop are limitations.

7. Maury-Caleast

Nearly level to sloping, well drained, deep soils that have a clayey subsoil; formed in residuum of weathered limestone

This map unit of nearly level to sloping soils is in the northeastern part of Boyle County and in the southeastern part of Mercer County (fig. 6). It is in the Inner Bluegrass. Slope ranges from 0 to 12 percent.

This map unit makes up about 13 percent of Boyle County. It is about 57 percent Maury soils, 23 percent Caleast soils, and about 20 percent soils of minor extent. This unit makes up about 2 percent of Mercer County. It is about 43 percent Maury soils, 23 percent Caleast soils, and about 34 percent soils of minor extent.

Maury soils are mostly on broad, karst ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part. Maury soils are deep. Permeability is moderate to moderately rapid.

Caleast soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown silty clay in the upper part, brown clay in the middle part, and strong brown clay in the lower part. The substratum is strong brown clay. Caleast soils are deep. Permeability is moderately slow.

Of minor extent in this map unit are the deep, very poorly drained Dunning soils and the deep, well drained Nolin soils on flood plains; the deep, well drained Elk soils on terraces; and the moderately deep, well drained McAfee soils on narrow ridges and side slopes.

The soils of this map unit are mainly used for cultivated crops. Most of the acreage has been cleared. The high clay content is the main limitation for most uses.

These soils are well suited to pasture and hay and to cultivated crops if erosion is adequately controlled. They are also well suited to woodland production and to urban uses. Moderately slow permeability, high clay content, and depth to bedrock are limitations.

8. McAfee-Caleast-Fairmount

Gently sloping to very steep, well drained, moderately deep, deep, and shallow soils that have a clayey subsoil; formed in residuum of weathered limestone

This map unit of gently sloping to very steep soils is in the eastern part of Boyle County and in the southeastern part of Mercer County. It is in the Inner Bluegrass. Slope ranges from 2 to 60 percent (fig. 7).

This map unit makes up about 13 percent of Boyle County. It is about 46 percent McAfee soils, 21 percent Caleast soils, 17 percent Fairmount soils, and about 16 percent soils of minor extent. This unit makes up about 2 percent of Mercer County. It is about 40 percent McAfee soils, 31 percent Caleast soils, 25 percent Fairmount soils, and about 4 percent soils of minor extent and Rock outcrop.

McAfee soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown clay in the upper part and reddish brown clay in the lower part. McAfee soils are moderately deep. Permeability is moderately slow.

Caleast soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown silty clay in the upper part, brown clay in the middle part, and strong brown clay in the lower part. The substratum is strong brown clay. Caleast soils are deep. Permeability is moderately slow.

Fairmount soils are mostly on narrow ridgetops and side slopes. The surface layer is very dark grayish brown

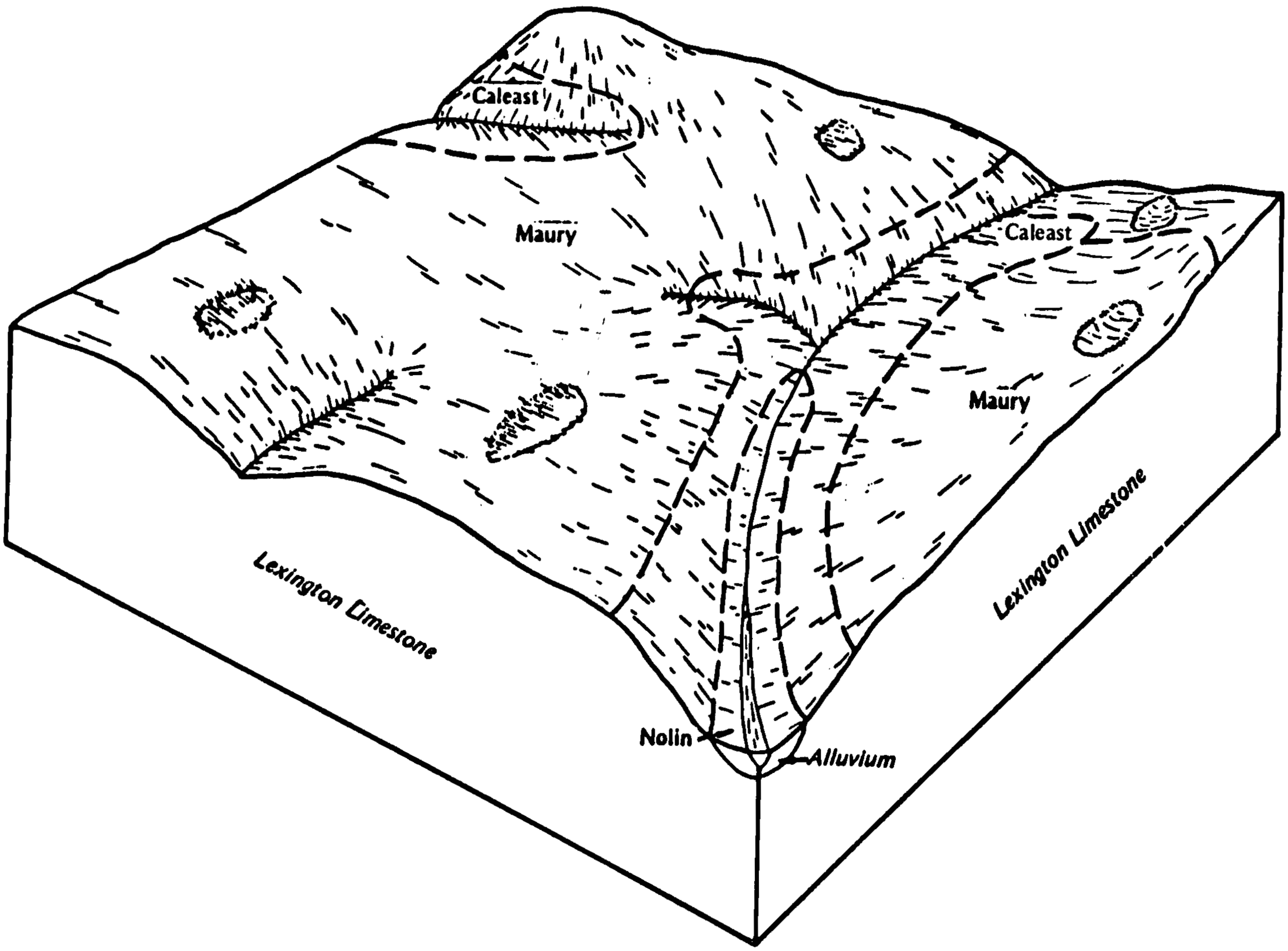


Figure 6.—Typical pattern of soils and underlying material in the Maury-Caleast map unit.

flaggy silty clay loam, and the subsoil is dark yellowish brown flaggy silty clay. Fairmount soils are shallow. Permeability is slow or moderately slow.

Of minor extent in this map unit are the deep, well drained Nolin soils on flood plains and the deep, well drained Maury soils on ridgetops and side slopes. Rock outcrop occurs as part of a complex with the Fairmount and McAfee soils.

The soils of this map unit are mainly used for pasture and woodland; however, some tracts are used for cultivated crops. Steep slopes, limestone fragments, depth to bedrock, Rock outcrop, and high clay content are the main limitations for farming and most other uses.

These soils are suited to pasture. Some tracts are suited to hay, but steepness of slope is a limitation. The soils also are suited to cultivated crops; however, steep slopes, depth to bedrock, Rock outcrop, limestone fragments, and high clay content are limitations. These soils are suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and plant competition is a management concern. The soils of this unit are poorly suited to urban uses because of depth to bedrock, Rock outcrop, high clay content, and steep slopes.

9. Caleast-McAfee-Maury

Gently sloping to moderately steep, well drained, deep and moderately deep soils that have a clayey subsoil; formed in residuum of weathered limestone

This map unit of gently sloping to moderately steep soils is in the north-central part of Boyle County. It is in the Inner Bluegrass. Slope ranges from 2 to 20 percent (fig. 8).

This map unit makes up about 11 percent of Boyle County. It is about 27 percent Caleast soils, 26 percent McAfee soils, 14 percent Maury soils, and about 33 percent soils of minor extent.

Caleast soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown clay in the middle part, and strong brown clay in the lower part. The substratum is strong brown clay. Caleast soils are deep. Permeability is moderately slow.

McAfee soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown clay in the upper part and reddish brown clay in the lower part. McAfee soils are moderately deep. Permeability is moderately slow.

Maury soils are mostly on broad, karst ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part. Maury soils are deep. Permeability is moderate to moderately rapid.

Of minor extent in this map unit are the deep, well drained Nolin soils on flood plains; the deep, well drained Elk soils on terraces; and the shallow, well drained Fairmount soils on narrow ridges and side slopes.

The soils of this map unit are used mainly for cultivated crops and pasture. Most of the acreage has been cleared. Depth to bedrock, high clay content, and steepness of slope are the main limitations for most uses.

These soils are well suited to pasture and hay and to

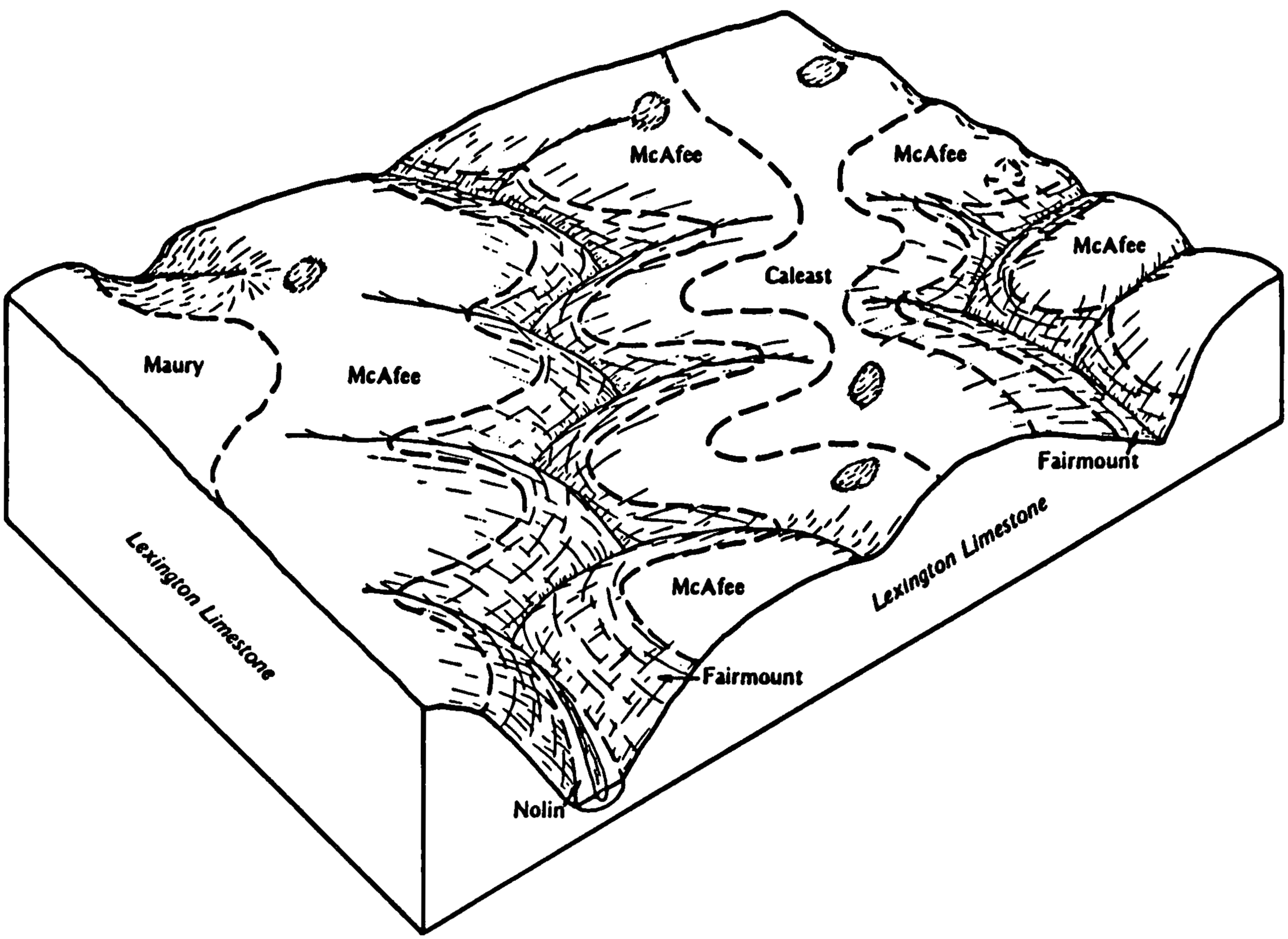


Figure 7.—Typical pattern of soils and underlying material in the McAfee-Caleast-Fairmount map unit.

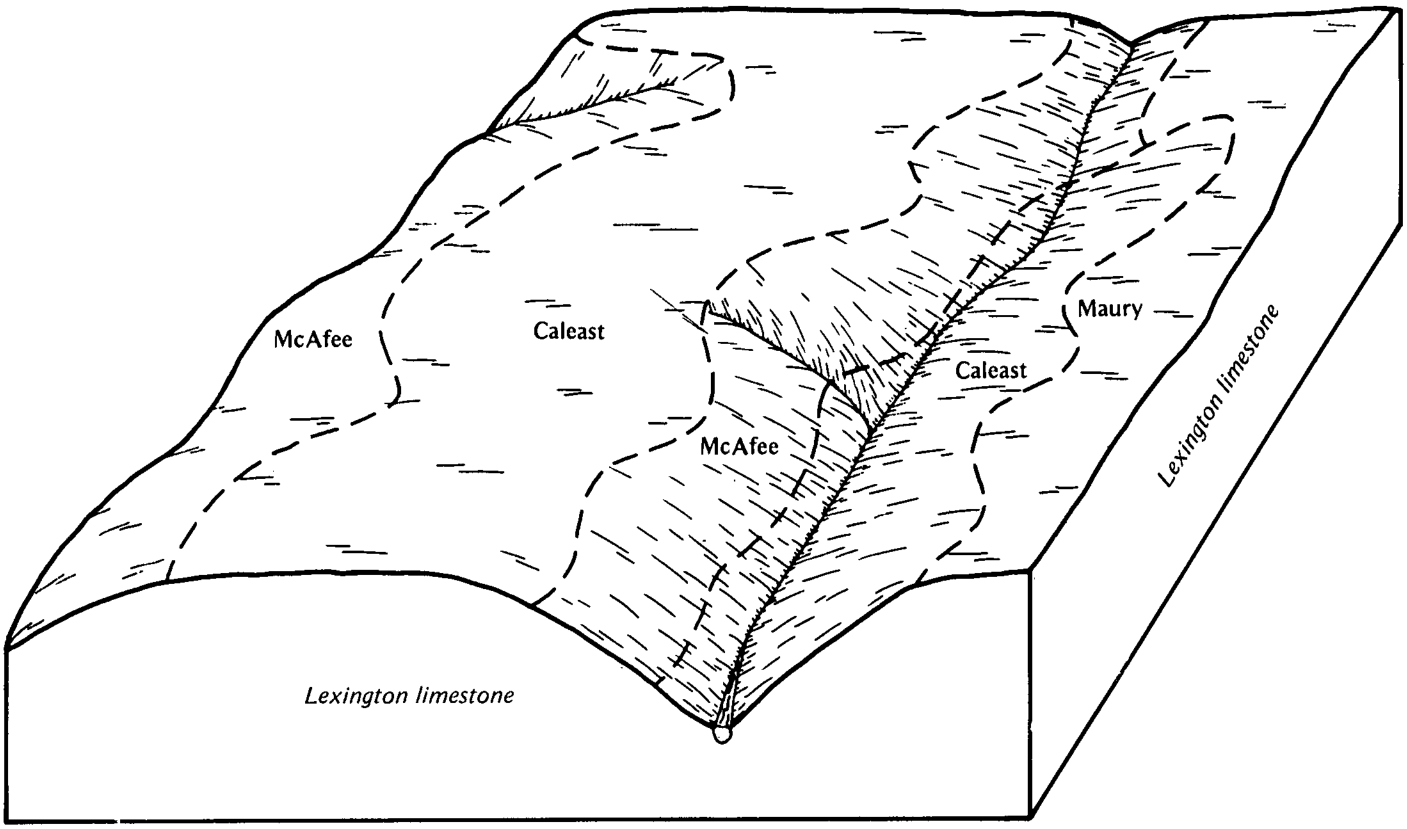


Figure 8.—Typical pattern of soils and underlying material in the Caleast-McAfee-Maury map unit.

cultivated crops if erosion is adequately controlled. They are well suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and plant competition is a management concern. These soils range from well suited to poorly suited to urban uses because of high clay content, permeability, and depth to bedrock.

10. Caleast-Maury

Sloping to nearly level, well drained, deep soils that have a clayey subsoil; formed in residuum of weathered limestone

This map unit of sloping to nearly level soils is in the southeastern part of Boyle County. It is between the Hills of the Bluegrass and the base of the Knobs. Slope ranges from 0 to 12 percent (fig. 9).

This map unit makes up about 3 percent of Boyle County. It is about 40 percent Caleast soils, 21 percent Maury soils, and about 39 percent soils of minor extent.

Caleast soils are mostly on karst ridgetops and side slopes. The surface layer is dark brown silt loam, and the subsoil is brown silty clay in the upper part, brown clay in the middle part, and strong brown clay in the lower part. The substratum is strong brown clay. Caleast soils are deep. Permeability is moderately slow.

Maury soils are mostly on karst ridgetops and side slopes. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the upper part. Maury soils are deep. Permeability is moderate to moderately rapid.

Of minor extent in this map unit are the deep, somewhat poorly drained Newark soils on the flood plains and the moderately deep, well drained McAfee soils on the narrow ridges and side slopes.

The soils of this map unit are mainly used for cultivated crops. Most of the acreage has been cleared. The high clay content and steepness of slope are the main limitations.

These soils are well suited to pasture and hay and to cultivated crops if erosion is adequately controlled. They are also well suited to woodland production; however, restricted use of equipment is a limitation, and plant competition is a management concern. These soils are suited to urban uses, but high clay content and moderately slow permeability are limitations for some uses.

Nearly level to very steep, well drained and moderately well drained, deep to shallow soils on uplands; underlain by siltstone, shale, and limestone

This group of map units consists of well drained and moderately well drained, deep to shallow soils that have a loamy surface layer and a loamy or clayey subsoil.

The three map units of this group make up about 28 percent of Boyle County. Most of the acreage is in woodland. Many tracts are in pasture, and a few areas are in cultivated crops and hay crops. Steepness of slope, moderately slow to very slow permeability, slippage, and depth to bedrock are the main limitations for most uses.

11. Tilsit-Trappist

Nearly level to steep, moderately well drained and well drained, deep and moderately deep soils that have a loamy or clayey subsoil; formed in colluvium or residuum of weathered black shale

This map unit of nearly level to steep soils is in the west-central and southwestern parts of Boyle County. It is at the base of the Knobs. Slope ranges from 0 to 30 percent.

This map unit makes up about 2 percent of Boyle County. It is about 54 percent Tilsit soils, 24 percent

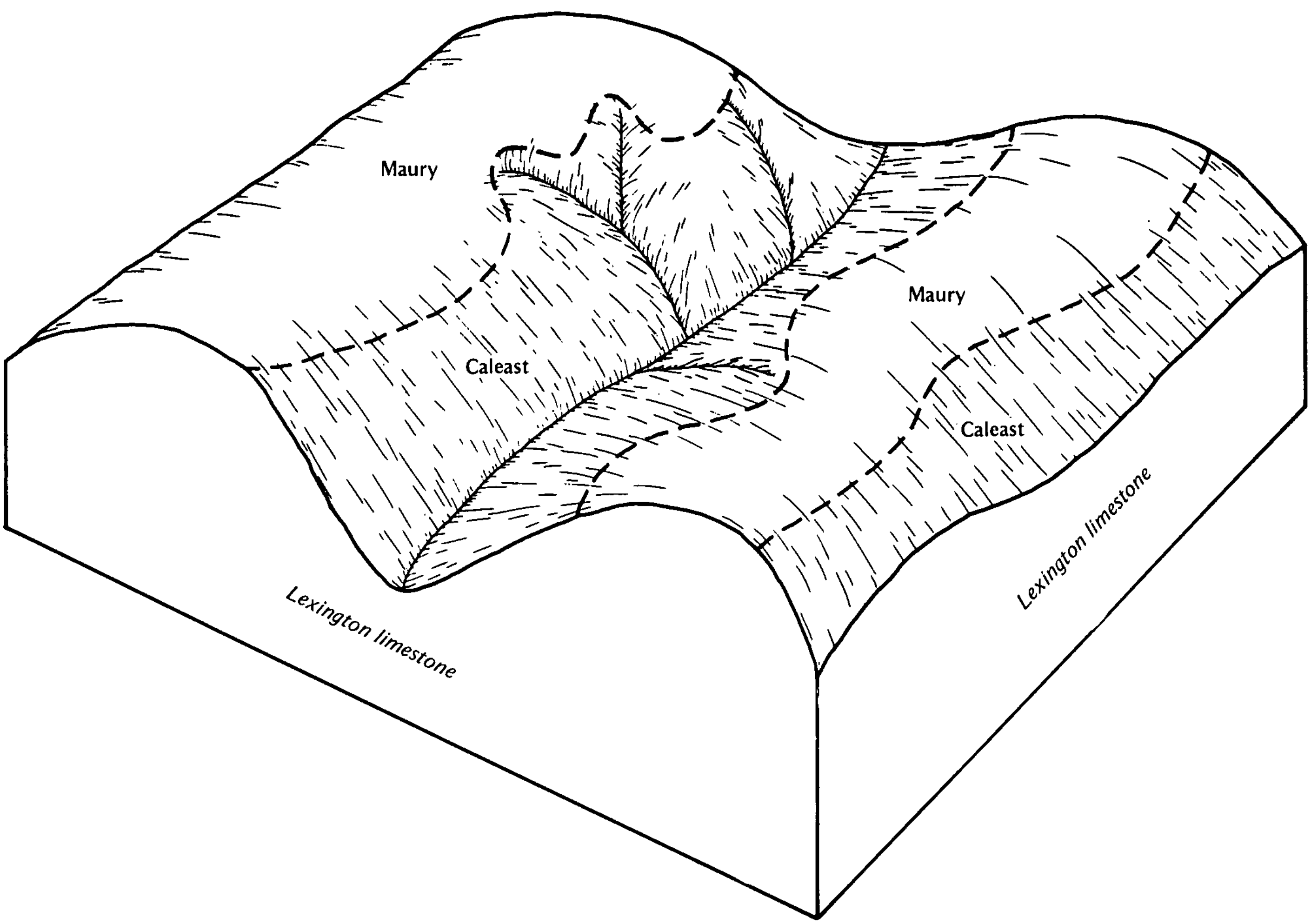


Figure 9.—Typical pattern of soils and underlying material in the Caleast-Maury map unit.

Trappist soils, and about 22 percent soils of minor extent.

Tilsit soils are mostly on broad ridges, foot slopes, and side slopes. The surface layer is brown silt loam, and the subsoil is yellowish brown silt loam in the upper part and a yellowish brown, very firm, compact and brittle silt loam fragipan in the lower part. The substratum is yellowish brown shaly silt loam. Tilsit soils are deep. Permeability is moderate above the fragipan and slow or very slow in the fragipan.

Trappist soils are mostly on side slopes and ridges. The surface layer is brown silt loam, and the subsoil is strong brown silty clay loam in the upper part and brown silty clay in the lower part. The substratum is yellowish red silty clay. Trappist soils are moderately deep. Permeability is slow.

Of minor extent in this map unit are the deep, well drained Sensabaugh soils and the deep, somewhat poorly drained Newark soils on flood plains and the deep, well drained Carpenter soils and the shallow, well drained Colyer soils on higher ridges and side slopes.

The soils of this map unit are used mainly for pasture, but some tracts are used for cultivated crops. Most of the acreage has been cleared. Wetness, high clay content, and depth to bedrock are the main limitations for farming and most other uses.

These soils are well suited to pasture and hay and well suited to cultivated crops if adequate drainage is installed and proper cropping systems are practiced. They also are suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and plant competition is a management concern. These soils are poorly suited to urban uses because of wetness, high clay content, permeability, and depth to bedrock.

12. Garmon-Carpenter-Vertrees

Very steep to gently sloping, well drained, moderately deep and deep soils that have a loamy or clayey subsoil; formed in residuum or colluvium of weathered limestone, siltstone, or shale

This map unit of very steep to gently sloping soils is in the southwestern part of Boyle County. It is in the Knobs. Slope ranges from 2 to 60 percent (fig. 10).

This map unit makes up about 21 percent of Boyle County. It is about 39 percent Garmon soils, 15 percent Carpenter soils, 10 percent Vertrees soils, and about 36 percent soils of minor extent.

Garmon soils are mostly on steep to very steep side slopes in the Knobs. The surface layer is brown silt loam, and the subsoil is light yellowish brown channery silt loam. Garmon soils are moderately deep. Permeability is moderately rapid.

Carpenter soils are mostly on gently sloping to steep colluvial side slopes, foot slopes, and narrow low ridges in the Knobs. The surface layer is brown gravelly silt loam, and the subsoil is brown silt loam in the upper part and light olive brown gravelly silty clay loam in the lower part. The substratum is strong brown channery silty clay. Carpenter soils are deep. Permeability is moderate in the colluvium and moderately slow or slow in the residuum.

Vertrees soils are mostly on sloping to moderately steep convex ridges and upper side slopes in the Knobs. The surface layer is brown silt loam, and the subsoil is brown silty clay loam in the upper part, red clay in the middle part, and yellowish red clay in the lower part. Vertrees soils are deep. Permeability is moderately slow.

Of minor extent in this map unit are the moderately deep, well drained Caneyville and Culleoka soils on the upper side slopes; the moderately deep, well drained Lenberg soils on the lower side slopes; and the deep, well drained Sensabaugh soils on the flood plains.

The soils of this map unit are used mainly for cultivated crops and pasture on the upper ridgetops, for woodland on the very steep side slopes, and for woodland and pasture on the lower side slopes. Steepness of slope is the main limitation for farming and most other uses.

These soils are suited to pasture and the less sloping soils are suited to cultivated crops and to hay if erosion is adequately controlled. They also are suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations. These soils are poorly suited to urban uses. Steepness of slope and depth to bedrock are limitations that are difficult to overcome. Slippage also is a limitation for urban uses.

13. Trappist-McAfee-Colyer

Gently sloping to very steep, well drained, moderately deep and shallow soils that have a clayey or shaly subsoil; formed in residuum of weathered limestone or black shale

This map unit of gently sloping to very steep soils is in the southwestern part of Boyle County. It is at the base of the Knobs. Slope ranges from 2 to 50 percent (fig. 11).

This map unit makes up about 5 percent of Boyle County. It is about 26 percent Trappist soils, 23 percent McAfee soils, 16 percent Colyer soils, and about 35 percent soils of minor extent.

Trappist soils are mostly on side slopes and ridges at the base of the Knobs. The surface layer is brown silt loam, and the subsoil is strong brown silty clay loam in the upper part and brown silty clay in the lower part. The substratum is yellowish red silty clay. Trappist soils are moderately deep. Permeability is slow.

McAfee soils are mostly on steep to very steep side slopes at the base of the Knobs. The surface layer is dark brown silt loam, and the subsoil is brown clay in the upper part and reddish brown clay in the lower part. McAfee soils are moderately deep. Permeability is moderately slow.

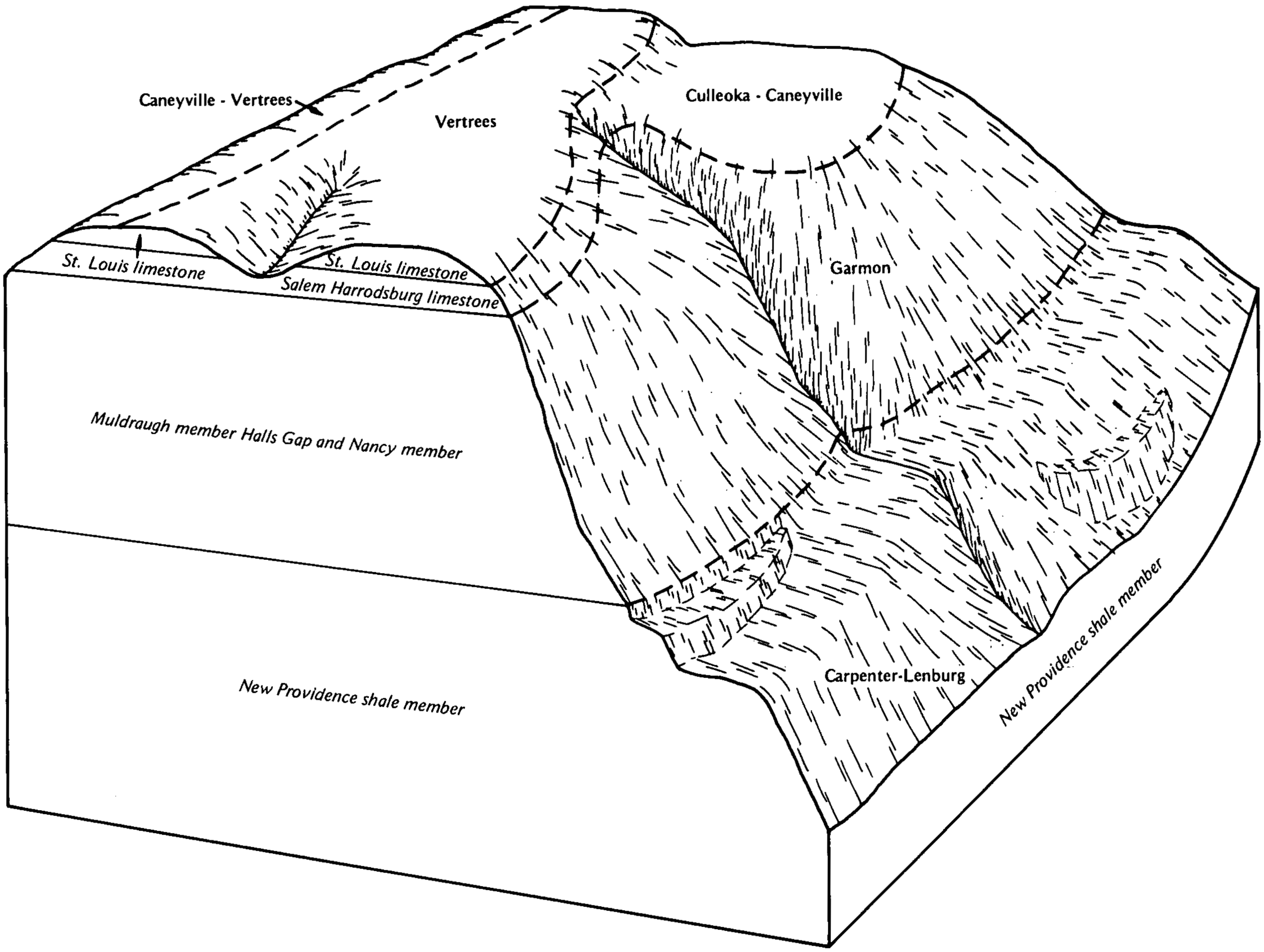


Figure 10.—Typical pattern of soils and underlying material in the Garmon-Carpenter-Vertrees map unit.

Colyer soils are mostly on side slopes and narrow ridgetops at the base of the Knobs. The surface layer is dark grayish brown silt loam, and the subsoil is brown shaly silty clay loam. The substratum is brown very shaly silty clay loam. Colyer soils are shallow. Permeability is slow.

Of minor extent in this map unit are the deep, well drained Nolin and Sensabaugh soils on flood plains.

The soils of this map unit are used mainly for pasture and woodland, but some gently sloping soils are used for cultivated crops. Steepness of slope, depth to bedrock, rock outcrop, high clay content, and shale fragments are the main limitations for farming and most other uses.

These soils are suited to pasture and hay, and the less sloping soils are suited to cultivated crops if erosion is adequately controlled. They are suited to woodland production; however, the hazard of erosion and restricted use of equipment are limitations, and plant competition is a management concern. These soils are poorly suited to urban uses. Steepness of slope, depth to bedrock, and high clay content are limitations that are difficult to overcome.

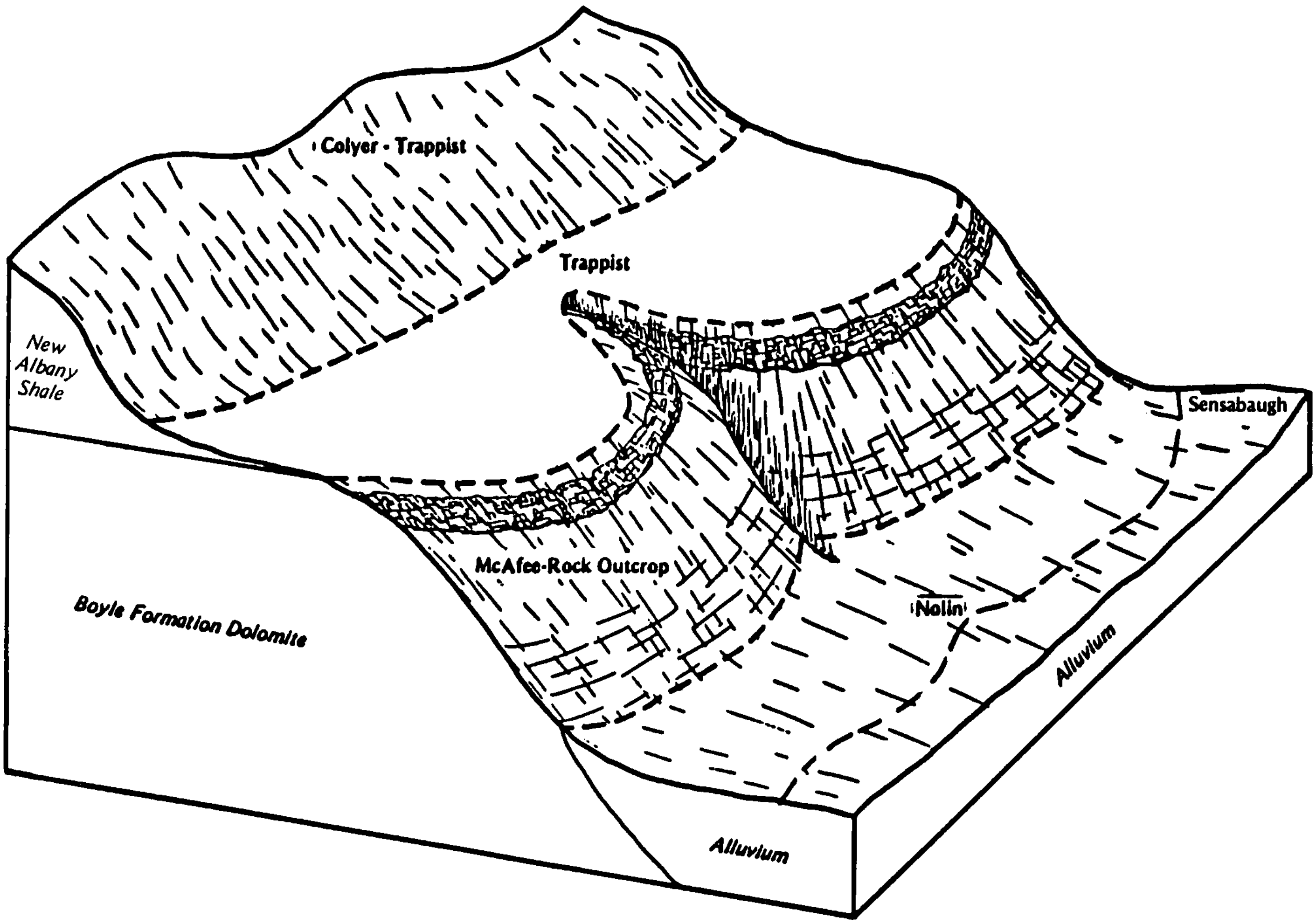


Figure 11.—Typical pattern of soils and underlying material in the Trappist-McAfee-Colyer map unit.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Lowell silt loam, 2 to 6 percent slopes, is one of several phases in the Lowell series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Culleoka-Caneyville complex, 12 to 20 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

The descriptions of the detailed soil map units follow.

Bo—Boonesboro silt loam. This moderately deep, well drained, nearly level to gently sloping soil is on flood plains in the Inner Bluegrass and Hills of the Bluegrass. Areas range from 4 to 30 acres. They are about 170 to 500 feet wide. Slope ranges from 0 to 4 percent.

Typically, the surface layer is brown silt loam about 18 inches thick. The subsoil to a depth of about 34 inches is brown silty clay loam in the upper part and brown gravelly silty clay loam in the lower part. Limestone bedrock is at a depth of about 34 inches.

This soil is high in natural fertility and moderate in organic matter content. It is slightly acid to moderately alkaline throughout. Permeability is moderate, and available water capacity is high. The root zone is moderately deep. This soil is subject to frequent flooding during the winter and early in spring, but it generally is not flooded during the growing season. Hard bedrock is at a depth of about 20 to 40 inches (fig. 12).

Included with this soil in mapping are areas of moderately deep, well drained, loamy soils that have less than 10 percent pebbles in the solum. Also included are a few intermingled areas of Nolin, Dunning, and Newark soils.

On most of the acreage this Boonesboro soil is used for hay and pasture. This soil is well suited to row crops, small grains, hay, and pasture; however, small grains and other winter crops may be damaged by flooding. Moderate depth of the root zone and the hazard of flooding are limitations.

This soil is well suited to most pasture and hay plants commonly grown in the area; however, some hay crops may be damaged by flooding. Frequent renovation of

Figure 12.—Underlying bedrock in an area of Boonesboro silt loam.

pasture is needed. Application of fertilizer, maintenance of desired stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Eastern cottonwood, sweetgum, yellow-poplar, white ash, and American sycamore are preferred for planting. Plant competition is a management concern.

This soil is poorly suited to urban uses because of moderate depth to bedrock, seepage, and flooding. Depth to bedrock and seepage limitations can be altered by proper engineering techniques, but the hazard of flooding would be difficult to overcome.

This soil is in capability subclass IIs and woodland suitability group 1o.

CaB—Caleast silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on karst ridgetops in the Inner Bluegrass. Areas range from 6 to 220 acres. They are about 200 to 1,100 feet wide.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of about 48 inches is brown silty clay loam in the upper part, brown clay in the middle part, and strong brown clay mottled in shades of gray in the lower part. The substratum to a depth of about 53 inches is strong brown clay mottled in shades of brown or gray. Limestone bedrock is at a depth of about 53 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are areas of well drained, loamy soils and moderately well drained, clayey soils. Also included are a few intermingled areas of Maury, McAfee, Fairmount, Chenault, and McGary soils.

On most of the acreage this Caleast soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, crop residue management, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to the pasture and hay plants commonly grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of the pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, white oak, black oak, and white ash are preferred for planting. Use of equipment is moderately limited on this soil because of the high clay content. Plant competition is moderate.

This soil is suited to urban uses; however, moderately slow permeability, high clay content, low strength, depth to bedrock, and moderate shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 2c.

CaC—Caleast silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on karst, narrow ridgetops and side slopes in the Inner Bluegrass. Areas range from 4 to 130 acres. They are about 170 to 900 feet wide.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of about 48 inches is brown silty clay loam in the upper part, brown clay in the middle part, and strong brown clay mottled in shades of gray in the lower part. The substratum to a depth of about 53 inches is strong brown clay mottled in shades of brown or gray. Limestone bedrock is at a depth of about 53 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are areas of well drained, loamy soils and moderately well drained, clayey soils. Also included are a few areas of intermingled Maury, McAfee, Fairmount, Chenault, and McGary soils.

On most of the acreage this Caleast soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains; however, steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to the pasture and hay plants commonly grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, white oak, black oak, and white ash are preferred for planting. Use of equipment is moderately limited on this soil because of the high clay content. Plant competition is moderate.

This soil is suited to urban uses. Moderately slow permeability, high clay content, low strength, steepness of slope, depth to bedrock, and moderate shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2c.

CcD—Caneyville-Rock outcrop complex, 6 to 20 percent slopes. This map unit consists of small areas of Caneyville soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping. The Caneyville soil is well drained and moderately deep. Areas of the unit range from 10 to 175 acres, and they are about 500 feet wide. They are on narrow ridgetops and upper side slopes in the Knobs. Individual areas of the Caneyville soil are 0.1 acre to 4 acres and are intermingled with exposed limestone bedrock in bands ranging from 3 to 30 feet wide.

Caneyville silt loam makes up about 50 to 70 percent of most mapped areas. Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 26 inches is reddish brown. The upper part of the subsoil is silty clay, and the lower part is clay. The substratum to a depth of about 35 inches is brown clay. Limestone bedrock is at a depth of about 35 inches.

The Caneyville soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to neutral in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and substratum. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Limestone Rock outcrop makes up about 10 to 20 percent of most mapped areas.

Included with this complex in mapping are small areas of clayey soils in which limestone bedrock is at a depth of 40 to 60 inches, areas of clayey soils in which limestone bedrock is at a depth of less than 20 inches, and areas of clayey soils in which shale bedrock is at a depth of 20 to 40 inches. Also included are a few areas of intermingled Vertrees and Culleoka soils.

On most of the acreage the Caneyville soil is used for pasture and woodland. It is poorly suited to row crops, small grains, and hay because of steepness of slope, Rock outcrop, moderate depth of the root zone, moderate available water capacity, and high clay content.

The Caneyville soil is suited to most pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope and moderate available water capacity limit pasture production. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

The Caneyville soil is suited to woodland. Loblolly pine, black oak, white oak, and Virginia pine are preferred for planting. The erosion hazard, limited use of equipment, and plant competition are management concerns.

The Caneyville soil is poorly suited to urban uses. Moderate depth to bedrock, moderately slow permeability, Rock outcrop, steepness of slope, high clay content, and shrink-swell are limitations. Some of these limitations can be overcome by proper engineering techniques.

This complex is in capability subclass VIs. The Caneyville soil is in woodland suitability group 3x.

CeD—Caneyville-Vertrees silt loams, 12 to 20 percent slopes. This map unit consists of small areas of Caneyville and Vertrees soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are well drained, moderately deep, and deep. Areas of the unit range from 6 to 45 acres. They are about 300 feet wide on the upper side slopes and narrow ridgetops in the Knobs. Individual areas of each soil are 1 acre to 4 acres.

Caneyville silt loam makes up about 40 to 60 percent of most mapped areas. Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 26 inches is reddish brown. The upper part of the subsoil is silty clay, and the lower part is clay. The substratum to a depth of about 35 inches is brown clay. Limestone bedrock is at a depth of about 35 inches.

The Caneyville soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to neutral in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and substratum. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Vertrees silt loam makes up about 30 to 40 percent of most mapped areas. Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 64 inches is brown silty clay loam in the upper part, red clay in the middle part, and yellowish red clay in the lower part.

The Vertrees soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to neutral in the surface layer and very strongly acid to medium acid in the subsoil. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential.

Included with these soils in mapping are small areas of shallow soils that have coarse fragments throughout and a silty clay loam surface layer. Also included are a few areas of limestone Rock outcrop.

On most of the acreage the Caneyville and Vertrees soils are used for pasture and woodland. These soils are poorly suited to row crops and small grains because of steepness of slope and because this narrow map unit is adjacent to steep, wooded areas.

The soils of this map unit are suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

The Caneyville soil is suited to woodland. Virginia pine, black oak, white oak, and loblolly pine are preferred for planting on the Caneyville soil. The Vertrees soil is well suited to woodland. White ash, black oak, white oak, Virginia pine, and northern red oak are preferred for planting on the Vertrees soil. The erosion hazard, equipment limitations, and plant competition are management concerns.

These soils are poorly suited to most urban uses because of the steepness of slope, moderate depth to bedrock, moderately slow permeability, high clay content, and shrink-swell. Some of these limitations can be overcome by proper engineering techniques.

These soils are in capability subclass VIe. The Caneyville soil is in woodland suitability group 3c, and the Vertrees soil is in woodland suitability group 2c.

CgB—Carpenter gravelly silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on colluvial, narrow, low ridges in the Knobs. Areas range from 5 to 50 acres. They are about 170 to 700 feet wide.

Typically, the surface layer is brown gravelly silt loam about 6 inches thick. The subsoil to a depth of about 43 inches is brown silt loam in the upper part and light olive brown gravelly silty clay loam in the lower part. The substratum to a depth of about 58 inches is mottled yellowish brown, light yellowish brown, and light brownish gray channery silty clay. Soft gray shale bedrock is at a depth of about 58 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid throughout. Permeability is moderate in the upper part of the profile and moderately slow or slow in the lower part. Available water capacity is high. The root zone is deep. Depth to soft bedrock ranges from 40 to 80 inches or more.

Included with this soil in mapping are areas of soils in which the combined thickness of the surface layer and subsoil is more than 60 inches and areas of soils that have less than 5 percent coarse fragments throughout. Also included are a few areas of intermingled Trappist and Tilsit soils.

On most of the acreage this Carpenter soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses; however, erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, contour farming, and stripcropping, helps to control erosion and increase infiltration. Coarse fragments may interfere with the use of tillage equipment.

This soil is well suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, black walnut, Virginia pine, black oak, and eastern white pine are preferred for planting. Plant competition is a management concern.

This soil is suited to most urban uses; however, high clay content, depth to rock, and moderately slow or slow permeability are limitations.

This soil is in capability subclass IIe and woodland suitability group 2o.

CgC—Carpenter gravelly silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on colluvial foot slopes and side slopes in the Knobs. Areas range from 5 to 70 acres. They are about 200 to 800 feet wide.

Typically, the surface layer is brown gravelly silt loam about 6 inches thick. The subsoil to a depth of about 43 inches is brown silt loam in the upper part and light olive brown gravelly silty clay loam in the lower part. The substratum to a depth of about 58 inches is mottled yellowish brown, light yellowish brown, and light brownish gray channery silty clay. Soft gray shale bedrock is at a depth of about 58 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid throughout. Permeability is moderate in the upper part of the profile and moderately slow or slow in the lower part. Available water capacity is high. The root zone is deep. Depth to soft bedrock ranges from 40 to 80 inches or more.

Included with this soil in mapping are areas of soils in which the combined thickness of the surface layer and subsoil is more than 60 inches and areas of soils that have less than 5 percent coarse fragments throughout. Also included are a few areas of intermingled Trappist, Colyer, and Lenberg soils.

On most of the acreage this Carpenter soil is used for row crops, small grains, hay, pasture, and woodland. This soil is suited to row crops and small grains but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, contour farming, and stripcropping, helps to control erosion and increase infiltration. Coarse fragments may interfere with the use of tillage equipment.

This soil is well suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland. Yellow-poplar, black walnut, Virginia pine, black oak, and eastern white pine are preferred for planting. Plant competition is a mangement concern.

This soil is suited to most urban uses; however, steepness of slope, moderately slow or slow permeability, high clay content, and depth to rock are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2o.

ClE—Carpenter-Lenberg gravelly silt loams, 12 to 30 percent slopes. This map unit consists of small areas of Carpenter and Lenberg soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are well drained and are deep to moderately deep. Areas of the unit range from 10 to 200 acres, and they are about 500 feet wide. They are on colluvial foot slopes and side slopes in the Knobs. Individual areas of each soil are 1 acre to 4 acres.

Carpenter gravelly silt loam makes up about 40 to 50 percent of most mapped areas. Typically, the surface layer is brown gravelly silt loam about 6 inches thick. The subsoil to a depth of about 43 inches is brown silt loam in the upper part and light olive brown gravelly silty clay loam in the lower part. The substratum to a depth of about 58 inches is mottled yellowish brown, light yellowish brown, and light brownish gray channery silty clay. Soft gray shale bedrock is at a depth of about 58 inches.

The Carpenter soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid throughout. Permeability is moderate in the upper part of the profile and moderately slow or slow in the lower part. Available water capacity is high. The root zone is deep. Depth to soft bedrock is 40 to 80 inches or more.

Lenberg gravelly silt loam makes up about 25 to 35 percent of most mapped areas. Typically, the surface layer is dark grayish brown gravelly silt loam about 2 inches thick. The subsurface layer is light yellowish brown gravelly silt loam about 10 inches thick. The subsoil to a depth of about 39 inches is strong brown silty clay loam in the upper part, yellowish brown silty clay mottled in shades of gray or red in the middle part, and mottled strong brown and light gray silty clay in the lower part. Soft gray shale bedrock is at a depth of about 39 inches.

The Lenberg soil is low in natural fertility and moderate in organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Depth to soft bedrock ranges from 20 to 40 inches.

Included with these soils in mapping are a few areas of intermingled Garmon, Colyer, and Trappist soils.

On most of the acreage these Carpenter and Lenberg soils are used for pasture and woodland. These soils are not suited to row crops, small grains, and hay because of steepness of slope.

The soils of this map unit are suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope limits the use of modern machinery in establishing and maintaining grasses on these soils. Overgrazing and grazing when the soils are wet reduce the ground cover and cause excessive runoff and erosion.

The Carpenter soil is well suited to woodland. Yellow-poplar, Virginia pine, eastern white pine, black walnut, and black oak are preferred for planting on the Carpenter soil. The erosion hazard and limited use of equipment are moderate limitions because of steepness of slope. Plant competition is a moderate management concern. The Lenberg soil is suited to Virginia pine, eastern redcedar, black oak, and white oak. The hazard of erosion and restricted use of equipment are management concerns on the Lenberg soil.

These soils are poorly suited to most urban uses because of steepness of slope, moderately slow permeability, high clay content, slippage, and moderate depth to soft bedrock (fig. 13). Some of these limitations can be overcome by proper engineering techniques; however, slippage, which could affect building stability, is difficult to overcome.

These soils are in capability subclass VIe. The Carpenter soil is in woodland suitability group 2r, and the Lenberg soil is in woodland suitability group 4c.

CmB—Chenault gravelly silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on karst areas on ridgetops on old high terraces along the Kentucky and Dix Rivers. Areas range from 4 to 30 acres. They are about 170 to 600 feet wide.

Typically, the surface layer is brown gravelly silt loam about 11 inches thick. The subsoil to a depth of about 49 inches is brown gravelly silty clay loam in the upper and middle parts and dark yellowish brown gravelly clay in the lower part. Limestone bedrock is at a depth of about 49 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and medium acid to neutral in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep. Depth to hard bedrock is 40 to 80 inches.

Included with this soil in mapping are areas of loamy and clayey soils that formed in old alluvium. These soils have less than 8 percent coarse fragments in the subsoil. Also included are a few areas of intermingled Caleast and McAfee soils.

On most of the acreage this Chenault soil is used for pasture, hay, row crops, and small grains. This soil is well suited to these uses, but erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, contour farming, and stripcropping, helps to control erosion and increase infiltration. Pebbles and subrounded fragments may interfere with the use of tillage equipment.

This soil is well suited to most pasture and hay plants in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed.

Figure 13.—Slippage in an area of Carpenter-Lenberg gravelly silt loams, 12 to 30 percent slopes. Note the band of leaning trees near the center.

Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Eastern white pine, yellow-poplar, black walnut, white ash, and northern red oak are preferred for planting. Plant competition is a management concern.

This soil is well suited to most urban uses. Moderate permeability, high clay content, depth to bedrock, and low strength are limitations.

This soil is in capability subclass IIe and woodland suitability group 2o.

CmC—Chenault gravelly silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on karst areas on narrow ridgetops and side slopes on old high terraces along the Kentucky and Dix Rivers. Areas range from 5 to 50 acres. They are about 200 to 800 feet wide.

Typically, the surface layer is brown gravelly silt loam about 11 inches thick. The subsoil to a depth of about 49 inches is brown gravelly silty clay loam in the upper and middle parts and dark yellowish brown gravelly clay in the lower part. Limestone bedrock is at a depth of about 49 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and medium acid to neutral in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep. Depth to hard bedrock is 40 to 80 inches.

Included with this soil in mapping are areas of loamy and clayey soils that have less than 8 percent coarse fragments in the subsoil. Both of these soils formed in old alluvium. Also included are areas of soils that have a very gravelly subsoil and a few areas of intermingled Caleast and McAfee soils.

On most of the acreage this Chenault soil is used for pasture, hay, row crops, and small grains. This soil is suited to row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, contour farming, and stripcropping, helps to control erosion and increase infiltration. Pebbles and subrounded fragments may interfere with the use of tillage equipment.

This soil is well suited to most pasture and hay plants in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, black walnut, white ash, and northern red oak are preferred for planting. Plant competition is a management concern.

This soil is suited to urban uses; however, steepness of slope, moderate permeability, high clay content, depth to bedrock, and low strength are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2o.

CnD—Chenault-Caleast complex, 12 to 20 percent slopes. This map unit consists of small areas of Chenault and Caleast soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are well drained and deep. Areas of the unit range from 5 to 50 acres, and they are about 600 feet wide. They are on karst side slopes on old high terraces and limestone uplands along the Kentucky and Dix Rivers. Individual areas of each soil are 1 acre to 6 acres.

Chenault gravelly silt loam makes up about 55 to 75 percent of most mapped areas. Typically, the surface layer is brown gravelly silt loam about 11 inches thick. The subsoil to a depth of about 49 inches is brown gravelly silty clay loam in the upper and middle parts and dark yellowish brown gravelly clay in the lower part. Limestone bedrock is at a depth of about 49 inches.

The Chenault soil is low in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and medium acid to neutral in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep. Depth to hard bedrock ranges from 40 to 80 inches.

Caleast silt loam makes up about 25 to 40 percent of most mapped areas. Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil to a depth of about 48 inches is brown silty clay in the upper part, brown clay in the middle part, and strong brown clay mottled in shades of gray in the lower part. The substratum to a depth of about 53 inches is strong brown clay mottled in shades of brown or gray. Limestone bedrock is at a depth of about 53 inches.

The Caleast soil is low in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this complex in mapping are areas of loamy and clayey soils that have less than 8 percent coarse fragments in the subsoil. Both of these soils formed in old alluvium. Also included are a few areas of intermingled McAfee and Fairmount soils.

On most of the acreage the Chenault and Caleast soils are used for pasture and hay. They are suited to limited production of row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration. Pebbles and subrounded fragments may interfere with the use of tillage equipment.

These soils are suited to most pasture and hay plants in the area; however, plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

These soils are well suited to woodland, but they are not used extensively for woodland production. On the Chenault soil, yellow-poplar, black walnut, eastern white pine, white ash, and northern red oak are preferred for planting. Plant competition is a management concern on the Chenault soil. On the Caleast soil, yellow-poplar, white ash, white oak, and black oak are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns on the Caleast soil.

These soils are poorly suited to most urban uses because of steepness of slope. This limitation can be partly overcome by proper engineering techniques.

This complex is in capability subclass IVe. The Chenault soil is in woodland suitability group 2o, and the Caleast soil is in woodland suitability group 2c.

CoD—Colyer-Trappist silt loams, 12 to 30 percent slopes. This map unit consists of small areas of Colyer and Trappist soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are well drained and shallow and moderately deep. Areas of the unit range from 10 to 200 acres, and they are about 300 feet wide. They are on side slopes and narrow ridgetops at the base of the Knobs. Individual areas of each soil are 0.5 acre to 4 acres.

Colyer silt loam makes up about 40 to 50 percent of most mapped areas. Typically, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsurface layer to a depth of about 6 inches is brown silt loam. The subsoil to a depth of about 14 inches is brown shaly silty clay loam. The substratum to a depth of about 18 inches is brown very shaly silty clay loam. Hard, black, fissile shale bedrock is at a depth of about 18 inches.

The Colyer soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface and subsurface layers and very strongly acid or extremely acid in the subsoil and substratum. Permeability is slow, and available water capacity is very low. The root zone is shallow. Hard bedrock is at a depth of 10 to 20 inches.

Trappist silt loam makes up about 30 to 35 percent of most mapped areas. Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is strong brown silty clay loam in the upper part and yellowish brown silty clay mottled in shades of red or brown in the lower part. The substratum to a depth of about 34 inches is yellowish red extremely shaly silty clay. Hard, black, acid shale bedrock is at a depth of about 34 inches.

The Trappist soil is low in natural fertility and moderate in organic matter content. It is medium acid to extremely acid in the surface layer except where limed and strongly acid to extremely acid in the subsoil and substratum. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with these soils in mapping are small areas of clayey soils in which black shale bedrock is at a depth of 40 to 60 inches, areas of clayey soils in which black shale bedrock is at a depth of less than 10 inches, and areas of clayey soils that are somewhat poorly drained. Also included, at the lower base of the map unit, are a few areas of limestone Rock outcrop. In addition, a few areas of intermingled Carpenter, Lenberg, and Sensabaugh soils are included.

On most of the acreage these Colyer and Trappist soils are used for pasture and woodland. The soils are not suited to row crops, small grains, and hay. Steepness of slope, shallow and moderate depth of the root zone, very low to moderate available water capacity, and shale fragments are limitations.

The soils of this map unit are suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope, shale fragments, and very low to moderate available water capacity limit pasture production. Overgrazing and grazing when the soil is wet reduce the ground cover and cause excessive runoff and erosion.

The Colyer soil is suited to Virginia pine, shortleaf pine, eastern white pine, white oak, and black oak. The erosion hazard, equipment limitations, and seedling mortality are management concerns on the Colyer soil. The Trappist soil is suited to Virginia pine, loblolly pine, and eastern white pine. The erosion hazard, equipment limitations, and plant competition are management concerns on the Trappist soil.

These soils are poorly suited to urban uses because of steepness of slope, shallow and moderate depth to bedrock, slow permeability, and low strength. Some of these limitations can be overcome by proper engineering techniques.

These soils are in capability subclass VIIs. The Colyer soil is in woodland suitability group 4d, and the Trappist soil is in woodland suitability group 3c.

CuD—Culleoka-Caneyville complex, 12 to 20 percent slopes. This map unit consists of small areas of Culleoka and Caneyville soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are well drained and moderately deep. Areas of the unit range from 8 to 45 acres, and they are about 400 feet wide. They are on the upper side slopes in the Knobs. Individual areas of each soil are 1 acre to 6 acres.

Culleoka channery silt loam makes up about 50 to 75 percent of most mapped areas. Typically, the surface layer is brown channery silt loam about 8 inches thick. The subsoil to a depth of about 39 inches is strong brown. The upper part of the subsoil is channery silty clay loam, and the lower part is silty clay loam. Siltstone bedrock is at a depth of about 39 inches.

The Culleoka soil is low in natural fertility and moderate in organic matter content. It is strongly acid to medium acid. Permeability is moderate to moderately rapid, and available water capacity is moderate. The root zone is moderately deep. Soft bedrock is at a depth of 20 to 40 inches.

Caneyville silt loam makes up about 15 to 25 percent of most mapped areas. Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 26 inches is reddish brown. The upper part of the subsoil is silty clay, and the lower part is clay. The substratum to a depth of about 35 inches is brown clay. Limestone bedrock is at a depth of about 35 inches.

The Caneyville soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to neutral in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and substratum. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this complex in mapping are small areas of deep, clayey soils and a few areas of shallow, loamy soils. Also included are a few areas of limestone Rock outcrop.

On most of the acreage the Culleoka and Caneyville soils are used for pasture and woodland. They are suited to limited production of row crops and small grains; however, steepness of slope and the proximity of this narrow map unit to steep, wooded soils are limitations.

These soils are suited to most pasture and hay plants grown in the area; however, plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

The Culleoka soil is well suited to woodland. Eastern white pine, black walnut, yellow-poplar, shortleaf pine, Virginia pine, black oak, and white ash are preferred for planting on the Culleoka soil. The Caneyville soil also is suited to woodland. Virginia pine, white ash, black oak, white oak, and loblolly pine are best for planting on the Caneyville soil. The erosion hazard, equipment limitations, and plant competition are management concerns on these soils.

These soils are poorly suited to urban uses. Steepness of slope, moderate depth to bedrock, high clay content, and low strength of both soils and the moderately slow permeability of the Caneyville soil are limitations. Some of these limitations can be overcome by proper engineering techniques.

This complex is in capability subclass IVe. The Culleoka soil is in woodland suitability group 2r, and the Caneyville soil is in woodland suitability group 3c.

Du—Dunning silty clay loam. This deep, very poorly drained to poorly drained, nearly level soil is on flood plains, in narrow valleys, and on upland depressions in the Hills of the Bluegrass and the Inner Bluegrass. Areas range from 5 to 100 acres. They are about 170 to 900 feet wide. Slope ranges from 0 to 2 percent.

Typically, the surface layer is very dark gray silty clay loam about 7 inches thick. The subsurface layer is very dark gray silty clay loam about 7 inches thick. The subsoil to a depth of about 42 inches is dark gray silty clay mottled in shades of brown. The substratum to a depth of about 60 inches is gray clay mottled in shades of brown.

This soil is high in natural fertility and organic matter content. It is slightly acid to mildy alkaline throughout. Permeability is slow, and available water capacity is high. The root zone is deep. This soil is subject to frequent flooding during the winter and spring but generally is not flooded during the growing season (fig. 14). This soil has moderate shrink-swell potential. A seasonal high water table is within 6 inches of the surface for long periods during the latter part of winter and early in spring.

Included with this soil in mapping are areas of soils that have a surface layer of brown silt loam as much as 20 inches thick and areas of soils that have a black surface layer more than 24 inches thick. Also included are a few areas of intermingled Nolin, Boonesboro, Newark, and McGary soils.

On most of the acreage this Dunning soil is used for row crops, hay, and pasture (fig. 15). This soil is suited to row crops but is poorly suited to small grains. The seasonal high water table and flooding are limitations. Good water management practices, such as the installation of tile drainage and the construction of open ditches and diversions. together with the use of plants

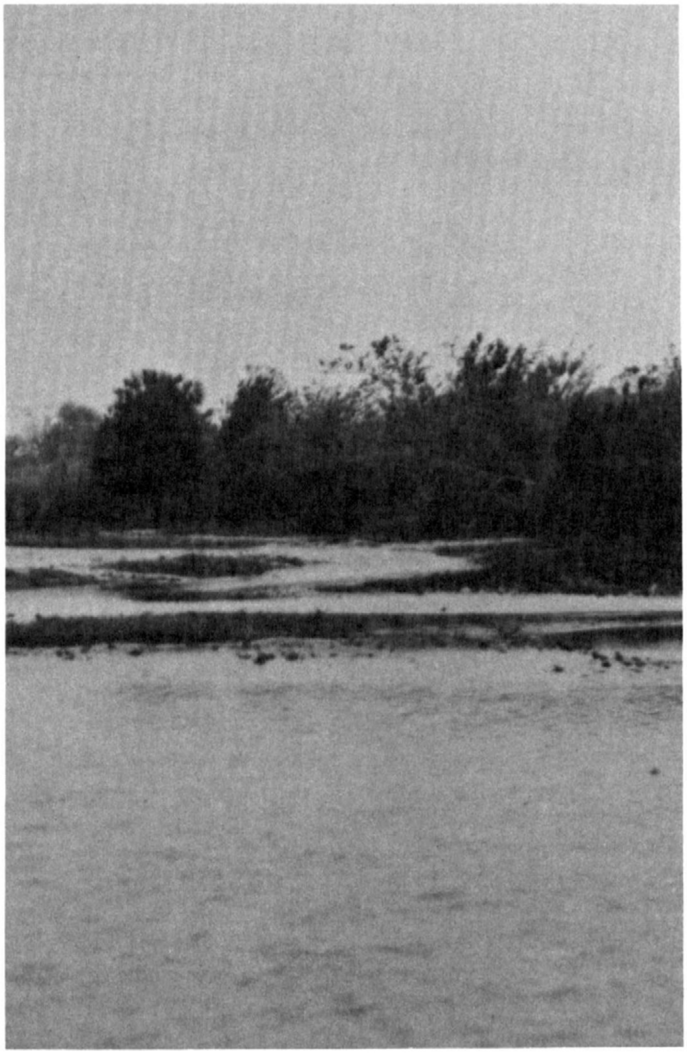


Figure 14.—A flooded area of Dunning silty clay loam.

that are moderately tolerant of wetness, help to overcome these limitations.

This soil is well suited to pasture and hay plants that are somewhat tolerant of wetness; however, some hay crops may be damaged by flooding. Frequent renovation of pasture is needed. Application of fertilizer, maintenance of proper stocking rates, maintenance of adequate drainage, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Loblolly pine and pin oak are preferred for planting. Equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to urban uses. Wetness, flooding, low strength, and slow permeability are limitations. Soil wetness can be altered by the use of diversions, open ditches, and tile drainage, but the hazard of flooding would be difficult to overcome. Low strength and slow permeability can be improved by proper engineering techniques.

This soil is in capability subclass IIIw and woodland suitability group 1w.

EdD—Eden silty clay loam, 6 to 20 percent slopes. This moderately deep, well drained, sloping to moderately steep soil is on narrow ridgetops and hillsides in the Hills of the Bluegrass. Areas range from 5 to 80 acres. They are about 200 to 2,000 feet wide.

Typically, the surface layer is dark grayish brown silty clay loam about 5 inches thick. The subsoil to a depth of about 24 inches is olive brown clay mottled in shades of brown in the upper part, olive brown flaggy clay in the middle part, and yellowish brown flaggy clay in the lower part. The substratum to a depth of about 39 inches is light olive brown flaggy clay mottled in shades of brown. Soft interbedded shale, siltstone, and limestone are at a depth of about 39 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid to moderately alkaline throughout. Permeability is slow, and available water capacity is low. The root zone is moderately deep. This soil has moderate shrink-swell potential. Soft bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of intermingled Lowell, Faywood, and Nicholson soils. Also included in the narrow valleys are small areas of Nolin, Newark, and Boonesboro soils.

On most of the acreage this Eden soil is used for hay and pasture. This soil is poorly suited to row crops and small grains because of steepness of slope, moderate depth of the root zone, and low available water capacity. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland. Virginia pine, black oak, white ash, and Scotch pine are preferred for planting. The erosion hazard, equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to most urban uses because

Figure 15.—Corn in an area of Dunning silty clay loam.

of steepness of slope, moderate depth to bedrock, slow permeability, shrink-swell, and high clay content. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IVe and woodland suitability group 3c.

EeE3—Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded. This moderately deep, well drained, steep, severely eroded soil is on hillsides in the Hills of the Bluegrass. This soil has been subject to severe sheet erosion and is truncated by rills and gullies. The subsoil, substratum, and limestone flagstones are exposed in many parts of most mapped areas. Areas range from 5 to 200 acres. They are about 200 to 2,500 feet wide.

Typically, the surface layer is yellowish brown flaggy silty clay about 6 inches thick. The subsoil to a depth of about 21 inches is light olive brown flaggy silty clay mottled in shades of brown. Soft interbedded shale, siltstone, and limestone are at a depth of about 21 to 36 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid to moderately alkaline throughout. Permeability is slow, and available water capacity is low. The root zone is moderately deep. This soil has moderate shrink-swell potential. Soft bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of intermingled Lowell, Faywood, and Fairmount soils. Also included in the narrow valleys are small areas of Nolin, Newark, and Boonesboro soils. A few spots of bedrock are exposed.

On most of the acreage this Eden soil is used for pasture and woodland. This soil is not suited to row crops, small grains, and hay because of steepness of slope, sheet erosion, rills, gullies, high clay content, low available water capacity, and flagstones on the surface.

This soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope and flagstones limit the use of modern machinery in establishing and maintaining grasses on this map unit. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

This soil is suited to eastern redcedar, Virginia pine, white oak, black oak, and Scotch pine. Equipment limitations, the erosion hazard, and seedling mortality are management concerns.

This soil is poorly suited to urban uses because of steepness of slope, slow permeability, high clay content, low strength, and moderate depth to bedrock. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass VIe and woodland suitability group 4c.

EkA—Elk silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level, rarely flooded soil is on low stream terraces throughout the survey area. Areas range from 4 to 30 acres. They are about 170 to 400 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 50 inches is brown silt loam in the upper part and brown silty clay loam in the middle and lower parts. The substratum to a depth of about 80 inches is yellowish brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. It is slightly acid through medium acid. Permeability is moderate, and available water capacity is high. The root zone is deep. This soil is subject to rare flooding during the winter and early in spring but generally is not flooded during the growing season.

Included with this soil in mapping are areas of deep, well drained, clayey soils on terraces. Also included are a few areas of intermingled Nicholson, McGary, and Nolin soils.

On most of the acreage this Elk soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses, but flooding is a limitation.

This soil is well suited to most pasture and hay plants commonly grown in the area; however, some hay crops may be damaged by flooding. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Eastern white pine, northern red oak, yellow-poplar, black walnut, white oak, black oak, and loblolly pine are preferred for planting. Plant competition is a management concern.

This soil is poorly suited to most urban uses because of flooding. This limitation is difficult to overcome.

This soil is in capability class I and woodland suitability group 2o.

EkB—Elk silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on stream terraces throughout the survey area. Areas range from 4 to 60 acres. They are about 170 to 700 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 50 inches is brown silt loam in the upper part and brown silty clay loam in the middle and lower parts. The substratum to a depth of about 80 inches is yellowish brown silty clay loam.

This soil is medium in natural fertility and moderate in organic matter content. It is slightly acid through medium acid. Permeability is moderate, and available water capacity is high. The root zone is deep.

Included with this soil in mapping are areas of deep, well drained, clayey soils on terraces, a few small areas of soils that have 5 to 15 percent pebbles in the subsoil; and a few, small low lying areas that are flooded at rare times. Also included are a few areas of intermingled Nicholson and McGary soils.

On most of the acreage this Elk soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses, but erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, crop residue management, and contour planting, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area; however, plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Eastern white pine, northern red oak, yellow-poplar, black walnut, white oak, black oak, and loblolly pine are preferred for planting. Plant competition is a management concern.

This soil is well suited to most urban uses, although low strength is a limitation for local roads and streets.

This soil is in capability subclass IIe and woodland suitability group 2o.

FaC—Fairmount-Rock outcrop complex, 6 to 12 percent slopes. This map unit consists of small areas of Fairmount soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping. The Fairmount soil is well drained and shallow. Areas of the unit range from 5 to 35 acres, and they are about 500 feet wide. They are on narrow ridgetops and side slopes in the Inner Bluegrass and the Hills of the Bluegrass. Many areas are karst (fig. 16). Individual areas of the Fairmount soil are 0.1 acre to 4 acres intermingled with exposed limestone bedrock in bands ranging from 2 to 20 feet in width.

Fairmount flaggy silty clay loam makes up about 70 to 90 percent of most mapped areas. Typically, the surface layer is very dark grayish brown flaggy silty clay loam about 6 inches thick. The subsoil to a depth of about 14 inches is dark yellowish brown flaggy silty clay. Limestone bedrock is at a depth of about 14 inches.

The Fairmount soil is low in natural fertility and high in organic matter content. It is neutral to moderately alkaline throughout. Permeability is slow to moderately slow, and available water capacity is very low. The root zone is shallow. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 10 to 20 inches.

Limestone Rock outcrop makes up about 10 to 25 percent of most mapped areas.

Included with this complex in mapping are small areas of Faywood, Chenault, McAfee, Caleast, Eden, and Lowell soils.

On most of the acreage the Fairmount soil is used for pasture and woodland. It is not suited to row crops, small grains, and hay because of shallow depth of the root zone, Rock outcrop, flagstones on the surface, and very low available water capacity.

The Fairmount soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Rock outcrop and very low available water capacity limit pasture production. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

Figure 16.—Pasture in an area of Fairmount-Rock outcrop complex, 6 to 12 percent slopes. This area is karst.

The Fairmount soil is suited to eastern redcedar, black oak, white oak, and Virginia pine. Equipment limitations and seedling mortality are management concerns.

The Fairmount soil is poorly suited to urban uses because of shallow depth to bedrock, Rock outcrop, moderately slow to slow permeability, high clay content, low strength, and flagstones on the surface. Some of these limitations can be overcome by proper engineering techniques.

This complex is in capability subclass VIs. The Fairmount soil is in woodland suitability group 4x.

FaD—Fairmount-Rock outcrop complex, 12 to 30 percent slopes. This map unit consists of small areas of Fairmount soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping (fig. 17). The Fairmount soil is well drained and shallow. Areas of the unit range from 5 to 75 acres, and they are about 400 feet wide. They are on narrow ridgetops and side slopes in the Inner Bluegrass and the Hills of the Bluegrass. Many areas are karst. Individual areas of the Fairmount soil are 0.1 acre to 4 acres. They are intermingled with exposed limestone bedrock in bands ranging from 3 to 25 feet in width.

Fairmount flaggy silty clay loam makes up about 40 to 90 percent of most mapped areas. Typically, the surface layer is very dark grayish brown flaggy silty clay loam about 6 inches thick. The subsoil to a depth of about 14 inches is dark yellowish brown flaggy silty clay. Limestone bedrock is at a depth of about 14 inches.

The Fairmount soil is low in natural fertility and high in organic matter content. It is neutral to moderately alkaline throughout. Permeability is slow to moderately slow, and available water capacity is very low. The root zone is shallow. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 10 to 20 inches.

Limestone Rock outcrop makes up about 10 to 30 percent of most mapped areas.

Included with this complex in mapping are small areas of loamy or clayey soils in which bedrock is at a depth of less than 10 inches. Also included are a few areas of intermingled Faywood, Chenault, McAfee, Caleast, Eden, and Lowell soils.

On most of the acreage the Fairmount soil is used for pasture and woodland. It is not suited to row crops, small grains, and hay because of shallow depth of the root zone, Rock outcrop, steepness of slope, flagstones on the surface, and very low available water capacity.

The Fairmount soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Rock outcrop and very low available water capacity limit pasture production. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

The Fairmount soil is suited to eastern redcedar, white oak, black oak, and Virginia pine. The erosion hazard, equipment limitations, and seedling mortality are management concerns.

The Fairmount soil is poorly suited to urban uses because of shallow depth to bedrock, Rock outcrop, steepness of slope, moderately slow to slow permeability, high clay content, low strength, and large stones. Some of these limitations can be overcome by proper engineering techniques.

This complex is in capability subclass VIs. The Fairmount soil is in woodland suitability group 4x.

FaF—Fairmount-Rock outcrop complex, 30 to 60 percent slopes. This map unit consists of small areas of

Fairmount soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping. The Fairmount soil is well drained and shallow. Areas of the unit range from 5 to 175 acres, and they are about 600 feet wide. They are on side slopes in the Inner Bluegrass and the Hills of the Bluegrass. Individual areas of the Fairmount soil are 0.1 acre to 4 acres. They are intermingled with exposed limestone bedrock in bands ranging from 3 to 60 feet in width.

Fairmount flaggy silty clay loam makes up about 55 to 70 percent of most mapped areas. Typically, the surface layer is very dark grayish brown flaggy silty clay loam about 6 inches thick. The subsoil to a depth of about 14 inches is dark yellowish brown flaggy silty clay. Limestone bedrock is at a depth of about 14 inches.

The Fairmount soil is low in natural fertility and high in organic matter content. It is neutral to moderately alkaline throughout. Permeability is slow to moderately slow, and available water capacity is very low. The root zone is shallow. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 10 to 20 inches.

Limestone Rock outcrop makes up about 18 to 35 percent of most mapped areas.

Included with this complex in mapping are small areas of loamy soils or clayey soils in which bedrock is at a depth of less than 10 inches. Also included along the Kentucky, Dix, and Chaplin Rivers are exposed vertical limestone bluffs ranging from 10 to 250 feet in height (fig. 18). A few areas of intermingled Faywood, McAfee, and Eden soils are in places.

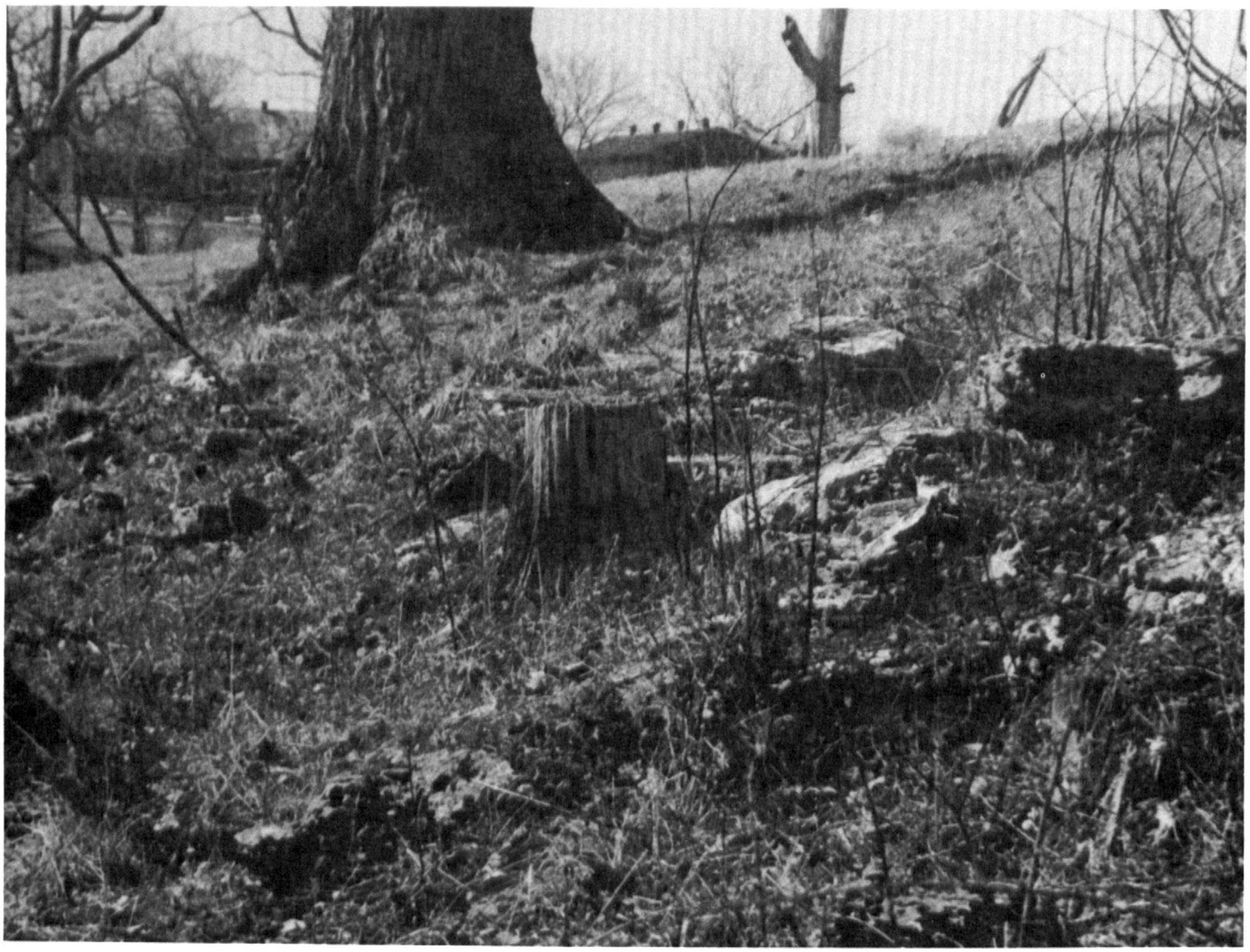


Figure 17.—Pasture in an area of Fairmount-Rock outcrop complex, 12 to 30 percent slopes.

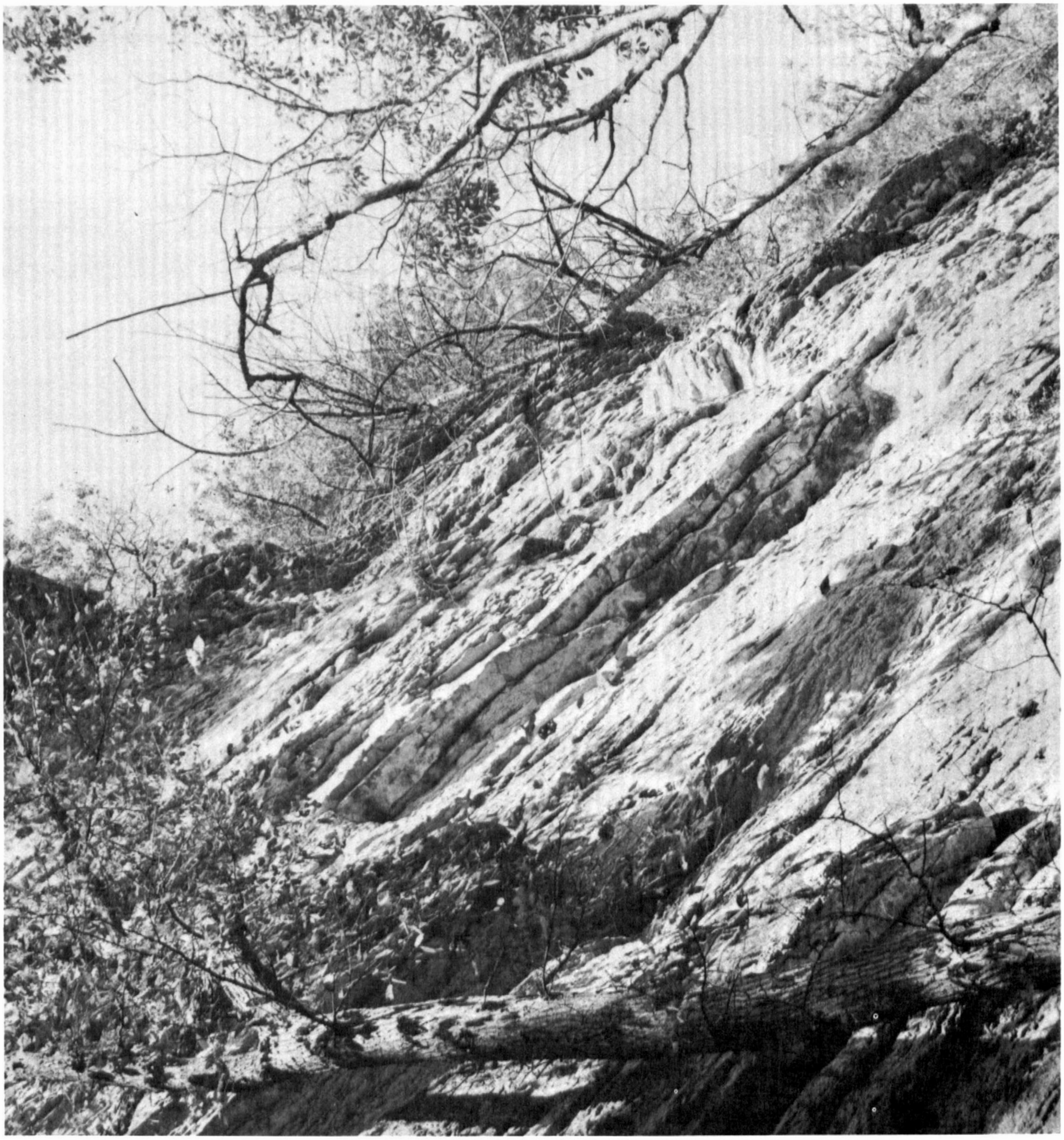


Figure 18.—Palisade along the Kentucky River in the Fairmount-Rock outcrop complex, 30 to 60 percent slopes.

Most of the acreage of the Fairmount soil is used for woodland. It is not suited to row crops, small grains, hay, and pasture. Steepness of slopes, shallow depth to bedrock, Rock outcrop, flagstones on the surface, and very low available water capacity are limitations.

The Fairmount soil is suited to eastern redcedar, black oak, white oak, and Virginia pine, but the erosion hazard, equipment limitations, and seedling mortality are management concerns. Although woodland productivity is low, the most practical use of this unit is for woodland and as habitat for wildlife.

The Fairmount soil is poorly suited to urban uses because of steepness of slope, shallow depth to bedrock, Rock outcrop, moderately slow to slow permeability, high clay content, low strength, and large stones. Any engineering technique undertaken to help overcome these limitations would probably be of little use.

This complex is in capability subclass VIIs. The Fairmount soil is in woodland suitability group 4x.

FdC—Faywood silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on narrow ridgetops and side slopes in the Hills of the Bluegrass and the Inner Bluegrass. Areas range from 4 to 150 acres. They are about 170 to 1,400 feet wide.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 31 inches is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Limestone bedrock is at a depth of about 31 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow and slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of limestone Rock outcrop. Also included are a few areas of intermingled Eden, Lowell, Caleast, and Fairmount soils.

On most of the acreage this Faywood soil is used for hay and pasture. This soil is suited to row crops and small grains; however, steepness of slope, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour planting, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants commonly grown in the area, although moderate depth of the root zone and moderate available water capacity are limitations. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Eastern white pine, white oak, white ash, and black oak are preferred for planting. The use of equipment is moderately limited on this soil because of the high clay content. Plant competition is moderate.

This soil is poorly suited to urban uses because of moderate depth to bedrock, moderately slow and slow permeability, high clay content, and shrink-swell. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 3c.

FdD—Faywood silt loam, 12 to 20 percent slopes. This moderately deep, well drained, moderately steep soil is on side slopes in the Hills of the Bluegrass and the Inner Bluegrass. Areas range from 5 to 120 acres. They are about 170 to 1,200 feet wide.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 31 inches is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Limestone bedrock is at a depth of about 31 inches.

This soil is low in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow and slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of limestone Rock outcrop. Also included are a few areas of intermingled Eden, Lowell, Caleast, and Fairmount soils.

On most of the acreage this Faywood soil is used for hay and pasture. This soil is suited to limited production of row crops and small grains; however, steepness of slope, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Black oak, white oak, eastern white pine, and white ash are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to urban uses because of steepness of slope, moderate depth to bedrock, moderately slow and slow permeability, shrink-swell, and high clay content. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IVe and woodland suitability group 3c.

FwD3—Faywood silty clay, 12 to 20 percent slopes, severely eroded. This moderately deep, well drained, moderately steep, severely eroded soil is on side slopes in the Hills of the Bluegrass and the Inner Bluegrass. This soil has been subject to severe sheet erosion, and it is truncated by rills and gullies. The subsoil and substratum are exposed in many parts of most mapped areas. Areas range from 5 to 40 acres. They are about 170 to 400 feet wide.

Typically, the surface layer is yellowish brown silty clay about 3 inches thick. The subsoil to a depth of about 25 inches is yellowish brown clay. Limestone bedrock is at a depth of about 25 inches.

This soil is low in natural fertility and organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow and slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of limestone Rock outcrop. Also included are a few areas of intermingled Eden, Lowell, Caleast, and Fairmount soils.

On most of the acreage this Faywood soil is used for pasture. This soil is not suited to row crops, small grains, and hay. Steepness of slope, sheet erosion, rills, gullies, high clay content, moderate depth of the root zone, and moderate available water capacity are limitations.

This soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope and moderate available water capacity limit pasture production. Overgrazing and grazing when the soil is wet reduce the ground cover and cause excessive runoff and erosion.

This soil is suited to Virginia pine and eastern redcedar. The erosion hazard, equipment limitations, and seedling mortality are management concerns.

This soil is poorly suited to urban uses because of steepness of slope, moderate depth to bedrock, moderately slow and slow permeability, high clay content, and shrink-swell. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass VIe and woodland suitability group 4c.

GaF—Garmon silt loam, 25 to 60 percent slopes. This moderately deep, well drained, steep and very steep soil is on side slopes and narrow ridgetops in the Knobs. Areas range from 8 to 800 acres. They are about 250 to 2,000 feet wide.

Typically, the surface layer is very dark grayish brown silt loam about 1 inch thick. The subsurface to a depth of about 10 inches is brown silt loam. The subsoil to a depth of about 30 inches is light yellowish brown channery silt loam. Siltstone bedrock is at a depth of about 30 inches.

This soil is low in natural fertility and organic matter content. It is medium acid to neutral throughout. Permeability is moderately rapid, and available water capacity is moderate. The root zone is moderately deep. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are areas of loamy soils in which bedrock is at a depth of 6 to 20 inches and areas of loamy soils that have more than 35 percent coarse fragments throughout the subsoil. Also included are small areas of moderately well drained soils, and a few areas of intermingled Vertrees, Caneyville, Culleoka, Carpenter, and Lenberg soils.

On most of the acreage this Garmon soil is used for woodland. This soil is poorly suited to row crops, small grains, hay, and pasture because of steepness of slope.

This soil is suited to woodland. Yellow-poplar, black oak, white oak, Virginia pine, loblolly pine, and eastern white pine are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns. This soil is used mostly for woodland. Another important use is as habitat for woodland wildlife.

This soil is poorly suited to urban uses because of steepness of slope and moderate depth to bedrock.

This soil is in capability subclass VIIe and woodland suitability group 3r.

LoB—Lowell silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops, benches, and foot slopes in the Hills of the Bluegrass. Areas range from 4 to 300 acres. They are about 170 to 1,600 feet wide.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil to a depth of about 38 inches is dark yellowish brown silty clay in the upper part, yellowish brown clay in the middle part, and light olive brown clay mottled in shades of brown in the lower part. The substratum to a depth of about 61 inches is light olive brown silty clay mottled in shades of gray or brown. Interbedded limestone, siltstone, and shale bedrock is at a depth of about 61 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid in the upper 30 inches and strongly acid to mildly alkaline below. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are areas of well drained, loamy soils, areas of moderately well drained, clayey soils, and areas of well drained, clayey soils on terraces. Also included are a few areas of intermingled Eden, Faywood, Fairmount, and Nicholson soils.

On most of the acreage this Lowell soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses, but erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area; however, plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, loblolly pine, Virginia pine, black oak, and white oak are preferred for planting. The use of equipment is moderately limited on this soil because of high clay content. Plant competition is moderate.

This soil is suited to most urban uses; however, it is limited by moderately slow permeability, high clay content, low strength, depth to bedrock, and moderate shrink-swell potential. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 2c.

LoC—Lowell silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on narrow ridgetops, side slopes, benches, and foot slopes in the Hills of the Bluegrass. Areas range from 4 to 450 acres. They are about 170 to 2,400 feet wide.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil to a depth of about 38 inches is dark yellowish brown silty clay in the upper part, yellowish brown clay in the middle part, and light olive brown clay mottled in shades of brown in the lower part. The substratum to a depth of about 61 inches is light olive brown silty clay mottled in shades of gray or brown. Interbedded limestone, siltstone, and shale bedrock is at a depth of about 61 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid in the upper 30 inches and strongly acid to mildly alkaline below. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are areas of well drained, loamy soils, areas of moderately well drained, clayey soils, and areas of well drained, clayey soils on terraces. Also included are a few areas of intermingled Eden, Faywood, and Fairmount soils.

On most of the acreage this Lowell soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, loblolly pine, black oak, Virginia pine, and white oak are preferred for planting. Use of equipment is moderately limited because of high clay content. Plant competition is moderate.

This soil is suited to urban uses, but moderately slow permeability, steepness of slope, high clay content, low strength, depth to bedrock, and moderate shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2c.

LoD—Lowell silt loam, 12 to 20 percent slopes. This deep, well drained, moderately steep soil is on side slopes in the Hills of the Bluegrass. Areas range from 5 to 100 acres. They are about 200 to 800 feet wide.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil to a depth of about 38 inches is dark yellowish brown silty clay in the upper part, yellowish brown clay in the middle part, and light olive brown clay mottled in shades of brown in the lower part. The substratum to a depth of about 61 inches is light olive brown silty clay mottled in shades of gray or brown. Interbedded limestone, siltstone, and shale bedrock is at a depth of about 61 inches.

This soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to slightly acid in the upper 30 inches and strongly acid to mildly alkaline below. Permeability is moderately slow, and available water capacity is high. The root zone is deep.

This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are a few areas of intermingled Eden, Faywood, and Fairmount soils.

On most of the acreage this Lowell soil is used for hay and pasture. This soil is suited to limited production of row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Black oak, eastern white pine, loblolly pine, Virginia pine, white oak, and white ash are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Moderately slow permeability, steepness of slope, high clay content, and shrink-swell are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IVe and woodland suitability group 2c.

LwC3—Lowell silty clay loam, 6 to 12 percent slopes, severely eroded. This deep, well drained, sloping, severely eroded soil is on side slopes in the Hills of the Bluegrass. This soil has been subject to severe sheet erosion, and it is truncated by rills and gullies. The subsoil and substratum are exposed in many parts of most mapped areas. Areas range from 4 to 125 acres. They are about 170 to 1,200 feet wide.

Typically, the surface layer is yellowish brown silty clay loam about 5 inches thick. The subsoil to a depth of about 38 inches is yellowish brown clay in the upper part and yellowish brown clay mottled in shades of brown in the lower part. The substratum to a depth of about 62 inches is light olive brown shaly silty clay mottled in shades of gray or brown. Interbedded limestone, siltstone, and shale bedrock is at a depth of about 62 inches.

This soil is low in natural fertility and organic matter content. It is very strongly acid to slightly acid in the upper 30 inches and strongly acid to mildly alkaline below. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 40 to 80 inches.

Included with this soil in mapping are areas of moderately well drained, clayey soils and a few areas of limestone Rock outcrop. Also included are a few areas of intermingled Eden, Faywood, and Fairmount soils.

On most of the acreage this Lowell soil is used for hay and pasture. This soil is suited to limited production of row crops and small grains; however, steepness of slope, sheet erosion, rills, gullies, and high clay content are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, crop residue management, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover to prevent further erosion. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Virginia pine, black oak, white oak, and loblolly pine are preferred for planting. The use of equipment is moderately limited because of rills, gullies, and high clay content. Plant competition is moderate.

This soil is suited to urban uses but moderately slow permeability, high clay content, steepness of slope, low strength, depth to bedrock, and moderate shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IVe and woodland suitability group 3c.

MaA—Maury silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on karst ridgetops in the Inner Bluegrass. Areas range from 5 to 60 acres. They are about 170 to 850 feet wide.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil to a depth of about 80 inches is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part.

This soil is high in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and very strongly acid to medium acid in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep.

Included with this soil in mapping are areas of well drained, loamy soils. Also included are a few areas of intermingled Caleast, McAfee, and Nolin soils.

On most of the acreage this Maury soil is used for row crops, small grains, hay, and pasture. It is well suited to these uses.

This soil is well suited to alfalfa and other hay and pasture plants grown in the area. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Black walnut, yellow-poplar, white ash, black locust, eastern white pine, northern red oak, and white oak are preferred for planting. Plant competition is a management concern.

This soil is well suited to most urban uses; however, high clay content and low strength are limitations. These limitations can be overcome by proper engineering techniques.

This soil is in capability class I and woodland suitability group 2o.

MaB—Maury silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on karst ridgetops and side slopes in the Inner Bluegrass. Areas range from 5 to 250 acres. They are about 250 to 1,500 feet wide.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil to a depth of about 80 inches is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part.

This soil is high in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and very strongly acid to medium acid in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep.

Included with this soil in mapping are areas of well drained, loamy soils. Also included are a few areas of intermingled Caleast, McAfee, and Nolin soils.

On most of the acreage this Maury soil is used for row crops, small grains, hay, and pasture (fig. 19). This soil is well suited to these uses, but erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to alfalfa and other hay and pasture plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Black walnut, yellow-poplar, white ash, black locust, eastern white pine, northern red oak, and white oak are preferred for planting. Plant competition is a management concern.

This soil is well suited to most urban uses (fig. 20); however, high clay content and low strength are limitations. These limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 2o.

MaC—Maury silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on karst ridgetops and side slopes in the Inner Bluegrass. Areas range from 5 to 55 acres. They are about 170 to 1,500 feet wide.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil to a depth of about 80 inches is brown silty clay loam in the upper part, brown silty clay in the middle part, and reddish brown silty clay in the lower part.

This soil is high in natural fertility and moderate in organic matter content. It is strongly acid to neutral in the surface layer, strongly acid to slightly acid in the upper and middle parts of the subsoil, and very strongly acid to medium acid in the lower part of the subsoil. Permeability is moderate, and available water capacity is high. The root zone is deep.

Included with this soil in mapping are areas of well drained, loamy soils. Also included are a few areas of intermingled Caleast, McAfee, and Nolin soils.

On most of the acreage this Maury soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to alfalfa and other hay and pasture plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Black walnut, yellow-poplar, white ash, eastern white pine, black locust, northern red oak, and white oak are preferred for planting. Plant competition is a management concern.

This soil is suited to most urban uses; however, steepness of slope, high clay content, and low strength are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2o.

McB—McAfee silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on karst ridgetops in the Inner Bluegrass. Areas range from 4 to 375 acres. They are about 170 to 2,200 feet wide.

Figure 19.—Soybean stubble in an area of Maury silt loam, 2 to 6 percent slopes.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is brown clay in the upper part and reddish brown clay in the lower part. Limestone bedrock is at a depth of about 30 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of limestone Rock outcrop. Also included are a few areas of intermingled Maury, Caleast, Fairmount, and Chenault soils.

On most of the acreage this McAfee soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses, but moderate available water capacity and moderate depth of the root zone are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area, although moderate depth of the root zone and moderate available water capacity are limitations. Plants and seeding rates should be selected that provide adequate ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, black oak, and white oak are preferred for planting. The use of equipment is moderately limited on this soil because of high clay content. Plant competition is moderate.

This soil is poorly suited to urban uses. Moderate depth to bedrock, high clay content, moderately slow permeability, and shrink-swell are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 3c.

McC—McAfee silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on karst ridgetops and side slopes in the Inner Bluegrass. Areas range from 4 to 300 acres. They are about 170 to 1,600 feet wide.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is brown clay in the upper part and reddish brown clay in the lower part. Limestone bedrock is at a depth of about 30 inches.

Figure 20.—Septic lines in an area of Maury silt loam, 2 to 6 percent slopes.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of limestone Rock outcrop. Also included are a few areas of intermingled Maury, Caleast, Fairmount, and Chenault soils.

On most of the acreage this McAfee soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains; however, steepness of slope, moderate available water capacity, and moderate depth of the root zone are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area, although moderate depth of the root zone and moderate available water capacity are limitations. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, black oak, and white oak are preferred for planting. The use of equipment is moderately limited on this soil because of high clay content. Plant competition and the erosion hazard are moderate management concerns.

This soil is poorly suited to urban uses. Moderate depth to bedrock, moderately slow permeability, slope, and high clay content are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 3c.

McD—McAfee silt loam, 12 to 20 percent slopes. This moderately deep, well drained, moderately steep soil is on karst side slopes in the Inner Bluegrass. Areas range from 4 to 50 acres. They are about 170 to 700 feet wide.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is brown clay in the upper part and reddish brown clay in the lower part. Limestone bedrock is at a depth of about 30 inches.

This soil is low in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of limestone Rock outcrop and areas of soils that have a cherty surface layer and cherty subsoil. Also included are a few areas of intermingled Caleast, Fairmount, and Chenault soils.

On most of the acreage this McAfee soil is used for hay and pasture. This soil is suited to limited production of row crops and small grains. Steepness of slope, moderate available water capacity, and moderate depth of the root zone are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is suited to most pasture and hay plants grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, black oak, and white oak are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to urban uses. Steepness of slope, moderate depth to bedrock, moderately slow permeability, high clay content, and shrink-swell are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IVe and woodland suitability group 3c.

MeD—McAfee-Rock outcrop complex, 12 to 20 percent slopes. This map unit consists of small areas of McAfee soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping. The McAfee soil is on side slopes in the Inner Bluegrass. It is well drained and moderately deep. Areas range from 4 to 90 acres. They are about 600 feet wide. Individual areas of the McAfee soil are 1 acre to 4 acres intermingled with exposed limestone bedrock in bands ranging from 3 to 30 feet wide.

McAfee silt loam makes up about 45 to 75 percent of most mapped areas. Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is brown clay in the upper part and reddish brown clay in the lower part. Limestone bedrock is at a depth of about 30 inches.

The McAfee soil is low in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep, and available water capacity is moderate. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Limestone Rock outcrop makes up about 10 to 30 percent of most mapped areas.

Included with this complex in mapping are small areas of loamy soils in narrow valleys and small areas of clayey soils on uplands. The clayey soils have 10 to 30 percent chert fragments throughout the surface layer and subsoil. Also included are a few areas of intermingled Fairmount and Caleast soils.

On most of the acreage the McAfee soil is used for pasture. It is not suited to row crops, small grains, and hay because of steepness of slope, Rock outcrop, moderate depth of the root zone, and moderate available water capacity.

The McAfee soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Rock outcrop and moderate available water capacity are limitations to pasture production. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

The McAfee soil is suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, black oak, white oak, and eastern white pine are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns.

The McAfee soil is poorly suited to urban uses because of moderate depth to bedrock, Rock outcrop, moderately slow permeability, steepness of slope, high clay content, and shrink-swell. Some of these limitations can be overcome by proper engineering techniques.

This complex is in capability subclass VIs. The McAfee soil is in woodland suitability group 3x.

MeF—McAfee-Rock outcrop complex, 20 to 50 percent slopes. This map unit consists of small areas of McAfee soil and limestone rock that are so intermingled that they could not be separated at the scale selected for mapping (fig. 21). The McAfee soil is well drained and moderately deep. Areas of the unit range from 12 to 150 acres, and they are about 900 feet wide. They are on side slopes in the base of the Knobs. Individual areas of the McAfee soil are 0.1 acre to 4 acres intermingled with exposed limestone bedrock in bands ranging from 3 to 50 feet wide.

McAfee silt loam makes up about 45 to 75 percent of most mapped areas. Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is brown clay in the upper part and reddish brown clay in the lower part. Limestone bedrock is at a depth of about 30 inches.

The McAfee soil is low in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderately slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Limestone Rock outcrop makes up about 10 to 30 percent of most mapped areas.

Included with this unit in mapping are small areas of loamy soils in narrow valleys and small areas of clayey soils on uplands that have 10 to 30 percent chert fragments throughout the surface layer and subsoil. Also included are a few areas of intermingled Fairmount and Caleast soils.

On most of the acreage the McAfee soil is used for pasture and woodland. It is not suited to row crops, small grains, and hay because of steepness of slope, moderate depth of the root zone, Rock outcrop, and moderate available water capacity.

The McAfee soil is suited to pasture plants; however, grasses and legumes should be selected that provide an adequate amount of forage and ground cover and do not require frequent renovation. Steepness of slope and Rock outcrop limit the use of modern machinery in establishing and maintaining the grasses. Overgrazing and grazing when the soil is wet reduce ground cover and cause excessive runoff and erosion.

The McAfee soil is suited to woodland. Eastern white pine, yellow-poplar, black oak, and white oak are preferred for planting. The erosion hazard, equipment limitations, and plant competition are management concerns.

The McAfee soil is poorly suited to urban uses because of moderate depth to bedrock, Rock outcrop, moderately slow permeability, steepness of slope, high clay content, and shrink-swell.

This complex is in capability subclass VIIs. The McAfee soil is in woodland suitability group 3x.

Mg—McGary silt loam. This deep, somewhat poorly drained, nearly level to gently sloping soil is on foot slopes, benches, and terraces throughout the survey area. Areas range from 5 to 20 acres. They are about 170 to 500 feet wide. Slope ranges from 0 to 4 percent.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 30 inches is yellowish brown silty clay mottled in shades of gray in the upper part and gray clay mottled in shades of brown in the lower part. The substratum to a depth of about 75 inches is gray clay mottled in shades of brown.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to neutral in the surface layer, strongly acid to mildly alkaline in the subsoil, and slightly acid to mildly alkaline in the substratum. Permeability is slow or very slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential. A seasonal high water table is within 12 to 36 inches of the surface

Figure 21.—Trees and pasture in the McAfee-Rock outcrop complex, 20 to 50 percent slopes.

for long periods generally during the latter part of winter and early in spring.

Included with this soil in mapping are areas of somewhat poorly drained, loamy soils on uplands and areas of poorly drained and moderately well drained, clayey soil on uplands. Also included are a few areas of intermingled Caleast, Lowell, Nicholson, Tilsit, Newark, and Dunning soils.

On most of the acreage this McGary soil is used for hay and pasture. This soil is suited to row crops and small grains; however, wetness of the soil and the small size of the areas are limitations. Good water management practices, such as the installation of tile drainage, the construction of open ditches and diversions, and the use of plants that are moderately tolerant of wetness are techniques that help to overcome the limitation of wetness.

This soil is well suited to pasture and hay plants that are somewhat tolerant of wetness. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, maintenance of adequate drainage measures, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Eastern white pine, white ash, red maple, yellow-poplar, and American sycamore are preferred for planting. The use of equipment is moderately limited on this soil because of wetness and high clay content. Plant competition is moderate.

This soil is poorly suited to urban uses because of slow or very slow permeability, high clay content, shrink-swell, and wetness. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIw and woodland suitability group 3w.

Ne—Newark silt loam. This deep, somewhat poorly drained, nearly level soil is on flood plains and local alluvial upland areas throughout the survey area. Areas range from 4 to 170 acres. They are about 200 to 800 feet wide. Slope is 0 to 2 percent.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 35 inches is yellowish brown silt loam mottled in shades of gray in the upper part and light brownish gray silt loam mottled in shades of brown in the lower part. The substratum to a depth of about 64 inches is light brownish gray silty clay loam mottled in shades of brown in the upper part and strong brown silty clay loam mottled in shades of gray or brown in the lower part.

This soil is high in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderate, and available water capacity is high. The root zone is deep. This soil is subject to frequent flooding during the winter and early in spring but generally is not flooded during the growing season. A seasonal high water table is within 6 to 18 inches of the surface for long periods generally during the winter and early in spring.

Included with this soil in mapping are areas of moderately well drained, loamy soils and poorly drained, loamy soils. Also included are small areas of clayey soils and a few areas of intermingled Nolin, Dunning, Boonesboro, and Sensabaugh soils.

On most of the acreage this Newark soil is used for row crops, hay, and pasture. This soil is well suited to these uses, but because small grains and other winter crops may be damaged by flooding and the seasonal high water table, these crops are better suited to areas where the high water table is controlled. Good water management practices, such as the installation of tile drainage, the construction of open ditches and diversions, and the use of plants that are moderately tolerant of wetness help to overcome limitations of flooding and wetness.

This soil is well suited to pasture and hay plants that are somewhat tolerant of wetness. Some hay crops, however, may be damaged by flooding. Frequent renovation of pasture is needed. Application of fertilizer, maintenance of proper stocking rates, maintenance of adequate drainage measures, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Eastern cottonwood, sweetgum, loblolly pine, red maple, American sycamore, eastern white pine, and yellow-poplar are preferred for planting. The use of equipment is moderately limited on this soil because of flooding and wetness. Plant competition is severe.

This soil is poorly suited to urban uses because of flooding and wetness. The construction of diversions and open ditches and the installation of tile drainage can help to control the wetness of the soil, but the limitation of flooding is difficult to overcome.

This soil is in capability subclass IIw and woodland suitability group is 1w.

NhB—Nicholson silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on terraces, benches, and ridgetops in the Hills of the Bluegrass and the Inner Bluegrass. Areas range from 4 to 10 acres. They are about 170 to 500 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 43 inches is yellowish brown silty clay loam in the upper part and yellowish brown silty clay loam mottled in shades of gray in the middle part. The middle part has very coarse prismatic structure and hard, firm, and brittle consistency. The lower part of the subsoil is strong brown clay mottled in shades of gray. The substratum to a depth of about 78 inches is light olive brown clay mottled in shades of gray or brown. Interbedded shale, siltstone, and limestone bedrock is at a depth of about 78 inches.

This soil is low in natural fertility and moderate in organic matter content. It is very strongly acid to medium acid through the fragipan unless limed and strongly acid to mildly alkaline below. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep because of the fragipan. A perched water table is within 18 to 30 inches of the surface for long periods during the winter and early in spring.

Included with this soil in mapping are areas of somewhat poorly drained soils that have fragipans. Also included are a few areas of intermingled McGary, Caleast, Elk, and Lowell soils.

On most of the acreage this Nicholson soil is used for hay and pasture. This soil is well suited to row crops, small grains, hay, and pasture; however, wetness, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area; however, wetness, moderate depth of the root zone, and moderate available water capacity during dry seasons are limitations. Alfalfa is not well suited to this soil. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, eastern white pine, shortleaf pine, white oak, black oak, and white ash are preferred for planting. Plant competition is a management concern.

This soil is poorly suited to urban uses. Wetness and slow permeability are limitations for building sites and sanitary facilities. These limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 2o.

No—Nolin silt loam. This deep, well drained, nearly level soil is on flood plains and local alluvial areas on uplands throughout the survey area. Areas range from 4 to 300 acres. They are about 200 to 1,500 feet wide. Slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil to a depth of about 52 inches is dark yellowish brown silt loam in the upper part and dark yellowish brown silt loam mottled in shades of brown in the lower part. The substratum to a depth of about 60 inches is dark yellowish brown silt loam.

This soil is high in natural fertility and moderate in organic matter content. It is medium acid to moderately alkaline throughout. Permeability is moderate, and available water capacity is high. The root zone is deep. This soil is subject to frequent flooding during the winter and early in spring but generally is not flooded during the growing season (fig. 22). A seasonal high water table is within 36 to 72 inches of the surface generally during the winter and early in spring.

Included with this soil in mapping are areas of moderately well drained, loamy soils, areas of well drained and moderately well drained, clayey soils, and areas of clayey soils that have a loamy overwash. Also included are a few areas of intermingled Newark, Dunning, Boonesboro, Sensabaugh, and Elk soils.

On most of the acreage this Nolin soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses; however, small grains and other winter crops may be damaged by flooding. The hazard of flooding is a concern in the management of this soil.

This soil is well suited to most pasture and hay plants grown in the area. Some hay crops, however, may be damaged by flooding. Frequent renovation of pasture is needed. Application of fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, black walnut, white oak, and black oak are preferred for planting. Plant competition is a management concern.

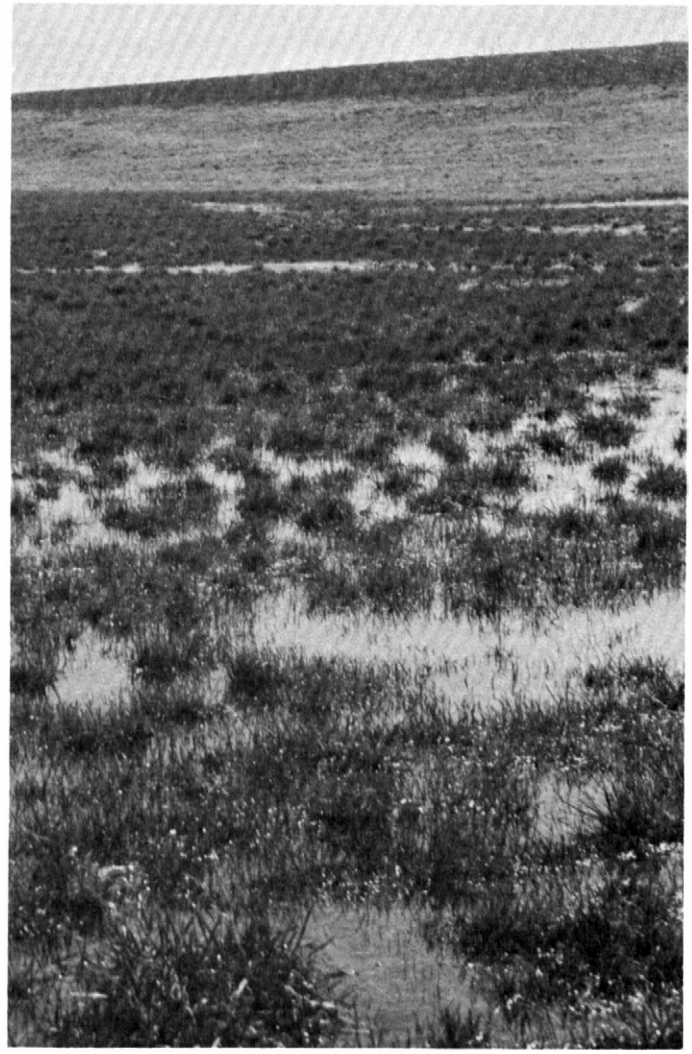


Figure 22.—Flooded pasture in an area of Nolin silt loam. In the background is an area of McAfee-Rock outcrop complex, 12 to 20 percent slopes.

This soil is poorly suited to urban uses because of the hazard of flooding.

This soil is in capability class IIw and woodland suitability group 1o.

Pt—Pits, quarries. Quarries are open excavations from which the soil and, commonly, the underlying material have been removed and limestone rock or other material is exposed. This material supports few or no plants. All of these limestone quarries are deep and have almost vertical walls (fig. 23). Pits that have an

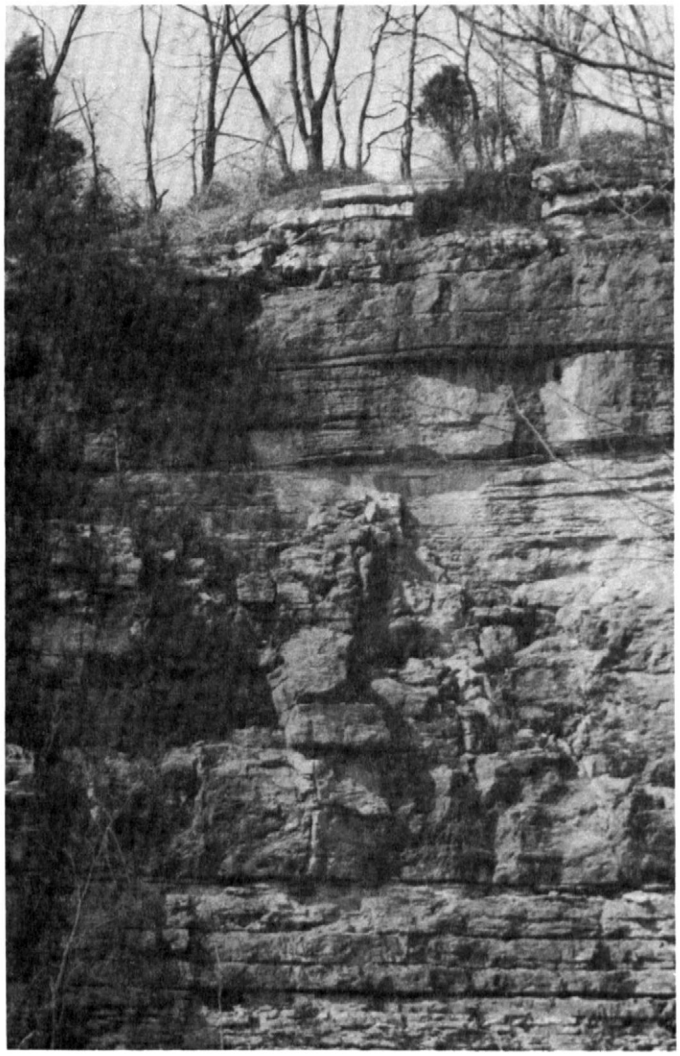


Figure 23.—Wall of a small limestone quarry.

area of less than 4 acres are designated with a pick and shovel symbol on the soil map.

Pits, quarries, is not assigned to a capability class or woodland suitability group.

Se—Sensabaugh gravelly silt loam. This deep, well drained, nearly level soil is on flood plains and alluvial fans in the Knobs. Areas range from 4 to 175 acres. They are about 170 to 600 feet wide. Slope is 0 to 2 percent.

Typically, the surface layer is brown gravelly silt loam about 10 inches thick. The subsoil to a depth of about 30 inches is brown gravelly silt loam. The substratum to a depth of about 46 inches is brown very gravelly silt loam. Limestone bedrock is at a depth of about 46 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to neutral throughout. Permeability is moderate to moderately rapid, and available water capacity is moderate. The root zone is deep. This soil is subject to frequent flooding during the winter and early in spring but generally is not flooded during the growing season. Hard bedrock is at a depth of 40 to 70 inches. A seasonal high water table is within 48 to 72 inches of the surface generally during the winter and early in spring.

Included with this soil in mapping are small areas of clayey soils that developed in colluvium at the base of side slopes. Also included are a few areas of intermingled Nolin and Newark soils.

On most of the acreage this Sensabaugh soil is used for hay and pasture. This soil is well suited to row crops, small grains, hay, and pasture; however, small grains may be damaged by flooding. The gravelly surface layer, moderate available water capacity, and flooding are limitations of this soil.

This soil is well suited to most pasture and hay plants grown in the area; however, some hay crops may be damaged by flooding. Frequent renovation of pasture is needed. Application of fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland, but it is not used extensively for woodland production. Yellow-poplar, black walnut, black oak, white oak, and white ash are preferred for planting. Plant competition is a management concern.

This soil is poorly suited to urban uses because of the hazard of flooding. This limitation is difficult to overcome.

This soil is in capability subclass IIs and woodland suitability group 2o.

TlA—Tilsit silt loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on broad ridges and foot slopes at the base of the Knobs. Areas range from 20 to 450 acres. They are about 400 to 4,000 feet wide.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 44 inches is yellowish brown silt loam in the upper part and yellowish brown silt loam mottled in shades of gray in the lower part. The lower part has very coarse prismatic structure and very firm, compact, and brittle consistency. The substratum to a depth of about 60 inches is yellowish brown shaly silt loam mottled in shades of gray.

This soil is low in natural fertility and moderate in organic matter content. It is strongly acid to extremely acid throughout unless limed. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep because of the fragipan at a depth of

18 to 30 inches. A perched water table is 18 to 30 inches below the surface for long periods during the winter and early in spring. Hard bedrock is at a depth of 40 to 70 inches.

Included with this soil in mapping are areas of loamy soils that formed in alluvium, areas of moderately deep, well drained, loamy soils, and areas of somewhat poorly drained soils that have a fragipan. Also included are a few areas of intermingled Trappist, McGary, Colyer, Carpenter, and Lenberg soils.

On most of the acreage this Tilsit soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses. The perched high water table and moderate depth of the root zone are limitations. If good water management is practiced and plants are used that are moderately tolerant of wetness, these limitations can be modified.

This soil is well suited to most pasture and hay plants grown in the area. Wetness, moderate depth of the root zone, and moderate available water capacity during dry seasons are limitations. Alfalfa is not well suited to this soil. Plants should be selected that provide an adequate amount of forage. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Eastern white pine, Virginia pine, black oak, white oak, and shortleaf pine are preferred for planting. Plant competition is a management concern.

This soil is poorly suited to most urban uses because of wetness, slow or very slow permeability, and low strength. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIw and woodland suitability group 3o.

TlB—Tilsit silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on ridges and foot slopes at the base of the Knobs. Areas range from 4 to 100 acres. They are about 200 to 2,500 feet wide.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of about 44 inches is yellowish brown silt loam in the upper part and yellowish brown silt loam mottled in shades of gray in the lower part. The lower part has very coarse prismatic structure and very firm, compact, and brittle consistency. The substratum to a depth of about 60 inches is yellowish brown shaly silt loam mottled in shades of gray.

This soil is low in natural fertility and moderate in organic matter content. It is strongly acid to extremely acid throughout unless limed. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep because of the fragipan at a depth of 18 to 30 inches. A perched water table is 18 to 30 inches below the surface for long periods during the winter and early in spring. Hard bedrock is at a depth of 40 to 70 inches.

Included with this soil in mapping are areas of loamy soils that formed in alluvium, areas of moderately deep, well drained, loamy soils, and areas of somewhat poorly drained soils that have a fragipan. Also included are a few areas of intermingled Trappist, McGary, Colyer, Carpenter, and Lenberg soils.

On most of the acreage this Tilsit soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses. The perched high water table and moderate depth of the root zone are limitations, but if good water management is practiced and plants are used that are moderately tolerant of wetness, these limitations can be overcome. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay plants grown in the area. Wetness, moderate depth of the root zone, and moderate available water capacity during dry seasons are limitations. Alfalfa is not well suited to this soil. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Eastern white pine, Virginia pine, black oak, white oak, and shortleaf pine are preferred for planting. Plant competition is a management concern.

This soil is limited for most urban uses because of wetness, slow or very slow permeability, and low strength. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 3o.

TpB—Trappist silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on ridges at the base of the Knobs. Areas range from 5 to 30 acres. They are about 170 to 1,100 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is strong brown silty clay loam in the upper part and yellowish brown silty clay mottled in shades of red in the lower part. The substratum to a depth of about 34 inches is yellowish red extremely shaly silty clay. Hard, black, acid shale bedrock is at a depth of about 34 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is extremely acid to strongly acid except where limed. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are areas of deep, well drained, loamy soils and areas of deep, well drained, clayey soils and deep, somewhat poorly drained, clayey soils. Also included are a few areas of intermingled Carpenter, Lenberg, Tilsit, Sensabaugh, and Colyer soils.

On most of the acreage this Trappist soil is used for row crops, small grains, hay, and pasture. This soil is well suited to these uses (fig. 24); however, erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay crops grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Shortleaf pine, loblolly pine, Virginia pine, and eastern white pine are preferred for planting. The use of equipment is moderately limited on this soil because of high clay content. Plant competition is moderate.

Figure 24.—Pasture in the foreground is in Trappist silt loam, 2 to 6 percent slopes; woodland in the background is in Garmon silt loam, 25 to 60 percent slopes.

This soil is poorly suited to urban uses. Slow permeability, depth to bedrock, high clay content, and shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIe and woodland suitability group 3c.

TpC—Trappist silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on narrow ridges and side slopes at the base of the Knobs. Areas range from 5 to 25 acres. They are about 170 to 900 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 30 inches is strong brown silty clay loam in the upper part and yellowish brown silty clay mottled in shades of red in the lower part. The substratum to a depth of about 34 inches is yellowish red extremely shaly silty clay. Hard, black, acid shale bedrock is at a depth of about 34 inches.

This soil is medium in natural fertility and moderate in organic matter content. It is extremely acid to strongly acid except where limed. Permeability is slow, and available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of deep, well drained, loamy soils and areas of deep, well drained, clayey soils; deep, somewhat poorly drained, clayey soils; and shallow, eroded, well drained, clayey soils. Also included are a few areas of intermingled Carpenter, Lenberg, Colyer, and Sensabaugh soils.

On most of the acreage this Trappist soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains, but steepness of slope and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay crops grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is suited to woodland, but it is not used extensively for woodland production. Shortleaf pine, Virginia pine, loblolly pine, and eastern white pine are preferred for planting. The use of equipment is moderately limited on this soil because of high clay content. Plant competition is moderate.

This soil is poorly suited to most urban uses. Slow permeability, depth to bedrock, high clay content, and shrink-swell potential are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 3c.

VeC—Vertrees silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on narrow, convex ridgetops and upper side slopes in the Knobs. Areas range from 5 to 100 acres. They are about 200 to 400 feet wide.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 64 inches is brown silty clay loam in the upper part, red clay in the middle part, and yellowish red clay in the lower part.

This soil is medium in natural fertility and moderate in organic matter content. It is very strongly acid to neutral in the surface layer and very strongly acid to medium acid in the subsoil. Permeability is moderately slow, and available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are areas of soils in which limestone or siltstone bedrock is at a depth of 40 to 60 inches. Also included are a few areas of intermingled Caneyville soils.

On most of the acreage this Vertrees soil is used for row crops, small grains, hay, and pasture. This soil is suited to row crops and small grains, but steepness of slope is a limitation. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including no-tillage and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay crops grown in the area. Plants and seeding rates should be selected that provide an adequate amount of forage and ground cover. Frequent renovation of pasture is needed. Applications of lime and fertilizer, maintenance of proper stocking rates, use of rotational grazing, and control of weeds are important management practices.

This soil is well suited to woodland. Yellow-poplar, Virginia pine, white ash, black oak, and northern red oak are preferred for planting. The use of equipment is moderately limited on this soil because of the high clay content. Plant competition is moderate.

This soil is suited to most urban uses. Moderately slow permeability, steepness of slope, moderate shrink-swell potential, high clay content, and low strength are limitations. Some of these limitations can be overcome by proper engineering techniques.

This soil is in capability subclass IIIe and woodland suitability group 2c.

prime farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Boyle and Mercer Counties are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in providing the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They are either used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation. The temperature and growing season are acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Almost 93,000 acres or slightly more than 33 percent of Boyle and Mercer Counties meets the soil requirements for prime farmland. Areas are scattered throughout the survey area but most of them are in general soil map units 2, 4, 7, 8, 9, and 11. Approximately 55,000 acres of this prime farmland is used for crops. Crops grown on this land, mainly corn, burley tobacco, soybeans, wheat, and alfalfa, account for an estimated one-fourth of the survey area's total agricultural income each year (*16*).

A recent trend in land use in some parts of the survey area has been the conversion of some prime farmland to industrial and urban uses (fig. 25). The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate, and usually are less productive than prime farmland.

The following map units, or soils, make up prime farmland in Boyle and Mercer Counties. On some soils included in the list, appropriate measures have been applied to overcome a hazard or limitation, such as flooding, wetness, or droughtiness. The location of each map unit is shown on the detailed soil map at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed soil map units." This list does not constitute a recommendation for a particular land use.

Bo	Boonesboro silt loam (where protected from flooding)
CaB	Caleast silt loam, 2 to 6 percent slopes
CgB	Carpenter gravelly silt loam, 2 to 6 percent slopes
CmB	Chenault gravelly silt loam, 2 to 6 percent slopes
Du	Dunning silty clay loam (where artificially drained and protected from flooding)
EkA	Elk silt loam, 0 to 2 percent slopes
EkB	Elk silt loam, 2 to 6 percent slopes
LoB	Lowell silt loam, 2 to 6 percent slopes
MaA	Maury silt loam, 0 to 2 percent slopes
MaB	Maury silt loam, 2 to 6 percent slopes
McB	McAfee silt loam, 2 to 6 percent slopes
Mg	McGary silt loam
Ne	Newark silt loam (where artificially drained and protected from flooding)
NhB	Nicholson silt loam, 2 to 6 percent slopes
No	Nolin silt loam (where protected from flooding)
Se	Sensabaugh gravelly silt loam (where protected from flooding)
TlA	Tilsit silt loam, 0 to 2 percent slopes
TlB	Tilsit silt loam, 2 to 6 percent slopes
TpB	Trappist silt loam, 2 to 6 percent slopes

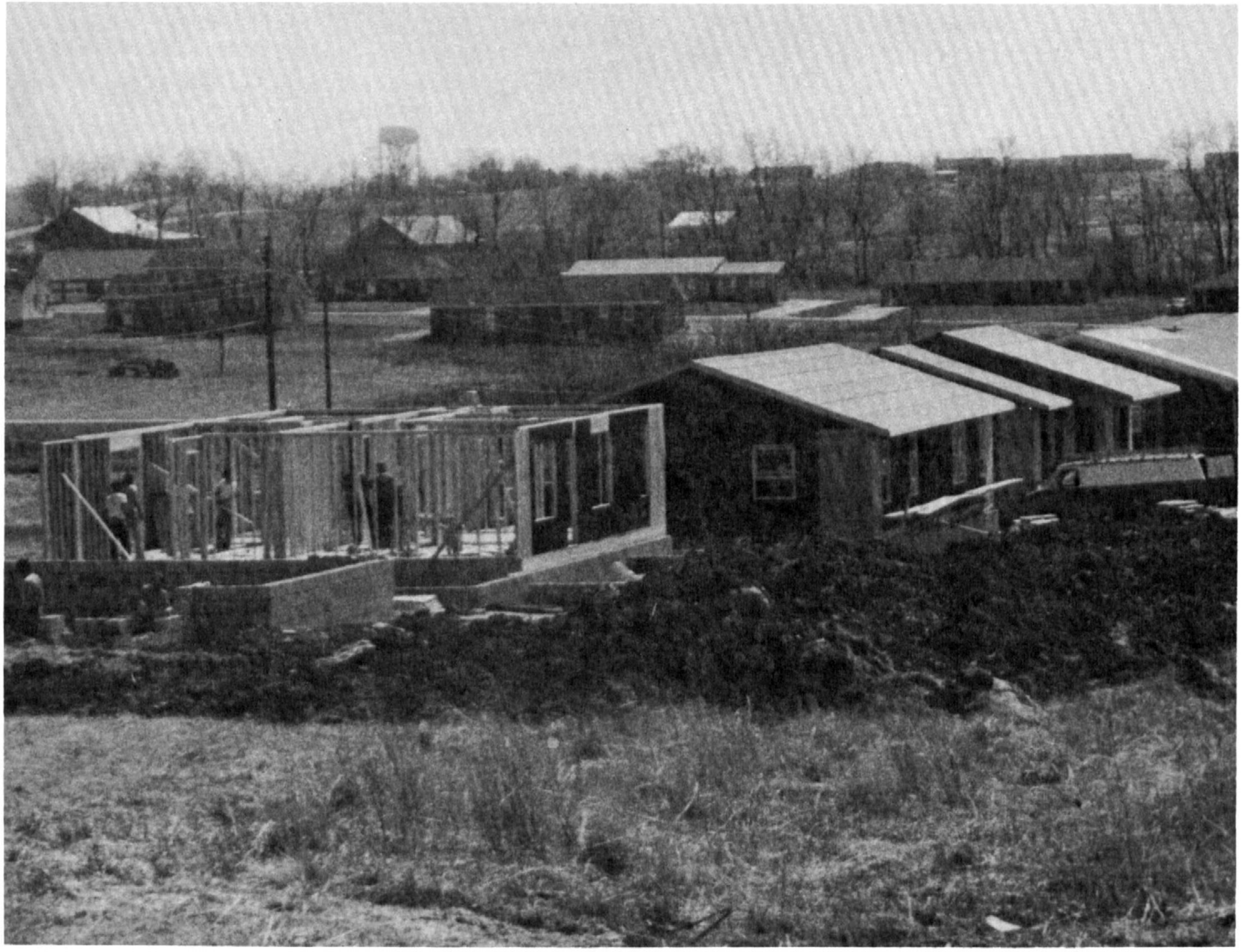


Figure 25.—Urban development in an area of Maury silt loam, 2 to 6 percent slopes.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

Henry Amos, conservation agronomist, Soil Conservation Service, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Nearly 224,000 acres in the survey area was used for crops and pasture in 1967, according to the Kentucky Soil and Water Conservation Needs Inventory, 1970 (*15*). Of this total, 111,000 acres was used for permanent pasture; 21,000 acres for row crops, mainly corn and tobacco; 6,000 acres for close-growing crops, mainly wheat; 66,000 acres for rotation hay and pasture; and 11,000 acres for hay. About 7,000 acres was in conservation use. The rest of the acreage was mainly idle cropland.

The soils in Boyle and Mercer Counties have good potential for increased production of food. About 2,400 acres of potentially good cropland is currently used as woodland, and about 45,000 acres is pasture. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can help facilitate the application of such technology.

Acreage in crops and pasture has been decreasing as more and more land is used for urban development. In 1967, there was about 11,000 acres of urban and built up land in the survey area, and the rate has increased about 120 acres per year since that time. The use of this soil survey to help make land use decisions that will influence the future role of farming in the survey area is discussed in the section "General soil map for broad land use planning."

Soil erosion is the major concern on about 83 percent of the cropland and pasture in Boyle and Mercer Counties. If slope is more than 2 percent, erosion is a hazard. Caleast, Chenault, Lowell, McAfee, Trappist, and Vertrees soils, for example, have slopes of more than 2 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as the Eden, Faywood, and Lowell soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include fragipans, as in the Nicholson and Tilsit soils, or bedrock, as in the Caneyville, Lenberg, Colyer, Trappist, Culleoka, Eden, Fairmount, Faywood, and McAfee soils. Erosion also reduces productivity on soils that tend to be droughty, such as the Colyer soils. Second, soil erosion on farmland results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, preparing a good seedbed is difficult on clayey soils because the original friable surface layer has been eroded. Such areas are common in the Eden, Faywood, and Lowell soils.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover on the soil for extended periods generally can hold soil erosion losses to amounts that will not reduce the productivity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on the sloping land, and also provide nitrogen and improve tilth for the following crop.

Minimizing tillage and leaving crop residue on the surface help to increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area. No-tillage for corn and double cropped soybeans, which is increasing in the survey area, is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area (fig. 26). No-tillage is more difficult to practice successfully on soils that have a clayey surface layer, such as the severely eroded Faywood and Lowell soils, than on soils that have a loamy surface layer.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Elk soil, and in some places, Chenault and Carpenter soils, are suitable for terraces. Other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in terrace channels, a clayey subsoil that would be exposed in terrace channels, or bedrock at a depth of less than 40 inches.

Contouring and contour stripcropping are widespread erosion control practices in the survey area. They are best adapted to soils that have smooth, uniform slopes, including most areas of the gently sloping Elk, Nicholson, and Tilsit soils, the gently sloping and sloping Caleast, Carpenter, Chenault, Lowell, Maury, McAfee, and Trappist soils, and the sloping Eden and Vertrees soils.

Information for the design of erosion control practices for each kind of soil is contained in the Technical Guide, available in local offices of the Soil Conservation Service.

Figure 26.—No-till soybeans following wheat in an area of Maury silt loam, 2 to 6 percent slopes.

Soil drainage is the main management need on about 2 percent of the acreage used for crops and pasture in the survey area. Some of the soils are so wet that the production of crops common to the area is generally not possible. An example is the very poorly drained Dunning soil.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years. In this group are the McGary and Newark soils. These soils make up about 1,870 acres.

Small areas of wetter soils along drainageways are commonly included in areas of the moderately well drained Nicholson and Tilsit soils. Artificial drainage is not generally practiced on these soils because they have a hard, compact, brittle layer or fragipan in the subsoil that limits the depth to which tile drainage can be placed to function properly. Ditches have been used in some areas of these soils to improve the drainage.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the somewhat poorly drained McGary and Newark soils and the poorly drained to very poorly drained Dunning soils if they are used for intensive row cropping. Drains have to be more closely spaced in slowly permeable soils than in more permeable soils. Tile drainage is very slow in the McGary and Dunning soils.

Soil fertility is naturally low or medium in the soils on the uplands in the survey area. Soils on the flood plains, such as the Boonesboro, Dunning, Newark, Nolin, and Sensabaugh soils, range from medium acid to moderately alkaline and are naturally higher in plant nutrients than most of the soils on the uplands.

Many soils on uplands and stream terraces are very strongly acid to medium acid in their natural state. If they have never been limed, applications of ground limestone are needed to raise the pH level sufficiently for good growth of alfalfa and other crops that grow only on nearly neutral soils. Levels of available phosphorus and potash are naturally low in most of these soils except for the Lowell soil, which has a medium level of phosphorus, and the Maury, Caleast, McAfee, and Fairmount soils, which have high levels of phosphorus. On all soils, additions of lime and fertilizer should be based on the results of soils tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Some of the soils used for crops in the survey area have a surface layer of silt loam that is light in color and low in organic matter content. Generally the structure of such soils is weak, and intense rainfall causes the formation of a crust on the surface. The crust is hard when dry and nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic matter can help improve soil structure and reduce crust formation.

Fall plowing is generally not a good practice on the light colored soils that have a surface layer of silt loam because a crust forms on these soils during winter and spring. Many of the soils are nearly as dense and hard at planting time after fall plowing as they were before they were plowed. In addition, about four-fifths of the cropland consists of sloping soils that are subject to damaging erosion if they are plowed in the fall.

The dark Dunning soils are clayey, and tilth is a concern because the soils often stay wet until late in spring. If they are wet when plowed, they tend to become very cloddy when dry, and good seedbeds are difficult to prepare. Fall plowing on such soils generally results in good tilth in the spring. Clayey, severely eroded soils, such as the Lowell and Faywood soils, become cloddy if they are plowed beyond the narrow moisture range which is optimum for preventing or minimizing clodding.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn, burley tobacco, and soybeans are the predominant row crops. Grain sorghum, sunflowers, and other similar crops can be grown if economic conditions are favorable.

Wheat is the common close-growing crop. Rye, barley, and oats could be grown, and grass seed could be produced from fescue, orchardgrass, and bluegrass.

Special crops grown in the survey area are vegetables, small fruits, tree fruits, and many nursery plants. A small acreage is used for melons, strawberries, sweet corn, tomatoes, peppers, and other vegetables and small fruits. Apples and peaches are the most important tree fruits grown in the survey area.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. In the survey area these are the Caleast, Carpenter, Chenault, Elk, Lowell, and Maury soils that have slopes of less than 6 percent. They make up about 50,000 acres. The Elk soils on slopes of less than 2 percent are less suited to vegetable and fruit crops because they are subject to flooding. Crops can generally be planted and harvested earlier on all of these soils than on other soils in the survey area.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. Soils in low positions where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

pasture and hayland

The 1970 Conservation Needs Inventory (*15*) indicated that approximately one-half of the pasture and hayland in Boyle and Mercer Counties was adequately treated. About 10 percent of the pasture and hayland needed reestablishment, and a large acreage needed improvement, brush control, and protection from overgrazing. Other management concerns included selecting adapted forage plants, maintaining or improving soil fertility, rotating grazing, managing brush, controlling weeds and insects, and maintaining adequate drainage.

The local office of the Soil Conservation Service can assist in planning soil management for crops and pasture.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass (*23*) are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

Charles A. Foster, forester, Soil Conservation Service, assisted in preparing this section.

Boyle and Mercer Counties are in the western Mesophytic forest region. Woodland occupies 21,000 acres or 18 percent of Boyle County and 20,300 acres or 12 percent of Mercer County. The oak-hickory forest type is most extensive.

Woodland tracts in the survey area are small private holdings of approximately 24 acres. They are essentially unmanaged. Most of the soils have the capability of producing 50 cubic feet or more of wood per acre per year, but actual production is about 33 cubic feet. An obstacle to management is that 30 percent of the land owners own woodland because it happens to be part of a farm or tract. Stands are not optionally stocked with desirable, high quality trees, and many areas have been owned fewer than 10 years.

If proper management were encouraged, tree growth, stocking, and quality could be improved. Such management would include the removal of low quality trees of all sizes in fully stocked and understocked stands and the regeneration of sawtimber stands after harvest. This soil survey can be useful in helping to identify the most productive forest lands, soil limitations for management, and tree species to favor for planting.

Three commercial sawmills and three pallet mills are in Boyle and Mercer Counties. Products include rough lumber, crossties, dimension stock, posts, cants, squares, and new and rebuilt pallets. In addition, several mills in adjacent counties buy logs and standing trees from the survey area.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at age 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands (*5, 8, 9, 10, 11, 13, 19, 20*). Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

William H. Casey, biologist, Soil Conservation Service, assisted in preparing this section.

The wildlife of Boyle and Mercer Counties consists of about 33 species of mammals, 34 species of reptiles and amphibians, and 89 species of nesting birds. In addition, many of the more than 200 other kinds of birds that visit Kentucky each year come to these counties during certain seasons.

The most important kinds of wildlife in Boyle and Mercer Counties are cottontail rabbits, gray squirrels, fox squirrels, white-tailed deer, raccoons, red foxes, mink, muskrats, bobwhite quail, mourning doves, and wood ducks. Although there is much overlap in the type of habitat required by these animals, white-tailed deer and gray squirrels are classified as woodland wildlife and rabbits, quail, and doves, as openland wildlife. Ducks, shore birds, and animals that spend much of their time in or about water, such as mink and muskrats, are classified as wetland wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants (*3*).

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife (*29*). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, Kentucky bluegrass, white clover, alfalfa, and orchardgrass.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, aster, tickclover, and cinquefoil.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are Virginia pine and redcedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlarks, field sparrows, cottontails, and red foxes.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkeys, woodcock, thrushes, woodpeckers, squirrels, gray foxes, raccoons, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrats, mink, and beaver.

engineering

Richard L. Quiggins, area engineer, Soil Conservation Service, assisted in preparing this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas (*24*). Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability (*21*) is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

physical and chemical analyses of selected soil

The results of physical analysis of a typical pedon in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for a soil sampled at a carefully selected site. The pedon is typical of the series and is described in the section "Soil series and their morphology." The soil sample was analyzed by the Kentucky Agricultural Experiment Station.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (*25*).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all materials less than 75 mm (3B1).

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) by difference weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (602), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).

Reaction (pH)—potassium chloride (8C1c).

Available phosphorus—procedure (656) Ky. Agric. Exp. Stn.

engineering index test data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and their morphology." The soil samples were tested by the Division of Research, Bureau of Highways, Department of Transportation, Commonwealth of Kentucky.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) (*1*) or the American Society for Testing and Materials (ASTM) (*2*).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM); California bearing ratio—T 193 (AASHTO), D 1883 (ASTM).

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*26*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 20, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning udic moisture regime, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalfs*, the suborder of the Alfisols that have an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*22*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*26*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Boonesboro series

The Boonesboro series consists of moderately deep, well drained soils that formed in mixed alluvium from soils formed in residuum of weathered limestone, shale, or siltstone. Permeability is moderate. These nearly level to gently sloping soils are on narrow flood plains in the Inner Bluegrass and the Hills of the Bluegrass. Slope ranges from 0 to 4 percent.

Boonesboro soils are in positions on the landscape similar to those of the Nolin, Dunning, and Newark soils. In Nolin soils bedrock is at a depth of more than 60 inches and coarse fragments are less than 5 percent throughout the solum. In Dunning soils bedrock is at a depth of more than 60 inches. Dunning soils do not have coarse fragments throughout the solum, and they are clayey. In Newark soils bedrock is at a depth of more than 60 inches. There is less than 15 percent coarse fragments in the upper 40 inches, and a dominantly gray layer is in the upper 24 inches.

Typical pedon of Boonesboro silt loam, about 2.5 miles southeast of Danville on Kentucky Highway 34 and 1.1 miles west of U.S. Highway 127 bypass; 50 feet south of Kentucky Highway 34, in a pasture:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; clear smooth boundary.

A1—7 to 18 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; common fine roots; neutral; clear smooth boundary.

B1—18 to 25 inches; brown (10YR 4/3) silty clay loam; weak medium subangular structure; friable; few fine roots; few fine black concretions; neutral; gradual smooth boundary.

B2—25 to 34 inches; brown (7.5YR 4/4) gravelly silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; 20 percent pebbles as much as 1/4 inch across; common fine dark brown concretions; neutral; abrupt smooth boundary.

R—34 inches; hard, gray limestone.

The thickness of the solum and depth to limestone bedrock range from 20 to 40 inches. Content of pebbles ranges from 0 to 5 percent in the A and B1 horizons and from 15 to 20 percent in the B2 and C horizons. Reaction ranges from slightly acid to moderately alkaline throughout.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

The B1 horizon in most pedons has hue of 10YR, value of 4, and chroma of 3 or 4. It is silty clay loam or silt loam. The B2 horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 3 or 4. It is gravelly silty clay loam or gravelly silt loam.

The C horizon in some pedons is 3 to 5 inches thick. Color and texture in the C horizon are similar to those of the B2 horizon.

This Boonesboro soil is a taxadjunct to the Boonesboro series because the surface layer has value one unit higher than the official series description, and the B1 horizon has less than 15 percent pebbles.

Caleast series

The Caleast series consists of deep, well drained soils that formed in residuum of weathered limestone. Permeability is moderately slow. These gently sloping to moderately steep soils are on karst ridgetops and side slopes in the Inner Bluegrass. Slope ranges from 2 to 20 percent.

Caleast soils are in positions on the landscape similar to those of the Maury, McAfee, Fairmount, Chenault, McGary, Nicholson, and Faywood soils. Maury soils are on broad, adjacent karst ridgetops and side slopes and have a solum more than 60 inches thick. McAfee soils are on adjacent karst ridgetops and side slopes. Bedrock is at a depth of 20 to 40 inches. Fairmount soils are on adjacent karst ridgetops and lower lying karst side slopes. Bedrock is at a depth of 10 to 20 inches. The fine-loamy Chenault soils are on higher lying and adjacent karst ridgetops and side slopes along the Kentucky and Dix Rivers. The somewhat poorly drained McGary soils are on lower lying and adjacent foot slopes and benches. Nicholson soils are on adjacent karst ridgetops and have a fragipan. Faywood soils are on lower lying side slopes at the Hills of the Bluegrass and the Inner Bluegrass geologic boundary. Bedrock is at a depth of 20 to 40 inches.

Typical pedon of Caleast silt loam, in an area of Caleast silt loam, 2 to 6 percent slopes, about 5 miles south of Harrodsburg on U.S. Highway 127 and 0.5 mile east of U.S. Highway 127 on a private drive; 350 feet north of the intersection of the private drive and a railroad, in a field:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; moderate fine and medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

B1—8 to 14 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular structure; very firm; few fine roots; common clay films on faces of peds; slightly acid; clear smooth boundary.

B2t—14 to 41 inches; brown (7.5YR 4/4) clay; moderate medium angular blocky structure; very firm; few fine roots; patchy clay films on faces of peds; few fine reddish black concretions; slightly acid; gradual smooth boundary.

B3—41 to 48 inches; strong brown (7.5YR 5/6) clay; few fine distinct light brownish gray (10YR 6/2) mottles; weak fine and medium angular blocky structure; very firm; few fine roots; common clay films on faces of peds; few fine reddish black concretions; slightly acid; gradual smooth boundary.

C—48 to 53 inches; strong brown (7.5YR 5/6) clay; common medium distinct yellowish brown (10YR 5/4) and few fine distinct light brownish gray (10YR 6/2) mottles; massive; very firm; neutral; abrupt smooth boundary.

R—53 inches; hard limestone.

The thickness of the solum ranges from 40 to 60 inches, and the depth to limestone bedrock ranges from 40 to 80 inches. Content of chert and limestone fragments ranges from 0 to 5 percent. Reaction ranges from medium acid to mildly alkaline.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The B1 horizon in most pedons has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4. The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay or clay. Mottles are in shades of brown in some pedons. A B3 horizon in most pedons has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 or 6. Mottles are in shades of brown or gray.

The C horizon in most pedons has a color range similar to that of the B3 horizon.

Caneyville series

The Caneyville series consists of moderately deep, well drained soils. Permeability is moderately slow. These soils formed in residuum of weathered limestone. They are sloping to moderately steep and are on narrow ridgetops and upper side slopes in the Knobs. Slope ranges from 6 to 20 percent.

Caneyville soils are in positions on the landscape similar to those of the Culleoka, Vertrees, and Garmon soils. The fine-loamy Culleoka soils are on adjacent and lower lying side slopes. Vertrees soils are on higher lying, convex ridges and adjacent side slopes and have a solum more than 60 inches thick. The fine-loamy Garmon soils are on lower side slopes. They do not have an argillic horizon.

Typical pedon of Caneyville silt loam, in an area of Caneyville-Rock outcrop complex, 6 to 20 percent slopes, about 11 miles west of Danville on Kentucky Highway 34 and 1.2 miles south of Kentucky Highway 34 on Kentucky Highway 1108; 900 feet west of Kentucky Highway 1108 on White Ridge Road; 200 feet south of White Ridge Road:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

B21t—8 to 18 inches; reddish brown (5YR 4/4) silty clay; few fine faint light brown (7.5YR 6/4) mottles; moderate fine and medium angular blocky structure; very firm; common fine roots; common clay films on faces of peds; few brown stains on peds; medium acid; clear smooth boundary.

B22t—18 to 26 inches; reddish brown (5YR 4/4) clay; common medium distinct pale brown (10YR 6/3) mottles; weak medium angular blocky structure; very firm; few fine roots; few clay films on faces of peds; few brown stains on peds; slightly acid; clear smooth boundary.

C—26 to 35 inches; brown (7.5YR 4/4) clay; massive; very firm; few fine brown concretions; neutral; abrupt smooth boundary.

R—35 inches; hard, gray, coarse grained limestone.

The thickness of the solum and the depth to limestone bedrock range from 20 to 40 inches. Content of chert, limestone, or siltstone fragments ranges from 0 to 10 percent throughout. Reaction ranges from very strongly acid to neutral in the A and B21t horizons and from medium acid to neutral in the B22t and C horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 2 to 4. It is silt loam or silty clay loam. The A1 horizon is 3 to 5 inches thick in some pedons. It has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon is 1 to 6 inches thick in some pedons. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The A1 and A2 horizons are silt loam.

The B1 horizon in some pedons is 4 to 7 inches thick. It has hue of 10YR or 7.5YR, value of 5, and chroma of 4 to 6. The B1 horizon is silty clay loam. The B21t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4 to 6. It is clay, silty clay, or silty clay loam. Mottles are in shades of brown. The B22t horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 or 6. It is clay or silty clay. Mottles are in shades of brown or red. The B2t horizon does not have hue of 2.5YR throughout.

The C horizon in most pedons has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay or silty clay. If present, mottles are in shades of brown, red, or gray.

Carpenter series

The Carpenter series consists of deep, well drained, moderately permeable soils that formed in loamy colluvium over residuum of weathered shale or siltstone. These gently sloping to steep soils are on colluvial side slopes, foot slopes, and narrow, low ridges in the Knobs. Slopes range from 2 to 30 percent.

Carpenter soils are in positions on the landscape similar to those of the Garmon, Lenberg, Colyer, Trappist, and Tilsit soils. Garmon soils are on adjacent and higher lying side slopes and narrow ridgetops. Hard bedrock is at a depth of 20 to 40 inches. The clayey Lenberg soils are on adjacent side slopes. Rippable bedrock is at a depth of 20 to 40 inches. The clayey-skeletal Colyer soils are on lower lying side slopes. Hard bedrock is at a depth of 10 to 20 inches. The clayey Trappist soils are on lower lying side slopes and narrow low ridges. Hard bedrock is at a depth of 20 to 40 inches. The fine-silty Tilsit soils are on lower lying broad ridges and have a fragipan.

Typical pedon of Carpenter gravelly silt loam, in an area of Carpenter-Lenberg complex, 12 to 30 percent slopes, about 12 miles southwest of Danville on Carpenter's Fork road and 0.25 mile southeast of Carpenter's Fork road on Wildlife Farm road; 200 feet east of Wildlife Farm road, in a wooded area:

Ap—0 to 6 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; very friable; many medium and coarse roots; 15 percent subrounded fragments of siltstone and shale as much as 2 inches across; strongly acid; clear smooth boundary.

B1—6 to 13 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; friable; many medium roots; 10 percent subrounded fragments of siltstone and shale as much as 2 inches across; strongly acid; clear smooth boundary.

B2t—13 to 43 inches; light olive brown (2.5Y 5/4) gravelly silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common medium roots; common clay films on faces of peds; 15 percent subrounded fragments of siltstone and shale as much as 2 inches across; strongly acid; clear smooth boundary.

IIC—43 to 58 inches; mottled yellowish brown (10YR 5/8), light yellowish brown (2.5Y 6/4), and light brownish gray (2.5Y 6/2) channery silty clay; massive; very firm; 20 percent fragments of siltstone and shale as much as 2 inches across; medium acid; clear smooth boundary.

IICr—58 to 70 inches; gray (10YR 6/1) soft shale; weak thick relic shale structure.

The thickness of the solum ranges from 40 to 60 inches, and the depth to shale or siltstone bedrock ranges from 40 to 80 inches or more. Content of coarse fragments ranges from 5 to 20 percent in the A horizon, from 5 to 35 percent in the B and C horizons, and from 5 to 20 percent in the IIB and IIC horizons. Reaction ranges from very strongly acid to slightly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam, loam, or the gravelly, channery, or shaly analogues. The A1 horizon is 1 inch to 3 inches thick in some pedons. It has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Texture ranges are similar to those of the Ap horizon. The A2 horizon is 5 to 10 inches thick in some pedons. It has color and texture ranges similar to those of the Ap horizon.

The B1 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Some pedons have a few to many silt coatings. It is silt loam, silty clay loam, or the gravelly, channery, or shaly analogues. The B2t horizon has hue of 7.5YR, 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 4 to 8. Some pedons have a few to many silt coatings in the upper part. The B2t horizon is silty clay loam, clay loam, loam, or the gravelly, channery, or shaly analogues. Mottles in shades of brown, red, or gray are in the lower part of most pedons. The IIB3 horizon is 5 to 15 inches thick in some pedons. It has color ranges similar to those of the B2t horizon. The IIB3 horizon is silty clay loam, silty clay, clay, or the channery or cherty analogues. Mottles are in shades of brown, red, or gray.

The IIC horizon has color and texture ranges similar to those of the IIB3 horizon.

Chenault series

The Chenault series consists of deep, well drained soils that formed in old alluvium over limestone or in residuum of weathered limestone. Permeability is moderate. These gently sloping to moderately steep soils are on karst areas on ridgetops and side slopes on old high terraces along the Kentucky and Dix Rivers. Slope ranges from 2 to 20 percent.

Chenault soils are in positions on the landscape similar to those of the Fairmount, McAfee, and Caleast soils. The associated soils are on adjacent and lower lying karst ridgetops and side slopes. Fairmount soils have limestone bedrock at a depth of 10 to 20 inches, and McAfee soils have limestone bedrock at a depth of 20 to 40 inches. All of the associated soils are more than 35 percent clay in the control section.

Typical pedon of Chenault gravelly silt loam, in an area of Chenault gravelly silt loam, 6 to 12 percent slopes, about 9 miles northeast of Harrodsburg on U.S. Highway 68 and 0.8 mile north of U.S. Highway 68 on a private road; 300 feet northwest of cemetery:

Ap—0 to 11 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; very friable; common fine roots; 15 percent pebbles and subrounded chert; strongly acid; abrupt smooth boundary.

B21t—11 to 23 inches; brown (7.5YR 4/4) gravelly silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; 30 percent pebbles and subrounded chert; medium acid; gradual smooth boundary.

B22t—23 to 41 inches; brown (7.5YR 4/4) gravelly silty clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; common clay films on faces of peds; many fine black concretions; 15 percent pebbles and subrounded chert; medium acid; clear smooth boundary.

IIB3—41 to 49 inches; dark yellowish brown (10YR 4/4) gravelly clay; many fine and medium distinct very dark gray (10YR 3/1) mottles; weak fine and medium subangular blocky structure; very firm; few fine roots; few clay films on faces of peds; 30 percent pebbles and subrounded chert; medium acid; abrupt smooth boundary.

IIR—49 inches; hard, gray limestone.

The thickness of the solum ranges from 40 to 60 inches, and the depth to limestone bedrock ranges from 40 to 80 inches. Content of coarse fragments ranges from 5 to 30 percent in the A horizon, from 10 to 30 percent in the B2t horizon, and from 5 to 30 percent in the IIB3 and IIC horizons. Reaction ranges from strongly acid to neutral in the A horizon, from strongly acid to slightly acid in the B2t horizon, and from medium acid to neutral in the IIB3 and IIC horizons.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, loam, or the gravelly analogues.

The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, clay loam, loam, or the gravelly analogues. Mottles are in shades of brown in the lower part of the B2t horizon in most pedons. In most pedons the IIB3 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. The IIB3 horizon is silty clay loam, silty clay, clay, or the gravelly analogues. Mottles are in shades of brown or gray.

The IIC horizon is 4 to 18 inches thick in some pedons, and is mottled in hue of 7.5YR or 10YR, value of 3 to 7, and chroma of 1 to 8. It is silty clay, clay, or the gravelly or cherty analogues.

Colyer series

The Colyer series consists of shallow, well drained, slowly permeable soils that formed in residuum of weathered black, fissile shale. These moderately steep to steep soils are on side slopes, ridgetops, and cone shaped hills at the base of the Knobs. Slope ranges from 12 to 30 percent.

Colyer soils are in positions on the landscape similar to those of the Trappist, Lenberg, Tilsit, and Carpenter soils. The clayey Trappist soils are on adjacent ridgetops and side slopes. Black shale bedrock is at a depth of 20 to 40 inches. The clayey Lenberg soils are on higher lying side slopes than Colyer soils. Gray shale bedrock is at a depth of 20 to 40 inches. The fine-silty Tilsit soils are on adjacent and lower lying broad ridges and have a fragipan. The fine-loamy Carpenter soils are on higher lying side slopes, foot slopes, and benches. Bedrock is at a depth of more than 40 inches.

Typical pedon of Colyer silt loam, in an area of Colyer-Trappist complex, 12 to 30 percent slopes, about 10 miles southwest of Danville on Kentucky Highway 37 and 0.2 mile south of Kentucky Highway 37 on Carpenter's Fork road; 200 feet west of a private drive, in a wooded area:

A1—0 to 1 inches; dark grayish brown (10YR 4/2) silt loam; weak fine crumb structure; very friable; many fine roots; 10 percent fragments of shale as much as 1 inch across; medium acid; abrupt smooth boundary.

A2—1 to 6 inches; brown (10YR 4/3) silt loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; many fine roots; 10 percent fragments of shale as much as 1 inch across; strongly acid; clear smooth boundary.

B2—6 to 14 inches; brown (7.5YR 4/4) very shaly silty clay loam; weak medium subangular blocky structure; firm; many fine roots; 40 percent fragments of shale as much as 1 inch across; very strongly acid; gradual smooth boundary.

C—14 to 18 inches; brown (7.5YR 4/4) extremely shaly silty clay loam; massive; firm; few medium roots; 80 percent fragments of shale as much as 3 inches across; extremely acid; abrupt wavy boundary.

R—18 inches; hard, black, fissile shale.

The thickness of the solum and the depth to black, fissile shale bedrock ranges from 10 to 20 inches. Content of shale fragments ranges from 5 to 20 percent in the A horizon, from 35 to 55 percent in the B2 horizon, and from 50 to 90 percent in the C horizon. Reaction ranges from medium acid to very strongly acid in the A horizon and is very strongly acid or extremely acid in the B2 and C horizons.

The A1 horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. The A1 and A2 horizons are silt loam, silty clay loam, or the shaly analogues. Some pedons have an Ap horizon 2 to 6 inches thick. The Ap horizon has color and texture ranges similar to those of the A2 horizon.

The B2 horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 or 6. Texture is the shaly or very shaly analogues of silty clay loam, silty clay, or clay.

The C horizon has a color range similar to that of the B2 horizon. Texture is very shaly silty clay loam, very shaly silty clay, or very shaly clay.

Culleoka series

The Culleoka series consists of moderately deep, well drained soils that formed in residuum of weathered siltstone, limestone, or fine grained sandstone. Permeability is moderate to moderately rapid. These moderately steep soils are on upper side slopes in the Knobs. Slope ranges from 12 to 20 percent.

Culleoka soils are in positions on the landscape similar to those of the Caneyville, Vertrees, and Garmon soils. The clayey Caneyville soils are on higher lying, convex ridges and adjacent side slopes. Vertrees soils are on higher lying, convex ridges and have a solum more than 60 inches thick. Garmon soils are on lower lying side slopes. They do not have an argillic horizon.

Typical pedon of Culleoka channery silt loam, in an area of Culleoka-Caneyville complex, 12 to 20 percent slopes, about 14 miles west of Danville on U.S. Highway 68 and 1,500 feet south of U.S. Highway 68 on a private road; 400 feet west of the private road:

Ap—0 to 8 inches; brown (10YR 4/3) channery silt loam; weak fine granular structure; very friable; common fine roots; 20 percent fragments of siltstone as much as 3 inches across; medium acid; abrupt smooth boundary.

B21t—8 to 25 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; common clay films on faces of peds; 15 percent fragments of siltstone as much as 1 inch across; strongly acid; gradual smooth boundary.

B22t—25 to 39 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common clay films on faces of peds; 10 percent fragments of siltstone as much as 1 inch across; strongly acid; abrupt wavy boundary.

Cr—39 to 52 inches; soft, yellowish brown siltstone; less weathered and slightly harder as depth increases.

The thickness of the solum and depth to siltstone, limestone, or fine grained sandstone bedrock ranges from 20 to 40 inches. Content of coarse fragments ranges from 0 to 20 percent in the A horizon and from 5 to 35 percent in the B horizons. Reaction ranges from strongly acid to medium acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is silt loam or channery silt loam.

Some pedons have a B1 horizon 4 to 6 inches thick. This horizon has hue of 10YR, value of 4 or 5, and chroma of 4. The B1 horizon is silt loam, silty clay loam, or the channery analogues. The B21t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, silt loam, or the channery analogues. The B22t horizon has a color range similar to that of the B21t horizon. It is silty clay loam or channery silty clay loam. Mottles are in shades of brown in some pedons. Some pedons have a B23t horizon 4 to 16 inches thick. This horizon has hue of 7.5YR, value of 5, and chroma of 6. The texture range is similar to that of the B22t horizon. Mottles are in shades of brown.

Dunning series

The Dunning series consists of deep, very poorly drained to poorly drained soils that formed in slack water alluvium that washed chiefly from soils formed in residuum of weathered limestone. Permeability is slow. These nearly level soils are on flood plains, in narrow valleys, and in upland depressions in the Hills of the Bluegrass and the Inner Bluegrass. Slope ranges from 0 to 2 percent.

Dunning soils are in positions on the landscape similar to those of the Boonesboro, Newark, Nolin, and McGary soils. Bedrock is at a depth of 20 to 40 inches in the well drained Boonesboro soils. Newark soils are somewhat poorly drained, and Nolin soils are well drained. Both soils are fine-silty. The somewhat poorly drained McGary soils are on adjacent stream terraces. They have an argillic horizon.

Typical pedon of Dunning silty clay loam, about 1.5 miles west of Danville on U.S. Highway 150; 2.0 miles north of U.S. Highway 150 on U.S. Highway 127 bypass; 2,500 feet west of U.S. Highway 127 bypass, in a pasture:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium granular structure; friable; many fine roots; neutral; clear smooth boundary.

A1g—7 to 14 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine angular blocky structure; firm; many fine roots; few fine strong brown concretions; slightly acid; clear smooth boundary.

Bg—14 to 42 inches; dark gray (10YR 4/1) silty clay; few medium distinct brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; firm; few fine roots; few medium strong brown concretions; neutral; clear smooth boundary.

Cg—42 to 60 inches; gray (N 5/0) clay; many medium distinct grayish brown (10YR 5/2) and common fine distinct pale brown (10YR 6/3) mottles; massive; very firm; many medium strong brown concretions; mildly alkaline.

The thickness of the solum ranges from 30 to 50 inches and depth to bedrock is 60 inches or more. Thickness of the mollic epipedon ranges from 12 to 24 inches. Reaction ranges from slightly acid to mildly alkaline throughout.

The Ap and the A1g horizons have hue of 10YR, value of 2 or 3, and chroma of 0 to 2. The Ap horizon is silt loam or silty clay loam, and the A1g horizon is silty clay loam.

The Bg horizon has hue of 10YR, value of 4 or 5, and chroma of 0 to 2. It is silty clay loam, silty clay, or clay. Mottles are in shades of brown or gray.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 0 or 1. It is silty clay or clay. Mottles are in shades of brown, gray, or olive.

Eden series

The Eden series consists of moderately deep, well drained, slowly permeable soils that formed in residuum of weathered, thin bedded siltstone, limestone, and shale. These soils are on sloping to steep side slopes and narrow ridgetops in the Hills of the Bluegrass. Slope ranges from 6 to 30 percent.

Eden soils are associated on the landscape with Lowell and Nicholson soils on ridgetops and with Faywood and Fairmount soils on side slopes. Lowell and Nicholson soils do not have a lithic or paralithic contact within 40 inches of the surface, and Nicholson soils have a fragipan. Fairmount and Faywood soils are shallower to hard rock than Eden soils.

Typical pedon of Eden silty clay loam, in an area of Eden silty clay loam, 6 to 20 percent slopes, about 0.8 mile south of Cornishville, and 0.5 mile west of Kentucky Highway 1941 on Huffman West road; 1,000 feet north of Huffman West road, in a wooded area:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine granular structure; firm; many fine roots; 5 percent fragments of limestone and siltstone as much as 4 inches long; moderately alkaline; abrupt smooth boundary.

B21t—5 to 11 inches; olive brown (2.5Y 4/4) clay; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine angular blocky structure; firm; common fine, medium and coarse roots; common clay films on faces of peds; 10 percent fragments of limestone and siltstone as much as 6 inches long; neutral; clear smooth boundary.

B22t—11 to 16 inches; olive brown (2.5Y 4/4) flaggy clay; moderate medium angular blocky structure; firm; few fine and medium roots; common clay films on faces of peds; 20 percent fragments of limestone and siltstone as much as 8 inches long; neutral; clear smooth boundary.

B23t—16 to 24 inches; yellowish brown (10YR 5/6) flaggy clay; moderate fine and medium angular blocky structure; firm; few very fine, fine, and medium roots; common clay films on faces of peds; 30 percent fragments of limestone and siltstone as much as 9 inches long; neutral; clear smooth boundary.

C—24 to 39 inches; light olive brown (2.5Y 5/4) flaggy clay; few medium distinct brown (10YR 5/3) and few fine prominent dark brown (10YR 3/3) mottles; massive; very firm; 30 percent fragments of limestone and siltstone as much as 10 inches long; moderately alkaline; clear smooth boundary.

Cr—39 to 64 inches; light olive brown (2.5Y 5/4) soft, calcareous shale in beds 8 to 15 inches thick interbedded with fractured, brown siltstone 1/2 inch to 2 inches thick and gray limestone beds 1/2 inch to 4 inches thick.

The thickness of the solum ranges from 14 to 40 inches. Depth to a paralithic contact of interbedded shale, siltstone, and limestone ranges from 20 to 40 inches. Coarse fragments of limestone, siltstone, and shale range from 0 to 25 percent in the A horizon, from 10 to 35 percent in the B horizon, and from 25 to 75 percent in the C horizon. Reaction ranges from strongly acid to moderately alkaline throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam, silty clay, or the flaggy analogues.

Some pedons have a B1 horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam or flaggy silty clay loam. Mottles are in shades of brown. The B2t horizon has a color range similar to that of the B1 horizon. It is silty clay, clay, or the flaggy analogues. Mottles are in shades of brown or olive. Some pedons have a B3 horizon with hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 3 to 6. Texture and mottles are similar to those of the B2t horizon.

The C horizon has hue of 2.5Y, 5Y, or 5GY, value of 4 to 6, and chroma of 0 to 4. It is the flaggy or very flaggy analogues of silty clay or clay. Mottles are in shades of gray, olive, or brown.

Elk series

The Elk series consists of deep, well drained soils that formed in mixed alluvium from soils developed in residuum of weathered limestone, siltstone, shale, or sandstone. Permeability is moderate. These nearly level to gently sloping soils are on stream terraces throughout the survey area. Slope ranges from 0 to 6 percent.

Elk soils are in positions on the landscape similar to those of the Nicholson, Nolin, and McGary soils. Nicholson soils are on adjacent terraces and have a fragipan. The clayey and somewhat poorly drained McGary soils are on adjacent terraces. Nolin soils are on lower lying flood plains and are frequently flooded. They do not have an argillic horizon.

Typical pedon of Elk silt loam, in an area of Elk silt loam, 0 to 2 percent slopes, about 1.5 miles north of Cornishville on Kentucky Highway 1941, and 400 feet southwest of the Chaplin River bridge:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

B1—9 to 17 inches; brown (7.5YR 5/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; few clay films on faces of peds; slightly acid; clear smooth boundary.

B21t—17 to 34 inches; brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; few fine reddish black concretions; medium acid; clear smooth boundary.

B22t—34 to 50 inches; brown (7.5YR 4/4) silty clay loam; few fine distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; 2 percent pebbles as much as 1/2 inch across; few fine reddish black concretions; medium acid; gradual smooth boundary.

C—50 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; massive; friable; 2 percent pebbles as much as 1 inch across; few fine reddish black concretions; slightly acid.

The thickness of the solum ranges from 36 to 58 inches, and depth to limestone, siltstone, or shale bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the C horizon. Except where limed, reaction ranges from slightly acid through very strongly acid.

The A horizon has hue of 10YR, value of 4, and chroma of 3.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 in most pedons. The B21t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. The B1 and B21t horizons are silt loam or silty clay loam. Some pedons have mottles in shades of brown. The B22t horizon has a color range similar to that of the B21t horizon. Most pedons have mottles in shades of brown. Some pedons have a B3 horizon 5 to 10 inches thick. This horizon has hue of 10YR, value of 5, and chroma of 4. The B3 horizon is silty clay loam. Mottles are in shades of brown or gray.

The C horizon has a range in matrix color and mottles similar to the B3 horizon.

Fairmount series

The Fairmount series consists of shallow, well drained soils that formed in residuum of weathered limestone. Permeability is slow to moderately slow. These sloping to very steep soils are on narrow ridgetops and side slopes in the Inner Bluegrass and the Hills of the Bluegrass. Many areas are karst. Slope ranges from 6 to 60 percent.

Fairmount series are in positions on the landscape similar to those of the Caleast, McAfee, Faywood, Lowell, Eden, and Chenault soils. Caleast, McAfee, and Chenault soils are on higher, adjacent karst ridgetops and side slopes than Fairmount soils. All of these soils have argillic horizons, and bedrock is at a depth of more than 20 inches. Faywood, Lowell, and Eden soils also are on higher ridgetops and side slopes. They also have argillic horizons and bedrock at a depth of more than 20 inches, but they do not have mollic epipedons.

Typical pedon of Fairmount flaggy silty clay loam, in an area of Fairmount-Rock outcrop complex, 6 to 12 percent slopes, about 2.4 miles north of Danville on Kentucky Highway 33 and 1,850 feet northwest of the intersection of Kentucky Highway 33 and a private drive; 350 feet west of Kentucky Highway 33, in a pasture:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) flaggy silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; 20 percent fragments of thin, flat limestone 6 to 15 inches long; neutral; abrupt smooth boundary.

B2—6 to 14 inches; dark yellowish brown (10YR 4/4) flaggy silty clay; strong fine angular blocky structure; very firm; common fine roots; 20 percent fragments of thin, flat limestone 6 to 15 inches long; neutral; abrupt wavy boundary.

R—14 inches; hard limestone.

The thickness of the solum and depth to limestone bedrock range from 10 to 20 inches. Content of thin, flat limestone fragments ranges from 5 to 30 percent throughout. Reaction ranges from neutral to moderately alkaline throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. It is silty clay loam, silty clay, or the flaggy analogues.

The B2 horizons have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. They are silty clay loam, silty clay, clay, or the flaggy analogues.

Faywood series

The Faywood series consists of moderately deep, well drained soils that formed in residuum of weathered limestone or interbedded limestone and shale. Permeability is moderately slow and slow. These sloping to moderately steep soils are on narrow ridgetops and side slopes in the Hills of the Bluegrass and the Inner Bluegrass. Slope ranges from 6 to 20 percent.

Faywood soils are in positions on the landscape similar to those of the Eden, Lowell, Caleast, and Fairmount soils. Eden soils are on higher and adjacent narrow ridgetops and side slopes. They have a paralithic contact at a depth of 20 to 40 inches. Lowell and Caleast soils are on higher ridgetops and side slopes. Bedrock is at a depth of more than 40 inches. Fairmount soils are on adjacent ridgetops and side slopes. They have a mollic epipedon and do not have an argillic horizon. Bedrock is at a depth of 10 to 20 inches.

Typical pedon of Faywood silt loam, in an area of Faywood silt loam, 6 to 12 percent slopes, about 3.0 miles north of Kentucky Highway 52 on Blue Grass road from a point 2 miles west of Danville and 0.8 mile west of Blue Grass road on a farm road; 500 feet south of the farm road, in a field:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B21t—7 to 20 inches; yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; very firm; common fine roots; continuous clay film on faces of peds; slightly acid; clear smooth boundary.

B22t—20 to 31 inches; yellowish brown (10YR 5/6) clay; common fine distinct pale brown (10YR 6/3) and common coarse distinct light olive brown (2.5Y 5/4) mottles; moderate medium angular blocky structure; very firm; few fine roots; continuous clay film on faces of peds; few fine dark brown concretions; slightly acid; abrupt smooth boundary.

R—31 inches; hard, gray limestone.

The thickness of the solum and depth to limestone or interbedded limestone and shale bedrock range from 20 to 40 inches. Content of limestone or shale fragments ranges from 0 to 10 percent throughout. Reaction ranges from medium acid to neutral throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is silt loam, silty clay loam, or silty clay.

The B21t horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 or 6. It is silty clay loam, silty clay, or clay. The B22t horizon has a color range similar to that of the B21t horizon. It is silty clay or clay. Mottles are in shades of brown.

Some pedons have a C horizon 4 to 10 inches thick. The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. The C horizon is clay. Mottles are in shades of brown or gray.

Garmon series

The Garmon series consists of moderately deep, well drained soils that developed in residuum of weathered siltstone or shale. Permeability is moderately rapid. These steep and very steep soils are on side slopes and narrow ridgetops in the Knobs. Slope ranges from 25 to 60 percent.

Garmon soils are in positions on the landscape similar to those of the Vertrees, Caneyville, Culleoka, Carpenter, and Lenberg soils. Vertrees soils are on higher ridgetops and upper side slopes. They have a clayey argillic horizon and a solum more than 60 inches thick. The clayey Caneyville soils are on higher narrow ridgetops and side slopes. They have an argillic horizon. Limestone bedrock is at a depth of 20 to 40 inches. Culleoka soils are on higher narrow ridgetops and side slopes and have an argillic horizon. Carpenter soils are on lower side slopes, benches, and foot slopes. They have an argillic horizon. Bedrock is at a depth of more than 40 inches. The clayey Lenberg soils are on lower side slopes. Gray shale bedrock is at a depth of 20 to 40 inches.

Typical pedon of Garmon silt loam, 25 to 60 perent slopes, about 14 miles west of Danville on U.S. Highway 68 and 1,700 feet south of U.S. Highway 68 on a farm road; 100 feet west of the farm road, in a wooded area:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; many fine roots; 10 percent fragments of siltstone as much as 1/2 inch across; medium acid; abrupt smooth boundary.

A2—1 to 10 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; many fine roots; 10 percent fragments of siltstone as much as 1 inch across; medium acid; gradual smooth boundary.

B21—10 to 22 inches; light yellowish brown (10YR 6/4) channery silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; 25 percent fragments of siltstone as much as 8 inches long; medium acid; clear smooth boundary.

B22—22 to 30 inches; light yellowish brown (10YR 6/4) very channery silt loam; weak medium subangular blocky structure; friable; few coarse roots; 45 percent fragments of siltstone as much as 8 inches long; medium acid; abrupt wavy boundary.

R—30 inches; yellowish brown siltstone.

The thickness of the solum and depth to siltstone or shale bedrock is 20 to 40 inches. Content of coarse fragments ranges from 2 to 45 percent throughout. Reaction ranges from medium acid to neutral throughout.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The A1 and A2 horizons are silt loam, loam, or channery silt loam. Some pedons have an Ap horizon 4 to 8 inches thick. The Ap horizon has color and texture ranges similar to those of the A2 horizon.

The B21 horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 or 6. It is silt loam, silty clay loam, or the channery analogues. The B22 horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. The texture range is similar to that of the B21 horizon. Mottles are in shades of brown in some pedons.

Some pedons have a B3 horizon or C horizon that has colors and textures similar to those of the B2 horizon.

Lenberg series

The Lenberg series consists of moderately deep, well drained soils that formed in residuum of weathered, acid clay shale. Permeability is moderately slow. These moderately steep to steep soils are on side slopes and foot slopes in the Knobs. Slope ranges from 12 to 30 percent.

Lenberg soils are in positions on the landscape similar to those of the Carpenter, Garmon, Colyer, Tilsit, and Trappist soils. The fine-loamy Carpenter soils are on adjacent side slopes, foot slopes, and benches. Bedrock is at a depth of more than 40 inches. The fine-loamy Garmon soils are on side slopes and narrow low ridgetops above the Lenberg soils. Hard bedrock is at a depth of 20 to 40 inches. Colyer soils are on lower side slopes and foot slopes. They have a thinner solum than Lenberg soils. Bedrock is at a depth of 10 to 20 inches. The fine-silty Tilsit soils are on lower lying broad ridges and have a fragipan. Trappist soils are on lower side slopes and ridges. Hard, black, acid shale bedrock is at a depth of 20 to 40 inches.

Typical pedon of Lenberg gravelly silt loam, in an area of Carpenter-Lenberg complex, 12 to 30 percent slopes, about 2.0 miles south of Mitchellsburg on Kentucky Highway 1108; 300 feet east of Kentucky Highway 1108, in a wooded area:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak fine granular structure; very friable; common fine and medium roots; 20 percent partially rounded fine grained sandstone, chert, and geodes 1/4 inch to 2 inches across; extremely acid; abrupt smooth boundary.

A2—2 to 10 inches; light yellowish brown (10YR 6/4) gravelly silt loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 20 percent partially rounded fine grained sandstone, chert, and geodes 1/4 inch to 2 inches across; very strongly acid; clear smooth boundary.

IIB21t—10 to 23 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure parting to moderate fine angular blocky; firm; few fine roots; patchy clay films on faces of peds; 2 percent fragments of partially rounded fine grained sandstone; very strongly acid; clear smooth boundary.

IIB22t—23 to 33 inches; yellowish brown (10YR 5/6) silty clay; few fine faint light brownish gray (10YR 6/2) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure parting to fine angular blocky; firm; few fine roots; patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

IIB3—33 to 39 inches; mottled strong brown (7.5YR 5/8) and light gray (2.5Y 7/2) silty clay; moderate medium subangular blocky structure parting to fine angular blocky; firm; few fine roots; patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

IICr—39 to 66 inches; dark yellowish brown (10YR 4/4) soft shale; platy relic structure; extremely firm; gray films between plates; less weathered and slightly harder as depth increases; very strongly acid.

The thickness of the solum and depth to soft, gray shale bedrock ranges from 20 to 40 inches. Coarse fragments of siltstone, sandstone, chert, geodes, or shale range from 0 to 30 percent in the solum and from 10 to 45 percent in the C horizon. Reaction is strongly acid or very strongly acid throughout unless limed.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is silt loam, silty clay loam, or the gravelly analogues.

Some pedons have a B1 horizon 4 to 8 inches thick. This horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. The B1 horizon is silt loam, silty clay loam, or the gravelly analogues. The B2t horizon and the IIB2t horizon have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. They are silty clay loam, silty clay, or the gravelly or shaly analogues. The IIB2t horizon has mottles in shades of red, brown, or gray. The IIB23t horizon in some pedons is 4 to 8 inches thick. The IIB3 horizon is mottled in shades of brown, red, or gray. The range in texture is similar to that of the IIB2t horizon.

Some pedons have a IIC horizon 5 to 15 inches thick. This horizon has a matrix and is mottled in shades of red, brown, olive, or gray. The IIC horizon is silty clay, clay, or the shaly analogues.

This Lenberg soil is a taxadjunct to the Lenberg series because the base saturation is less than 35 percent immediately above the paralithic contact.

Lowell series

The Lowell series consists of deep, well drained soils that formed in residuum of weathered limestone, shale, and siltstone. Permeability is moderately slow. These gently sloping to moderately steep soils are on ridgetops, side slopes, benches, and foot slopes in the Hills of the Bluegrass. Slope ranges from 2 to 20 percent.

Lowell soils are associated on the landscape with Eden, Faywood, Fairmount, and Nicholson soils. Eden soils are on lower lying narrow ridgetops and side slopes and have a paralithic contact at a depth of 20 to 40 inches. Faywood soils are on lower side slopes and have a lithic contact at a depth of 20 to 40 inches. Fairmount soils also are on lower side slopes. Bedrock is at a depth of 10 to 20 inches. Fairmount soils have a mollic epipedon and do not have an argillic horizon. The fine-silty Nicholson soils are on adjacent ridgetops and lower lying terraces and have a fragipan. The somewhat poorly drained McGary soils are on adjacent and lower lying terraces, foot slopes, and benches.

Typical pedon of Lowell silt loam, in an area of Lowell silt loam, 6 to 12 percent slopes, about 3.5 miles southeast of Danville on U.S. Highway 150 and 0.25 mile south of Ball's Branch bridge on U.S. Highway 150; 1,320 feet west, in a pasture:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

B21t—8 to 16 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium angular blocky structure; very firm; few fine roots; common clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—16 to 31 inches; yellowish brown (10YR 5/4) clay; moderate medium angular blocky structure; very firm; few fine roots; many clay films on faces of peds; few fine brown concretions; slightly acid; clear smooth boundary.

B3—31 to 38 inches; light olive brown (2.5Y 5/4) clay; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium angular blocky structure; very firm; few fine roots; few clay films on faces of peds; 2 percent fragments of soft siltstone as much as 1/2 inch across; neutral; gradual smooth boundary.

C—38 to 61 inches; light olive brown (2.5Y 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/6) mottles; massive; very firm; 5 percent fragments of soft siltstone as much as 1 inch across; neutral; abrupt smooth boundary.
R—61 inches; interbedded limestone, siltstone, and shale.

The thickness of the solum ranges from 30 to 60 inches, and depth to interbedded limestone, shale, and siltstone bedrock ranges from 40 to 80 inches. Content of limestone, shale, or siltstone fragments ranges from 0 to 5 percent in the solum and from 1 to 30 percent in the C horizon. Reaction ranges from very strongly acid to slightly acid in the upper 30 inches and from strongly acid to mildly alkaline below.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

Some pedons have a B1 horizon 4 to 10 inches thick. The B1 horizon has hue of 10YR, value of 5, and chroma of 4. It is silt loam or silty clay loam. The B21t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, silty clay, or clay. Mottles are in shades of brown in some pedons. The B22t horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 or 6. It is silty clay or clay. Mottles are in shades of brown or gray in some pedons. The B3 horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 or 6. It is silty clay or clay. Mottles are in shades of brown or gray.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 5, and chroma of 4 or 6. It is silty clay, clay, or the shaly, flaggy, or channery analogues. Mottles are in shades of olive or gray.

Maury series

The Maury series consists of deep, well drained soils that formed in 1 foot to 2 feet of loesslike material over residuum of weathered limestone. Permeability is moderate. These nearly level to sloping soils are on karst ridgetops and side slopes in the Inner Bluegrass. Slope ranges from 0 to 12 percent.

Maury soils are in positions on the landscape similar to those of the Caleast, McAfee, and Nicholson soils. Caleast soils are on adjacent ridgetops and side slopes and have a solum less than 60 inches thick. McAfee soils are on adjacent side slopes and ridgetops. They have a mollic surface layer. Bedrock is at a depth of 20 to 40 inches. Nicholson soils are on adjacent ridgetops and have a fragipan.

Typical pedon of Maury silt loam, in an area of Maury silt loam, 2 to 6 percent slopes, about 2 miles north of Danville on U.S. Highway 127 and 0.4 mile south of the intersection of U.S. Highway 127 and U.S. Highway 127 bypass; 325 feet west of U.S. Highway 127, in a pasture:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; common fine roots; strongly acid; abrupt smooth boundary.
B1—10 to 17 inches; brown (7.5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few fine reddish black concretions; strongly acid; clear smooth boundary.
B21t—17 to 27 inches; brown (7.5YR 4/4) silty clay loam, moderate medium subangular blocky structure; firm; few fine roots; common clay films on faces of peds; few fine reddish black concretions; strongly acid; clear smooth boundary.
B22t—27 to 48 inches; brown (7.5YR 4/4) silty clay; moderate medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; common fine reddish black concretions; strongly acid; clear smooth boundary.
B23t—48 to 65 inches; reddish brown (5YR 4/4) silty clay; moderate medium subangular blocky structure; firm; few fine roots; continuous clay films on faces of peds; common fine reddish black concretions; strongly acid; gradual smooth boundary.
B24t—65 to 80 inches; reddish brown (5YR 4/4) silty clay; few coarse faint brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; continuous clay films on faces of peds; 2 percent fragments of chert as much as 1 inch across; common fine reddish black concretions; strongly acid.

The thickness of the solum ranges from 60 to 120 inches, and depth to limestone bedrock ranges from 60 to 150 inches or more. Coarse fragments of chert range from 0 to 5 percent in the B2t horizon. Reaction ranges from strongly acid to neutral in the A horizon, from strongly acid to slightly acid in the upper part of the B horizon, and from very strongly acid to medium acid in the lower part of the B horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

The B2t horizon has hue of 5YR or 7.5YR in the upper part and 5YR or 2.5YR in the lower part, value of 3 to 5, and chroma of 4 to 8. It is silty clay loam, silty clay, or clay. Mottles are in shades of brown in the lower part of the B2t horizon in some pedons.

McAfee series

The McAfee series consists of moderately deep, well drained soils that formed in residuum of weathered limestone. Permeability is moderately slow. These gently sloping to very steep soils are on karst ridgetops and side slopes in the Inner Bluegrass. Slope ranges from 2 to 50 percent.

McAfee soils are in positions on the landscape that are similar to those of the Maury, Caleast, Fairmount, and Chenault soils. Maury soils are on higher and adjacent karst ridgetops and side slopes and have a solum more than 60 inches thick. Caleast soils are on higher lying and adjacent karst ridgetops and side slopes. Bedrock is at a depth of more than 40 inches. Fairmount soils are on lower karst side slopes. Bedrock is at a depth of 10 to 20 inches. The fine-loamy Chenault soils are on higher lying and adjacent karst ridgetops and side slopes along the Kentucky and Dix Rivers. Bedrock is at a depth of more than 40 inches.

Typical pedon of McAfee silt loam, in an area of McAfee silt loam, 6 to 12 percent slopes, about 1.3 miles west of Harrodsburg on Kentucky Highway 1989 and 700 feet north of Kentucky Highway 1989; 1,850 feet east of the Salt River, in a pasture:

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; moderate fine granular structure; very friable; many fine roots; 2 percent fragments of limestone as much as 2 inches across; medium acid; abrupt smooth boundary.

B21t—9 to 18 inches; brown (7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; 2 percent fragments of limestone as much as 1 inch across; neutral; clear smooth boundary.

B22t—18 to 30 inches; reddish brown (5YR 4/4) clay; moderate medium angular and subangular blocky structure; very firm; few fine roots; continuous clay films on faces of peds; 2 percent fragments of limestone as much as 4 inches across; neutral; abrupt irregular boundary.

R—30 inches; hard limestone.

The thickness of the solum and depth to limestone bedrock range from 20 to 40 inches. Content of chert and limestone fragments ranges from 0 to 10 percent throughout. Reaction ranges from medium acid to neutral throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 to 4. It is silt loam or silty clay loam.

Some pedons have a B1 horizon 4 to 8 inches thick. This horizon has hue of 7.5YR, value of 4, and chroma of 4. The B1 horizon is silty clay loam. The B21t horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, silty clay, or clay. The B22t horizon has hue of 5YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, silty clay, or clay. Mottles in shades of brown are in some pedons.

McGary series

The McGary series consists of deep, somewhat poorly drained soils that developed in clayey colluvium or old clayey alluvium washed from soils formed in residuum of weathered limestone, siltstone, or shale. Permeability is slow or very slow. These nearly level to gently sloping soils are on foot slopes, benches, and terraces throughout the survey area. Slope ranges from 0 to 4 percent.

McGary soils are in positions on the landscape similar to those of the Elk, Nicholson, Tilsit, Newark, and Dunning soils. The well drained, fine-silty Elk soils are on adjacent and lower terraces. Nicholson soils are also on adjacent and lower terraces and have a fragipan. Tilsit soils are on adjacent foot slopes and higher upland ridges and have a fragipan. The fine-silty Newark soils are on flood plains. The very poorly drained to poorly drained Dunning soils have a thick, dark surface layer.

Typical pedon of McGary silt loam, about 1.4 miles north of Burgin and 600 feet east of Kentucky Highway 33, in a pasture:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many very fine and fine roots; 2 percent fragments of siltstone as much as 1/2 inch across; slightly acid; abrupt smooth boundary.

B21t—8 to 17 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate fine angular blocky structure; firm; common very fine and fine roots; common clay films on faces of peds; medium acid; clear smooth boundary.

B22tg—17 to 30 inches; gray (10YR 5/1) clay; common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine angular blocky structure; very firm; few very fine and fine roots; common clay films on faces of peds; medium acid; clear smooth boundary.

C1g—30 to 55 inches; gray (10YR 5/1) clay; many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; common fine brown concretions; mildly alkaline; clear smooth boundary.

C2g—55 to 75 inches; gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; many medium brown concretions; mildly alkaline.

The solum ranges from 24 to 40 inches in thickness, and depth to bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 10 percent throughout. Reaction ranges from medium acid to neutral in the A horizon, from strongly acid to mildly alkaline in the B horizon, and from slightly acid to mildly alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The B21t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam, silty clay, or clay. Mottles are in shades of gray. The B22tg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay or clay. Mottles are in shades of brown.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1. It is silty clay or clay. Mottles are in shades of brown.

This McGary soil is a taxadjunct to the McGary series because it does not have carbonates in the upper 40 inches and has as much as 10 percent coarse fragments throughout the profile.

Newark series

The Newark series consists of deep, somewhat poorly drained soils that formed in mixed alluvium from limestone, shale, siltstone, or sandstone. Permeability is moderate. These nearly level soils are on flood plains and local alluvial upland areas throughout the survey area. Slope ranges from 0 to 2 percent.

Newark soils are in positions on the landscape similar to those of the Nolin, Dunning, Boonesboro, Sensabaugh, Nicholson, and McGary soils. Nolin soils do not have gray mottles in the upper 24 inches of the solum. Dunning soils are clayey and have a mollic epipedon. Bedrock is at a depth of 20 to 40 inches in Boonesboro soils. Sensabaugh soils do not have gray mottles and are fine-loamy. McGary soils are on terraces and have a clayey, argillic horizon. Nicholson soils have a fragipan.

Typical pedon of Newark silt loam, about 12 miles west of Danville on U.S. Highway 150 and 300 feet south of U.S. Highway 150; 325 feet west of South Craintown road:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

B21—8 to 17 inches; yellowish brown (10YR 5/4) silt loam; many fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; neutral; gradual smooth boundary.

B22g—17 to 35 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fine roots; few fine dark reddish brown concretions; medium acid; gradual smooth boundary.

C1g—35 to 50 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and many medium faint brown (10YR 5/3) mottles; massive; friable; few fine dark reddish brown concretions; medium acid; gradual smooth boundary.

C2—50 to 64 inches; strong brown (7.5YR 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and few fine distinct brown (10YR 5/3) mottles; massive; friable; common fine dark reddish brown concretions; medium acid.

The thickness of the solum ranges from 22 to 44 inches, and depth to bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the C horizons. Reaction ranges from medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The B21 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam. Mottles are in shades of gray or brown. Sixty percent or more of the B22g horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2, or value of 4 or 5 and chroma of 1. The B22g horizon is silt loam or silty clay loam. Mottles are in shades of brown or gray.

The color range of the Cg horizon is similar to that of the B22g horizon. Texture is silt loam or silty clay loam. Mottles are in shades of brown or gray. The C2 horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 5 or 6, and chroma of 3 to 6. It is silt loam or silty clay loam. Mottles are in shades of brown or gray.

Nicholson series

The Nicholson series consists of deep, moderately well drained soils that formed in mixed alluvium or in silty material over residuum of weathered limestone, siltstone, or shale. Permeability is slow. These gently sloping soils are on terraces, benches, and upland ridgetops in the Hills of the Bluegrass and the Inner Bluegrass. Slope ranges from 2 to 6 percent.

Nicholson soils are predominantly in positions on the landscape similar to those of the Elk and McGary soils on terraces, but they are also in positions similar to those of the Eden, Lowell, Maury, and Caleast soils on uplands and benches. The well drained Elk soils are on adjacent terraces. The clayey, somewhat poorly drained McGary soils are on terraces or benches. The clayey, well drained Eden soils are on lower lying side slopes in the Hills of the Bluegrass and have a paralithic contact at a depth of 20 to 40 inches. The clayey, well drained Lowell soils are on adjacent ridgetops and side slopes in the Hills of the Bluegrass. The clayey, well drained Maury soils are on adjacent ridgetops and side slopes in the Inner Bluegrass. The clayey, well drained Caleast soils are on adjacent ridgetops and side slopes in the Inner Bluegrass and have a mollic surface layer. Nolin and Newark soils are on lower lying flood plains. These soils are alluvial.

Typical pedon of Nicholson silt loam, 2 to 6 percent slopes, about 1.5 miles south of Harrodsburg on U.S. Highway 68; 3.5 miles south of the U.S. Highway 68 on Kentucky Highway 1915; 1,250 feet east of Kentucky Highway 1915, in a pasture:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; many fine roots; few fine black concretions; neutral; clear smooth boundary.

B2t—9 to 19 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; common clay films on faces of peds; few fine black concretions; medium acid; clear smooth boundary.

Bx—19 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; many medium prominent light brownish gray (10YR 6/2) mottles; very coarse prismatic structure parting to weak subangular blocky; firm, compact, and brittle; few fine roots between prisms; prisms coated with light brownish gray silty clay; few clay films on faces of peds; few fine black concretions; strongly acid; gradual wavy boundary.

IIB3—28 to 43 inches; strong brown (7.5YR 5/6) clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; firm; thin continuous clay films on faces of peds; few fine black concretions; slightly acid; clear smooth boundary.

IIC—43 to 78 inches; light olive brown (2.5Y 5/4) clay; many medium distinct light olive gray (5Y 6/2) and many medium distinct yellowish brown (10YR 5/6) mottles; massive; thin platy relict shale structure; very firm; 5 percent fragments of siltstone as much as 2 inches across; neutral; abrupt smooth boundary.

IIR—78 inches; interbedded shale, siltstone, and limestone.

The thickness of the solum ranges from 40 to 80 inches, and depth to limestone, siltstone, or shale bedrock ranges from 60 to 100 inches. Depth to the fragipan is 18 to 30 inches. Content of limestone, siltstone, or shale fragments ranges from 0 to 15 percent in the IIB horizon and from 0 to 25 percent in the IIC horizon. Reaction ranges from very strongly acid to medium acid throughout the fragipan unless limed and from strongly acid to mildly alkaline below the fragipan.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. Mottles are in shades of brown in some pedons. The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5, and chroma of 4 to 8. It is silt loam or silty clay loam. Mottles are in shades of gray. Structure is very coarse prismatic parting to weak or moderate, fine to coarse blocky. The IIB horizon has hue of 5YR, 7.5YR, 10YR, or 2.5YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay or clay. Mottles are in shades of brown, red, or gray.

The IIC horizon has a color range similar to that of the IIB horizon. It is silty clay, clay, or the flaggy, channery, or shaly analogues.

Nolin series

The Nolin series consists of deep, well drained soils that formed in mixed alluvium from soils formed in residuum of weathered limestone, shale, siltstone, or sandstone. Permeability is moderate. These nearly level soils are on flood plains and local alluvial upland areas throughout the survey area. Slope ranges from 0 to 2 percent.

Nolin soils are in positions on the landscape similar to those of the Newark, Dunning, Boonesboro, Sensabaugh, Elk, and Nicholson soils. Newark soils are somewhat poorly drained. Dunning soils are clayey and are very poorly drained to poorly drained. In the Boonesboro soils bedrock is at a depth of 20 to 40 inches. Sensabaugh soils are fine-loamy. Elk soils are on slightly higher lying terraces than Nolin soils and have an argillic horizon. Nicholson soils are on slightly higher terraces and have a fragipan.

Typical pedon of Nolin silt loam, about 3.5 miles southeast of Danville on U.S. Highway 150 and 0.2 mile south of Ball's Branch bridge on U.S. Highway 150; 300 feet west of U.S. Highway 150, in a hayfield:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

B21—10 to 35 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium granular structure; friable; common fine roots; neutral; clear smooth boundary.

B22—35 to 52 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; common fine roots; common fine very dusky red concretions; neutral; gradual smooth boundary.

C—52 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; 5 percent pebbles as much as 2 inches across; many fine very dusky red concretions; neutral.

The thickness of the solum ranges from 40 to 70 inches, and depth to bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the C horizon. Reaction ranges from medium acid to moderately alkaline throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The lower part of the B2 horizon usually has mottles in shades of brown or gray.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or the gravelly analogues. Mottles are in shades of brown or gray.

Sensabaugh series

The Sensabaugh series consists of deep, well drained soils that formed in alluvium from residuum of weathered limestone, shale, siltstone, and sandstone. Permeability is moderate to moderately rapid. These nearly level soils are on flood plains and alluvial fans in the Knobs. Slope ranges from 0 to 2 percent.

Sensabaugh soils are in positions on the landscape similar to those of the Nolin and Newark soils. Nolin soils are well drained and fine-silty. Newark soils are somewhat poorly drained and fine-silty.

Typical pedon of Sensabaugh gravelly silt loam, about 15 miles southwest of Danville on Kentucky Highway 37; 0.4 mile southwest of Forkland on Kentucky Highway 37; 1,700 feet south of Kentucky Highway 37:

Ap—0 to 10 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; very friable; many fine roots; 20 percent pebbles and fragments of shale and chert as much as 2 inches across; neutral; abrupt smooth boundary.

B21—10 to 18 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; friable; common fine roots; 25 percent pebbles and fragments of shale and chert as much as 2 inches across; neutral; gradual smooth boundary.

B22—18 to 30 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; friable; few fine roots; 30 percent pebbles and fragments of shale and chert as much as 4 inches long; neutral; gradual smooth boundary.

C—30 to 46 inches; brown (10YR 4/3) very gravelly silt loam; massive; friable; 50 percent pebbles and fragments of shale as much as 4 inches long; neutral; abrupt smooth boundary.

R—46 inches; limestone.

The thickness of the solum ranges from 24 to 55 inches, and depth to bedrock ranges from 40 to 70 inches. Content of coarse fragments ranges from 2 to 30 percent in the A horizon, from 5 to 40 percent in the B horizon, and from 15 to 70 percent in the C horizon. Reaction ranges from medium acid to neutral throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4.

The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or the gravelly or very gravelly analogues.

The C horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is gravelly or very gravelly silt loam or silty clay loam. Mottles are in shades of brown or gray in some pedons.

This Sensabaugh soil is a taxadjunct to the Sensabaugh series because bedrock typically is at a depth of 40 to 60 inches. This depth is shallower than that of the official series.

Tilsit series

The Tilsit series consists of deep, moderately well drained soils that formed in silty colluvium over residuum of weathered, black, acid shale. Permeability is slow. These nearly level to gently sloping soils are on broad ridges and foot slopes at the base of the Knobs. Slope ranges from 0 to 6 percent.

Tilsit soils are in positions on the landscape similar to those of the Trappist, McGary, Colyer, Carpenter, and Lenberg soils. The clayey Trappist soils are on adjacent, higher ridges and side slopes. Black, acid shale bedrock is at a depth of 20 to 40 inches. The clayey, somewhat poorly drained McGary soils are on lower terraces and adjacent foot slopes. The clayey-skeletal Colyer soils are on adjacent and higher side slopes. Black, acid shale bedrock is at a depth of 10 to 20 inches. The fine-loamy, well drained Carpenter soils are on higher foot slopes, ridges, benches, and side slopes. The clayey Lenberg soils are on higher side slopes. Gray shale bedrock is at a depth of 20 to 40 inches.

Typical pedon of Tilsit silt loam, in an area of Tilsit silt loam, 2 to 6 percent slopes, about 10 miles southwest of Danville on Kentucky Highway 37 and 200 feet north of the intersection of Kentucky Highway 37 and Tar Lick road:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; 2 percent pebbles and fragments of chert as much as 1/2 inch across; strongly acid; abrupt smooth boundary.

B2t—8 to 23 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; 2 percent pebbles and fragments of chert as much as 1 inch across; strongly acid; abrupt smooth boundary.

Bx—23 to 44 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct gray (10YR 6/1) mottles; moderate very coarse prismatic structure parting to moderate fine and medium subangular blocky; very firm, compact, brittle; few fine roots between prisms; light gray silty clay loam between prisms; common clay films on faces of peds; 2 percent pebbles and fragments of chert as much as 1/2 inch across; strongly acid; clear smooth boundary.

C—44 to 60 inches; yellowish brown (10YR 5/6) shaly silt loam; many fine distinct gray (10YR 6/1) mottles; massive; friable; 30 percent fragments of shale and siltstone as much as 1 inch across; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches, and depth to hard, black, acid, shale bedrock ranges from 40 to 70 inches. Content of coarse fragments ranges from 1 to 10 percent in the solum and from 10 to 40 percent in the C horizon. Reaction ranges from strongly acid to extremely acid throughout unless limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

Some pedons have a B1 horizon 4 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4. The B1 horizon is silt loam. Mottles are in shades of brown. The B2t horizon has hue of 10YR, value of 5 or 6, and chroma of 6 to 8. It is silt loam or silty clay loam. Mottles are in shades of brown in some pedons. The Bx horizon has hue of 10YR, value of 5, and chroma of 4 or 6. It is silt loam or silty clay loam. Mottles are in shades of brown or gray. The tertiary or secondary structure is very coarse prismatic parting to angular or subangular blocky peds. In some pedons the IIB3 horizon is 4 to 20 inches thick below the Bx horizon. It has hue of 10YR or 7.5YR, value of 5, and chroma of 6. The IIB3 horizon is silty clay loam or silty clay. Mottles are in shades of brown or gray.

The C horizon or IIC horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6. It is silt loam, silty clay loam, silty clay, or the shaly analogues. Mottles are in shades of brown or gray.

This Tilsit soil is a taxadjunct to the Tilsit series because it has base saturation of about 40 to 47 percent. Saturation was determined by the Hach kit.

Trappist series

The Trappist series consists of moderately deep, well drained soils that formed in residuum of weathered, black, acid shale. Permeability is slow. These gently sloping to steep soils are on side slopes and ridges at the base of the Knobs. Slope ranges from 2 to 30 percent.

Trappist soils are in positions on the landscape similar to those of the Colyer, Tilsit, Lenberg, and Carpenter soils. In the clayey-skeletal Colyer soils, black, acid shale bedrock is at a depth of 10 to 20 inches. The fine-silty Tilsit soils are on adjacent and lower, broad ridges and have a fragipan. Lenberg soils are on higher side slopes. Soft, gray shale bedrock is at a depth of 20 to 40 inches. The fine-loamy Carpenter soils are on higher side slopes, foot slopes, and benches. Bedrock is at a depth of more than 40 inches.

Typical pedon of Trappist silt loam, in an area of Trappist silt loam, 2 to 6 percent slopes, about 12 miles southwest of Danville on Carpenter Fork road; 0.4 mile southwest of Carpenter Fork road on a farm lane; 325 feet north of a farm house and'200 feet west of the farm lane:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; 1 percent fragments of shale as much as 1/2 inch across; neutral; abrupt smooth boundary.

B2t—9 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; continuous clay film on faces of peds; 2 percent fragments of shale as much as 1 inch across; strongly acid; clear smooth boundary.

B3—24 to 30 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct yellowish red (5YR 4/6) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; common clay films on faces of peds; 2 percent fragments of shale as much as 1 inch across; very strongly acid; clear smooth boundary.

C—30 to 34 inches; yellowish red (5YR 4/6) extremely shaly silty clay; massive; very firm; 70 percent fragments of shale as much as 3 inches across; extremely acid; abrupt wavy boundary.

R—34 inches; hard, black, acid shale.

The thickness of the solum and depth to black, acid shale bedrock range from 20 to 40 inches. Content of shale fragments ranges from 0 to 10 percent in the solum and from 25 to 75 percent in the C horizon. Reaction ranges from extremely acid to strongly acid except where limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Some pedons have an A1 horizon 1 inch to 2 inches thick. This horizon has hue of 10YR, value of 4, and chroma of 2. The A2 horizon is 2 to 5 inches thick. It has hue of 10YR, value of 5, and chroma of 3. The A1 and A2 horizons are silt loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silty clay loam, silty clay, or clay. Mottles are in shades of red or brown in most pedons.

The C horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 or 6 in most pedons. It is shaly, very shaly, or extremely shaly analogues of silty clay or clay. Mottles are in shades of brown or red in some pedons.

Vertrees series

The Vertrees series consists of deep, well drained soils that formed in residuum of weathered limestone or siltstone. Permeability is moderately slow. These sloping to moderately steep soils are on convex ridges and upper side slopes in the Knobs. Slope ranges from 6 to 20 percent.

Vertrees soils are in positions on the landscape that are similar to those of the Caneyville, Culleoka, and Garmon soils. Caneyville soils are on adjacent and lower side slopes. Limestone bedrock is at a depth of 20 to 40 inches. The fine-loamy Culleoka soils are on lower side slopes. Bedrock is at a depth of 20 to 40 inches. Garmon soils are on lower side slopes and do not have an argillic horizon.

Typical pedon of Vertrees silt loam, in an area of Vertrees silt loam, 6 to 12 percent slopes, about 14.7 miles west of Danville on U.S. Highway 68; 0.8 mile southwest of U.S. Highway 68 on a county road; 2,000 feet south of the county road on a private road and 800 feet east of the private road, in a field:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; common fine roots; 12 percent fragments of chert and siltstone as much as 3 inches across; slightly acid; abrupt smooth boundary.

B1—7 to 13 inches; brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; few clay films on faces of peds; 10 percent fragments of chert and siltstone as much as 3 inches across; medium acid; clear smooth boundary.

B21t—13 to 38 inches; red (2.5YR 4/6) clay; strong fine angular blocky structure; very firm; few fine roots; continuous clay film on faces of peds; 10 percent fragments of chert as much as 4 inches across; very strongly acid; gradual smooth boundary.

B22t—38 to 64 inches; yellowish red (5YR 4/6) clay; common medium faint strong brown (7.5YR 5/6) and red (2.5YR 4/6) and few fine faint pale brown (10YR 6/3) mottles; moderate fine and medium angular blocky structure; very firm; few fine roots; patchy clay films on faces of peds; 10 percent fragments of chert as much as 4 inches across; very strongly acid.

The thickness of the solum and depth to limestone or siltstone bedrock is more than 60 inches. Content of chert or siltstone fragments ranges from 0 to 20 percent in individual horizons throughout the solum. Reaction ranges from very strongly acid to neutral in the A horizon and from very strongly acid to medium acid in the B horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is silt loam, loam, or the cherty analogues. The A1 horizon is 1 inch to 6 inches thick in some pedons. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The A1 horizon is silt loam or loam. The A2 horizon is 4 to 6 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The A2 horizon is silt loam, loam, or the cherty analogues.

The B1 horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam, silty clay loam, or the cherty analogues. The B21t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay, silty clay, or the cherty analogues. Mottles are in shades of brown. The B22t horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay, silty clay, or the cherty analogues. Mottles are in shades of brown or red. The B23t horizon is 8 to 25 inches thick in some pedons. It has a range similar to that of the B22t horizon. Some pedons have a B3 horizon that has a texture range and matrix color range similar to that of the B22t horizon. Mottles are in shades of brown, red, or gray.

formation of the soils

This section gives information about the geology and topography of Boyle and Mercer Counties. It also discusses the five major factors of soil formation and explains their effects on the soils of the survey area.

geology and topography

Boyle County is in the Knobs, the Inner Bluegrass, and the Hills of the Bluegrass physiographic regions, and Mercer County is in the Inner Bluegrass and the Hills of the Bluegrass physiographic regions (*6*). Both Boyle and Mercer Counties are underlain by plane, bedded sedimentary rock of Ordovician, Devonian, and Mississippian ages. According to the U.S. Geologic Survey (*18*), this rock is predominantly of Ordovician age, except in the southern part of Boyle County. In this area the rock is of Mississippian and Devonian ages. Table 21 shows the geologic systems of Boyle and Mercer Counties and lists the predominant soils that formed on them.

Camp Nelson Limestone, of Ordovician age, is exposed at lower elevations along the Kentucky and Dix Rivers. It is light gray to light brownish gray limestone and dolomite and is the oldest formation in Boyle and Mercer Counties. Resting on the Camp Nelson Limestone is the Oregon Formation, also of Ordovician age. It is in narrow bands along the Kentucky and Dix Rivers. The Camp Nelson Limestone is yellowish gray to yellowish white, calcareous dolomite and ranges from 6 to 31 feet in thickness. Resting on the Oregon Formation is the Tyron Limestone, also along the Kentucky and Dix Rivers. The Tyrone Limestone is predominantly light gray to light olive gray limestone and very light gray to light brownish gray limestone with occasional layers of dolomite and shale. It ranges from 80 to 110 feet in thickness. The Camp Nelson Limestone, the underlying Oregon Formation, and the Tyrone Limestone are of Middle Ordovician age and are known collectively as the High Bridge Group. Underlying the High Bridge Group are steep to very steep vertical limestone bluffs that are exposed along the rivers. The Fairmount soils are predominant on all of these formations.

The Lexington Limestone lies on the Tyrone Limestone and underlies the survey area from the steep to very steep soils along the Kentucky and Dix Rivers westward to the Salt River in Mercer County and extending southward to the southwestern part of the town of Danville. It often occurs at the base of hillsides in the western part of the survey area. The Lexington Limestone is of the Upper part of the Middle Ordovician age. It ranges from 200 to 300 feet in thickness. Several members of this formation are predominantly beds of limestone in shades of lighter gray, some members have shale beds, and some members are phosphatic. The area underlain by the Lexington Limestone is karst. The topography is undulating to rolling and somewhat hilly. Sinks are scattered throughout the area. The Maury, Caleast, McAfee, and Fairmount soils are predominant on this formation.

Near the Kentucky and Dix Rivers are isolated, high, nearly level areas of fluvial deposits as much as 60 feet thick. They are of Pliocene or Pleistocene age. These areas also are karst. The Chenault soils are common to these areas.

The Clays Ferry Formation rests on the Lexington Limestone and underlies the western part of the survey area and the area along the Brumfield Fault in the southern part of Boyle County. It occasionally occurs as isolated areas on the higher ridgetops in the Lexington Limestone part of the survey area. The Clays Ferry Formation is of Upper Ordovician age. It is interbedded limestone and shale and has a maximum thickness of about 280 feet. The limestone is in shades of medium gray or light olive gray and averages about 50 percent of the formation. The topography of the area underlain by the Clays Ferry Formation is hilly with rolling ridgetops. The Lowell, Eden, Faywood, and Fairmount soils are predominant on this formation.

The Garrard Siltstone lies on the Clays Ferry Formation. It is in a few isolated areas northwest of Perryville, in a band south of the Brumfield Fault, and in a band along an unnamed fault between the Brumfield Fault and the Kentucky River Fault System near Lincoln County. The Garrard Siltstone is of Upper Ordivician age. It is medium gray to orange gray, calcareous siltstone and is about 60 feet thick. The topography of the area underlain by the Garrard Siltstone is rolling to hilly. The Lowell and Eden soils are predominant on this formation.

Resting on the Garrard Siltstone Formation is the Calloway Creek Limestone and resting on the Calloway Creek Limestone is the Ashlock Formation. These formations are in moderately narrow bands above the Garrard Siltstone. They also occur in areas south of the Brumfield Fault and in areas extending eastward toward

Lincoln County. They are of Upper Ordovician age. The Calloway Creek Limestone is dominantly medium gray and has small amounts of greenish gray shale. It ranges from 120 to 140 feet in thickness. The Ashlock Formation has several members that are predominantly beds of light olive gray limestone and beds of light greenish gray mudstone, siltstone, and shale. It ranges from 65 to 100 feet in thickness. The topography of the area underlain by the Garrard Siltstone and the Ashland Formation is undulating to hilly. The Maury, Caleast, and McAfee soils commonly occur on these formations.

Resting on the Ashlock Formation along the North Rolling Fork and its tributaries are the Grant Lake Limestone and the Drakes Formation. These formations are of Upper Ordovician age. The Grant Lake Limestone is medium gray limestone that has small beds of shale. It ranges from 15 to 25 feet in thickness. The Drakes Formation consists of three members that are predominantly beds of dolomitic siltstone and limestone in shades of gray. It ranges from about 60 to 100 feet in thickness. The topography of this area is rolling to very steep. The McAfee soil commonly occurs in this area.

The Brassfield Dolomite rests on the Drakes Formation. It is exposed in one small area near the junction of Day Branch and Scrubgrass Branch. It is of Lower Silurian age and is the only Silurian age exposure in the survey area. The Brassfield Dolomite is light olive gray and is about 15 feet thick. Because the exposure is very small, it has little significance in the survey area.

The Boyle Formation rests on the Ashlock Formation and is in a narrow band between the Ashlock Formation and the more nearly level areas at Junction City. It is also along the North Rolling Fork where it is exposed on the upper hillsides. Along the North Rolling Fork this formation rests on either the Drakes Formation or the Brassfield Dolomite. The Boyle Formation is of Middle Devonian Age. It is olive gray to brownish gray dolomite and ranges from 20 to 60 feet in thickness. This formation is undulating to hilly near Junction City and steep to very steep along the North Rolling Fork. The Caleast and McAfee soils are predominant on this formation.

The New Albany Shale rests on the Boyle Formation. It underlies the broad, nearly level area at Junction City and extends westward along the base of the Knobs in a narrow band to the town of Parksville. A small, isolated area is exposed at Mitchellsburg. The New Albany Shale is of Middle and Upper Devonian ages. It is grayish black, carbonaceous shale and ranges from 40 to 60 feet in thickness. The area underlain by the New Albany Shale is mostly nearly level to rolling, but there are some hilly areas and steep slopes near the base of the Knobs. The Colyer, Trappist, and Tilsit soils are predominant on this formation.

The Borden Formation lies on the New Albany Shale. It underlies the hillsides and some of the ridgetops in the Knobs. This formation of Mississippian age has four members. The New Providence Shale member rests on the New Albany Shale at the base of the Knobs. It is dark greenish gray shale and ranges from 100 to 110 feet in thickness. The topography is undulating to steep. The Carpenter and Lenberg soils are on the New Providence member. The Nancy member and the Halls Gap member lie on the New Providence Shale member. They are mostly light gray or greenish gray siltstone mixed with dark greenish gray shale and range from 120 to 140 feet in thickness. Some small layers of limestone are in the Halls Gap member. The hillsides are very steep. The Garmon soils are predominant in the Nancy member and the Halls Gap member. Resting on the Halls Gap member is the Muldraugh member. It consists of dolomitic and light gray siltstone and ranges from 40 to 50 feet in thickness. Some small layers of limestone are in the Muldraugh member. The topography is mostly hilly to steep. The Culleoka and Caneyville soils are predominant on the Muldraugh member.

The Salem and Harrodsburg Limestones rest on the Borden Formation and underlie the ridgetops in the Knobs. On many of the ridgetops the Salem and Harrodsburg Limestones are highly exposed. This formation is of Mississippian age. It is medium gray limestone and ranges from 60 to 65 feet in thickness. On some of the higher lying, isolated ridgetops the St. Louis Limestone rests on the Salem and Harrodsburg Limestone. It is the most highly exposed formation in the survey area. The St. Louis Limestone also is of Mississippian age. It is olive gray to dark gray limestone and is about 50 feet thick. The topography of the Salem and Harrodsburg Limestones and the St. Louis Limestone is rolling to hilly. The Vertrees and Caneyville soils are predominant in these formations.

factors of soil formation

Soils formed through the interaction of the parent material with five major factors: climate, vegetation and animal life, relief, and time (*7*). These factors are interrelated. Each factor affects the other factors and the effects of each one vary from place to place. In some places a particular factor may dominate soil formation. Other factors, such as gravity, water, and man, are also important in the formation of soils (*12*).

parent material

Parent material is the unconsolidated mass in which a soil forms. In the early stages of soil development a soil has properties similar to those of the parent material. As weathering takes place, these properties are modified and each soil develops its own characteristics. The nature of the parent material affects the rate of weathering and determines the texture and mineral composition of the soil. These properties affect the permeability, shrink-swell, and porosity characteristics of the soil.

Parent material can be weathered in place, during which time the parent rock breaks down, or it can be transported and deposited by water, wind, gravity, or ice. In the survey area most of the soils developed from parent material that weathered in place from sedimentary rock of the Mississippian, Devonian, and Ordovician ages. The Vertrees, Trappist, and Maury soils are examples. These soils that developed from residual parent material mostly have a clayey subsoil.

Examples of soils that developed from parent material that was deposited by water or streams are the Boonesboro, Dunning, Elk, and Nolin soils. Except for the Dunning soils, these soils have a loamy subsoil. Dunning soils have a clayey subsoil.

Some soils formed from more than one type of parent material. The Chenault soils are an example. In this soil the surface layer and upper part of the subsoil formed in parent material deposited by water, and the lower part of the subsoil and the substratum formed in parent material weathered from limestone rock. In some places an entire soil developed in water-transported parent material that was deposited directly upon the bedrock. In these soils the layers of water-transported parent material are usually gravelly and loamy, and the layers developed from parent material are usually clayey.

The Carpenter soil at the base of steep and very steep hillsides in the Knobs is an example. In this soil the surface layer and upper part of the subsoil formed in parent material that moved down the hillside mostly as a result of gravity. The lower part of the subsoil and the substratum formed in parent material weathered from soft shale. Gravelly and loamy layers usually form from gravity-transported soil material, and clayey layers usually form from residual parent material.

Wind-transported material is not common in Boyle and Mercer Counties and is generally of small extent. The Nicholson soil on the upland ridgetops is an example of this type of soil. The surface layer and upper part of the subsoil of the Nicholson soil formed in wind-transported parent material collectively referred to as loess. These soil layers are loamy or silty. The lower part of the subsoil and the substratum formed in residual parent material. These layers are usually clayey.

No soils formed in ice-transported parent material in Boyle and Mercer Counties.

climate

Climate affects the physical, chemical, and biological properties of soils mostly through the influence of temperature and rainfall. It is probably the most influential factor in soil formation (*7*). Temperature affects the chemical and physical reaction rates of the soil, and these rates affect the rate of soil development. If temperature increases 10 degrees Centigrade, the rate of chemical reaction doubles. Moisture and temperature affect biochemical reactions. Moisture is essential in soil development (*12*). Climate also significantly affects or controls the natural vegetation, and because it influences such factors as erosion and deposition, it to some extent influences the relief of the area and the degree of development of the soil (*12*).

The effects of soil formation are predominantly global; however, local effects or microclimates also influence soil development. Variations in the local temperature on north- and south-facing hillsides can cause differences in soil development in the survey area, although the differences are not statistically significant. For example, soils in the Knobs on south-facing slopes have a lower pH value than soils on north-facing slopes; however, these values are within the range of characteristics on a particular landscape. The Garmon soil is an example. Also, the rate of growth for northern red oak and for white oak are not statistically different on these aspects. In the Hills of the Bluegrass, the Eden soil on steep, south-facing slopes has more limestone and siltstone flagstones on the surface than the Eden soil on steep, north-facing slopes; however, both soils are within the range of characteristics of the Eden soil.

Changes or shifts in climate over long periods affect formation of the soils. Soil formation is affected by climatic averages, however, and weather extremes probably have had more influence on particular soil properties than on soil formation (*12*). The soils in Boyle and Mercer Counties formed in a temperate, moist climate that was probably similar to that of the present. Winters are fairly short, and periods of extremely low temperatures are also short. Periods of high temperature are fairly brief in summer. The average annual temperature in the survey area is about 55 degrees. The average annual precipitation is about 47 inches, and it is fairly evenly distributed throughout the year.

Temperature and rainfall in Boyle and Mercer Counties have favored almost continuous weathering of rocks and minerals, leaching of soluble materials and fine particles, and removal and deposition of materials by water. Soluble bases, including calcium and magnesium, and clay minerals have been moved to lower horizons or in some instances moved completely from the soil. As a result, many soils that developed in parent material high in carbonates and clay minerals are acid and have loamy surface layers and an accumulation of clay in the subsoil. Examples are the Vertrees, Maury, and Lowell soils.

plant and animal life

The native vegetation in Boyle and Mercer Counties was mostly mixed hardwood trees. In many areas, however, particularly in the Inner Bluegrass, native vegetation was probably canebreaks and grass. Most of the soils formed under hardwood forest. Soils that remained in woodland have a thin, dark surface layer. Soils that have been plowed, for example, the Vertrees and Lowell soils, have had the dark layer mixed with the light colored layer below it. This mixed layer is lower in organic matter content than the surface layer of soils that formed under cane or grass.

The McAfee and Caleast soils have thicker, somewhat darker surface layers than is typical for soils that formed under trees. They probably formed under cane and grass. The Maury soil is in a position on the landscape similar to that of the McAfee and Caleast soils; however, the Maury soil has a light colored surface layer. This difference is probably the result of more intense weathering. The Dunning soil has a thick, dark surface layer resulting from the accumulation of organic matter. This soil formed under marsh vegetation.

Earthworms, insects, and other small animals mix soil material and add organic matter. Bacteria, fungi, and other micro-organisms break down plant and animal residue. Trees and other plants transport plant nutrients from the lower part of the soil to the upper part. They also add organic matter, provide protective cover that retards erosion, and influence soil temperature. Soil material is mixed by root channeling and by tree overthrow. The organic matter added by plants and animals alters the chemical processes in the soil and forms humus. Some micro-organisms directly or symbiotically release nutrients such as nitrogen to the soil. The organic fraction tends to improve soil structure. The decay of the organic matter releases acids that accelerate weathering.

Soil changes that are caused by man are evident in soils that have been eroded, drained, excavated, or filled. Cultivation, drainage, irrigation, fertilization, and introduction of new plants, and major land forming operations further influence soil development by changing the nature and properties of the soils. Most of these changes, except for major land forming, take place slowly.

relief

Relief affects soil formation through its influence on drainage, erosion, plant cover, and soil temperatures. Because relief varies widely, it accounts for many differences in the soils in Boyle and Mercer Counties. Topography tends to modify the effects of climate and vegetation. For example, the Newark soils, which formed on nearly level flood plains, had an excess of water during formation that caused a lack of oxidation and resulted in the formation of a gray subsoil. On other nearly level to gently sloping soils, a fragipan may form under certain conditions. The Tilsit soil is an example.

Gently sloping to sloping soils commonly tend to show most clearly the influence of all of the soil forming factors. Although excess water runs off on these soils, erosion is not excessive and a normal soil profile is developed. The Caleast, Maury, Lowell, and Vertrees soils are examples.

Some steep soils are shallow and show slight development because geologic erosion takes place almost as rapidly as the formation of parent material and soil development. The Fairmount soil is an example. Some steep soils are deep because the parent material slowly moves down and accumulates on the lower part of the slope. This movement is illustrated in the Carpenter soils. Other steep soils are moderately deep because weathering of the underlying rock proceeds at a faster rate than geologic erosion. The Garmon soil is an example.

In some karst areas the surface layer of soils from the surrounding karst slopes has eroded and is deposited in the basin of the sink. These areas often have a low degree of weathering because the soil material has been freshly deposited. In Boyle and Mercer Counties, these local alluvial areas are too small to map separately and are mapped as inclusions. Such areas are included with the Chenault soil.

Although soil temperature and plant cover are somewhat different on the north- and south-facing slopes, these differences are generally slight.

time

The time required for a soil to form depends on the other soil forming factors. Less time is required for a soil to form in a warm, moist climate than in a cool, dry climate. Also, some parent material is more resistant to the soil-forming processes than others. For example, quartz sand may change very little even if it is exposed for long periods. Some parent material, however, may be more porous and allow for more intense weathering. The relative degree of profile development rather than the number of years a soil has been in the process of forming determines the age of the soil.

Soils are immature if they have characteristics almost identical to the parent material. In Boyle and Mercer Counties immature soils occur in flood plains where fresh deposition prevents the development of distinct soil horizons. Nolin and Sensabaugh soils are examples. Immature soils also occur on steep landscapes where geologic erosion and runoff prevent complete soil development. The Garmon soil is an example.

Mature soils are those that have well developed profiles. The Maury, Lowell, and Vertrees soils are examples. They are deep to bedrock and have distinct, well developed profiles. Erosion often removes material from mature and some immature soils and deposits the sediment as new parent material on other immature and mature soils (*12*).

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glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	Less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chert. An impure, very fine grained siliceous rock frequently associated with limestones, dolomites, or conglomerates.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A form of noninvertion tillage that retains protective amounts of residue mulch on the surface throughout the year. These include no-tillage, strip tillage, stubble mulching, and other types of noninvertion tillage.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geode. A hollow nodule, concretion, or vug lined with inwardly pointing crystals. It may vary from an inch to a foot or more.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithic contact. A boundary between the soil and continuous coherent, underlying material. The underlying material must be sufficiently coherent to make hand-digging, with a spade impractical and have a hardness of 3 or more (Mohs scale).

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Paralithic contact. A boundary between the soil and continuous, coherent underlying material. The mineral material below the contact has a hardness of less than 3 (Mohs's scale) and can be dug with difficulty with a spade.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-74 at Danville, Kentucky]

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average daily	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days[1]	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	41.9	23.2	32.6	69	-6	6	3.91	2.08	5.39	7	5.6
February---	45.4	24.6	35.1	71	-1	11	3.80	1.51	5.64	7	4.7
March------	54.2	32.6	43.4	80	13	66	4.71	2.62	6.41	9	3.5
April------	66.9	43.5	55.2	86	25	185	4.66	2.41	6.49	8	.2
May--------	75.9	52.4	64.2	91	32	445	4.21	2.32	5.74	8	.0
June-------	83.0	60.4	71.7	95	45	651	4.08	2.96	5.11	7	.0
July-------	86.6	64.2	75.4	96	50	787	4.82	3.21	6.28	8	.0
August-----	86.5	62.4	74.5	96	49	760	3.48	1.73	4.91	6	.0
September--	81.9	56.2	69.1	97	38	573	3.53	1.83	4.91	5	.0
October----	70.6	44.4	57.5	89	26	257	1.98	1.06	2.72	4	.0
November---	55.9	34.5	45.2	79	14	21	3.59	2.06	4.82	7	1.8
December---	45.3	26.8	36.0	71	1	19	3.97	1.88	5.67	7	2.8
Yearly:											
Average--	66.2	43.8	55.0	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	-9	---	---	---	---	---	---
Total----	---	---	---	---	---	3,781	46.74	40.05	53.14	83	18.6

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-74 at Danville, Kentucky]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 6	April 22	April 29
2 years in 10 later than--	April 1	April 16	April 24
5 years in 10 later than--	March 22	April 6	April 14
First freezing temperature in fall:			
1 year in 10 earlier than--	November 2	October 24	October 10
2 years in 10 earlier than--	November 6	October 28	October 15
5 years in 10 earlier than--	November 14	November 3	October 23

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-74 at Danville, Kentucky]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	218	191	175
8 years in 10	224	198	180
5 years in 10	236	211	191
2 years in 10	247	224	202
1 year in 10	254	231	208

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Boyle County	Mercer County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
Bo	Boonesboro silt loam	600	400	1,000	0.4
CaB	Caleast silt loam, 2 to 6 percent slopes	6,240	2,190	8,430	3.0
CaC	Caleast silt loam, 6 to 12 percent slopes	5,380	2,240	7,620	2.7
CcD	Caneyville-Rock outcrop complex, 6 to 20 percent slopes	840	0	840	0.3
CeD	Caneyville-Vertrees silt loams, 12 to 20 percent slopes	1,470	0	1,470	0.5
CgB	Carpenter gravelly silt loam, 2 to 6 percent slopes	630	0	630	0.2
CgC	Carpenter gravelly silt loam, 6 to 12 percent slopes	1,100	0	1,100	0.4
ClE	Carpenter-Lenberg gravelly silt loams, 12 to 30 percent slopes	5,980	0	5,980	2.1
CmB	Chenault gravelly silt loam, 2 to 6 percent slopes	280	1,070	1,350	0.5
CmC	Chenault gravelly silt loam, 6 to 12 percent slopes	550	1,870	2,420	0.9
CnD	Chenault-Caleast complex, 12 to 20 percent slopes	230	750	980	0.4
CoD	Colyer-Trappist silt loams, 12 to 30 percent slopes	2,330	0	2,330	0.8
CuD	Culleoka-Caneyville complex, 12 to 20 percent slopes	1,380	0	1,380	0.5
Du	Dunning silty clay loam	1,170	990	2,160	0.8
EdD	Eden silty clay loam, 6 to 20 percent slopes	9,290	30,580	39,870	14.2
EeE3	Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded	3,200	31,200	34,400	12.3
EkA	Elk silt loam, 0 to 2 percent slopes	290	1,370	1,660	0.6
EkB	Elk silt loam, 2 to 6 percent slopes	1,420	2,400	3,820	1.4
FaC	Fairmount-Rock outcrop complex, 6 to 12 percent slopes	1,440	4,700	6,140	2.2
FaD	Fairmount-Rock outcrop complex, 12 to 30 percent slopes	2,000	8,320	10,320	3.7
FaF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes	1,190	5,870	7,060	2.5
FdC	Faywood silt loam, 6 to 12 percent slopes	1,590	4,150	5,740	2.0
FdD	Faywood silt loam, 12 to 20 percent slopes	800	1,230	2,030	0.7
FwD3	Faywood silty clay, 12 to 20 percent slopes, severely eroded	270	570	840	0.3
GaF	Garmon silt loam, 25 to 60 percent slopes	9,760	0	9,760	3.5
LoB	Lowell silt loam, 2 to 6 percent slopes	5,370	5,930	11,300	4.0
LoC	Lowell silt loam, 6 to 12 percent slopes	7,830	7,510	15,340	5.5
LoD	Lowell silt loam, 12 to 20 percent slopes	1,850	1,370	3,220	1.1
LwC3	Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	2,480	1,820	4,300	1.5
MaA	Maury silt loam, 0 to 2 percent slopes	90	880	970	0.3
MaB	Maury silt loam, 2 to 6 percent slopes	10,000	13,060	23,060	8.2
MaC	Maury silt loam, 6 to 12 percent slopes	1,720	4,230	5,950	2.1
McB	McAfee silt loam, 2 to 6 percent slopes	2,620	4,350	6,970	2.5
McC	McAfee silt loam, 6 to 12 percent slopes	6,940	12,600	19,540	7.0
McD	McAfee silt loam, 12 to 20 percent slopes	1,230	2,590	3,820	1.4
MeD	McAfee-Rock outcrop complex, 12 to 20 percent slopes	1,170	820	1,990	0.7
MeF	McAfee-Rock outcrop complex, 20 to 50 percent slopes	2,030	0	2,030	0.7
Mg	McGary silt loam	190	200	390	0.1
Ne	Newark silt loam	910	570	1,480	0.5
NhB	Nicholson silt loam, 2 to 6 percent slopes	500	1,080	1,580	0.6
No	Nolin silt loam	5,610	6,230	11,840	4.2
Pt	Pits, quarries	40	60	100	*
Se	Sensabaugh gravelly silt loam	1,410	0	1,410	0.5
TlA	Tilsit silt loam, 0 to 2 percent slopes	690	0	690	0.2
TlB	Tilsit silt loam, 2 to 6 percent slopes	1,010	0	1,010	0.4
TpB	Trappist silt loam, 2 to 6 percent slopes	820	0	820	0.3
TpC	Trappist silt loam, 6 to 12 percent slopes	830	0	830	0.3
VeC	Vertrees silt loam, 6 to 12 percent slopes	2,070	0	2,070	0.7
	Water	470	380	850	0.3
	Total	117,310	163,580	280,890	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Corn	Wheat	Soybeans	Tobacco	Grass-legume hay	Pasture	Alfalfa hay
	Bu	Bu	Bu	Lb	Ton	AUM*	Ton
Bo------------------------ Boonesboro	100	40	40	2,800	3.0	7.0	---
CaB----------------------- Caleast	110	40	40	2,900	4.0	8.0	4.5
CaC----------------------- Caleast	110	35	35	2,600	4.0	8.0	4.5
CcD----------------------- Caneyville-Rock outcrop	---	---	---	---	---	4.0	---
CeD----------------------- Caneyville-Vertrees	---	---	---	---	---	5.0	---
CgB----------------------- Carpenter	110	35	35	2,650	3.0	6.0	3.5
CgC----------------------- Carpenter	100	30	30	2,300	3.0	6.0	3.5
ClE----------------------- Carpenter-Lenberg	---	---	---	---	---	5.0	---
CmB----------------------- Chenault	115	35	35	3,000	3.5	7.0	4.0
CmC----------------------- Chenault	110	30	35	2,650	3.5	7.0	4.0
CnD----------------------- Chenault-Caleast	97	30	30	2,436	3.0	6.0	3.5
CoD----------------------- Colyer-Trappist	---	---	---	---	---	4.0	---
CuD----------------------- Culleoka-Caneyville	75	25	20	1,500	3.0	5.5	---
Du------------------------ Dunning	120	---	40	---	4.0	8.0	---
EdD----------------------- Eden	70	20	20	1,950	2.5	5.0	3.5
EeE3---------------------- Eden	---	---	---	---	---	3.5	---
EkA----------------------- Elk	130	45	40	3,200	4.5	9.0	5.0
EkB----------------------- Elk	130	45	40	3,200	4.5	9.0	5.0
FaC----------------------- Fairmount-Rock outcrop	---	---	---	---	---	3.5	---
FaD----------------------- Fairmount-Rock outcrop	---	---	---	---	---	3.0	---
FaF----------------------- Fairmount-Rock outcrop	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Corn	Wheat	Soybeans	Tobacco	Grass-legume hay	Pasture	Alfalfa hay
	Bu	Bu	Bu	Lb	Ton	AUM*	Ton
FdC------ Faywood	80	20	25	2,300	3.0	6.0	3.5
FdD------ Faywood	---	---	---	2,100	2.5	5.0	3.0
FwD3------ Faywood	---	---	---	---	---	4.5	---
GaF------ Garmon	---	---	---	---	---	---	---
LoB------ Lowell	110	40	35	2,900	4.0	8.0	5.0
LoC------ Lowell	100	35	30	2,600	4.0	8.0	5.0
LoD------ Lowell	85	30	---	2,300	3.5	7.0	4.0
LwC3------ Lowell	85	30	25	2,150	3.0	6.0	3.5
MaA------ Maury	135	50	45	3,200	4.5	9.5	5.5
MaB------ Maury	125	50	40	3,200	4.5	9.5	5.5
MaC------ Maury	115	45	35	3,000	4.0	8.5	5.0
McB------ McAfee	100	30	30	2,600	3.5	7.0	3.5
McC------ McAfee	95	25	25	2,200	3.5	6.5	3.5
McD------ McAfee	60	---	---	---	3.0	5.5	3.0
MeD------ McAfee-Rock outcrop	---	---	---	---	---	---	---
MeF------ McAfee-Rock outcrop	---	---	---	---	---	---	---
Mg------ McGary	100	30	35	---	3.5	7.0	---
Ne------ Newark	115	45	40	2,500	4.5	8.5	---
NhB------ Nicholson	115	40	40	3,000	4.0	8.0	4.0
No------ Nolin	135	45	45	3,300	4.5	9.0	5.0
Pt**. Pits							
Se------ Sensabaugh	125	45	40	3,000	---	7.0	3.5
TlA------ Tilsit	100	40	30	2,650	---	7.0	3.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Corn	Wheat	Soybeans	Tobacco	Grass-legume hay	Pasture	Alfalfa hay
	Bu	Bu	Bu	Lb	Ton	AUM*	Ton
TlB----------------------- Tilsit	100	40	30	2,500	---	7.0	3.0
TpB----------------------- Trappist	90	35	35	2,550	3.5	6.5	3.5
TpC----------------------- Trappist	85	30	30	2,400	3.5	6.5	3.5
VeC----------------------- Vertrees	95	35	30	2,650	4.0	7.0	4.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I:					
Boyle County	380	---	---	---	---
Mercer County	2,250	---	---	---	---
II:					
Boyle County	38,110	28,890	7,210	2,010	---
Mercer County	37,280	30,080	6,800	400	---
III:					
Boyle County	29,370	28,010	1,360	---	---
Mercer County	33,790	32,600	1,190	---	---
IV:					
Boyle County	17,260	17,260	---	---	---
Mercer County	38,340	38,340	---	---	---
V:					
Boyle County	---	---	---	---	---
Mercer County	---	---	---	---	---
VI:					
Boyle County	16,370	10,920	---	5,450	---
Mercer County	45,610	31,770	---	13,840	---
VII:					
Boyle County	15,310	9,760	---	5,550	---
Mercer County	9,979	4,109	---	5,870	---
VIII:					
Boyle County	---	---	---	---	---
Mercer County	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
Bo------------------ Boonesboro	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Eastern cottonwood, sweetgum, yellow-poplar, white ash, American sycamore.
CaB, CaC----------- Caleast	2c	Slight	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar-------	80 90	Yellow-poplar, white ash, white oak, black oak.
CcD:*								
Caneyville--------	3x	Moderate	Moderate	Slight	Moderate	Eastern redcedar---- White oak----------- Black oak----------- Hickory-------------	45 63 69 ---	Virginia pine, loblolly pine, black oak, white oak.
Rock outcrop.								
CeD:*								
Caneyville--------	3c	Moderate	Moderate	Slight	Moderate	Black oak----------- Eastern redcedar---- White oak----------- Hickory-------------	69 45 63 ---	Virginia pine, loblolly pine, black oak, white oak.
Vertrees----------	2c	Moderate	Severe	Slight	Severe	White oak----------- Chinkapin oak------- Black oak----------- Northern red oak----	80 80 80 80	White ash, Virginia pine, northern red oak, black oak, white oak.
CgB, CgC----------- Carpenter	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Black oak----------- Scarlet oak---------	80 --- ---	Yellow-poplar, black walnut, Virginia pine, eastern white pine, shortleaf pine, black oak.
ClE:*								
Carpenter---------	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Yellow-poplar, black walnut, Virginia pine, eastern white pine, shortleaf pine, black oak.
Lenberg-----------	4c	Moderate	Moderate	Slight	Slight	White oak----------- Scarlet oak--------- Virginia pine-------	60 60 60	Virginia pine, eastern redcedar, black oak, white oak.
CmB, CmC----------- Chenault	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar-------	80 90	Yellow-poplar, black walnut, eastern white pine, white ash, northern red oak.
CnD:*								
Chenault----------	2o	Slight	Slight	Slight	Severe	Northern red oak---- Yellow-poplar-------	80 90	Yellow-poplar, black walnut, eastern white pine, white ash, northern red oak.
Caleast-----------	2c	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar-------	80 90	Yellow-poplar, white ash, white oak, black oak.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
CoD:*								
Colyer	4d	Moderate	Moderate	Moderate	Slight	Scarlet oak Virginia pine Chestnut oak	60 58 64	Virginia pine, shortleaf pine, eastern white pine, white oak, black oak.
Trappist	3c	Moderate	Moderate	Slight	Moderate	Virginia pine Black oak White oak	62 58 58	Virginia pine, loblolly pine, eastern white pine.
CuD:*								
Culleoka	2r	Moderate	Moderate	Slight	Moderate	Yellow-poplar Northern red oak Shortleaf pine Eastern redcedar	105 94 80 60	Eastern white pine, black walnut, yellow-poplar, shortleaf pine, Virginia pine, black oak, white ash.
Caneyville	3c	Moderate	Moderate	Slight	Moderate	Black oak Eastern redcedar White oak Hickory	69 45 63 ---	Virginia pine, white ash, loblolly pine, black oak, white oak.
Du Dunning	1w	Slight	Severe	Severe	Severe	Pin oak Sweetgum	95 95	Loblolly pine, pin oak.
EdD Eden	3c	Moderate	Moderate	Moderate	Moderate	Eastern redcedar Scarlet oak Black oak	40 70 73	White oak, Virginia pine, Scotch pine, black oak, white ash.
EeE3 Eden	4c	Moderate	Moderate	Moderate	Slight	Eastern redcedar Scarlet oak Black oak	35 60 63	Eastern redcedar, Virginia pine, Scotch pine, white oak, black oak.
EkA, EkB Elk	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Hackberry	80 90 ---	Eastern white pine, yellow-poplar, black walnut, loblolly pine, northern red oak, white oak, shortleaf pine, black oak.
FaC:								
Fairmount	4x	Slight	Moderate	Moderate	Slight	Eastern redcedar Scarlet oak Chinkapin oak White ash	41 60 61 71	Virginia pine, eastern redcedar, black oak, white oak.
Rock outcrop.								
FaD:								
Fairmount	4x	Moderate	Moderate	Moderate	Slight	Eastern redcedar Scarlet oak Chinkapin oak White ash	41 60 61 71	Virginia pine, eastern redcedar, black oak, white oak.
Rock outcrop.								
FaF:								
Fairmount	4x	Severe	Severe	Moderate	Slight	Eastern redcedar Scarlet oak Chinkapin oak White ash	41 60 61 71	Virginia pine, eastern redcedar, black oak, white oak.
Rock outcrop.								

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Plant competi-tion	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
FdC: Faywood	3c	Slight	Moderate	Slight	Moderate	Northern red oak Virginia pine White oak Black oak	70 70 --- ---	Eastern white pine, white oak, white ash, black oak.
FdD: Faywood	3c	Moderate	Moderate	Slight	Moderate	Northern red oak Virginia pine White oak Black oak	70 70 --- ---	Eastern white pine, white oak, white ash, black oak.
FwD3: Faywood	4c	Moderate	Moderate	Moderate	Slight	White oak Virginia pine	--- 60	Virginia pine, eastern redcedar.
GaF: Garmon	3r	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak Yellow-poplar	76 75 69 95	Virginia pine, loblolly pine, eastern white pine, yellow-poplar, black oak, white oak.
LoB, LoC: Lowell	2c	Slight	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine White ash	81 90 80 75	Yellow-poplar, eastern white pine, Virginia pine, loblolly pine, black oak, white oak.
LoD: Lowell	2c	Moderate	Moderate	Slight	Moderate	Northern red oak Black oak Black locust Virginia pine White ash	81 89 78 80 75	Eastern white pine, Virginia pine, loblolly pine, black oak, white oak, white ash.
LwC3: Lowell	3c	Slight	Moderate	Slight	Moderate	Northern red oak Virginia pine Black oak	70 65 75	Virginia pine, loblolly pine, black oak, white oak.
MaA, MaB, MaC: Maury	2o	Slight	Slight	Slight	Severe	Northern red oak White ash Bur oak Hackberry	80 --- --- ---	Black walnut, yellow-poplar, white ash, black locust, eastern white pine, northern red oak, white oak.
McB, McC: McAfee	3c	Slight	Moderate	Slight	Moderate	Northern red oak Eastern redcedar Yellow-poplar Black locust	79 50 85 ---	Eastern white pine, yellow-poplar, black oak, white oak.
McD: McAfee	3c	Moderate	Moderate	Slight	Moderate	Northern red oak Eastern redcedar Yellow-poplar Black locust	79 50 85 ---	Eastern white pine, yellow-poplar, black oak, white oak.
MeD:* McAfee	3x	Moderate	Moderate	Slight	Moderate	Northern red oak Eastern redcedar Yellow-poplar Black locust	79 50 85 ---	Eastern white pine, yellow-poplar, black oak, white oak.
Rock outcrop.								
MeF:* McAfee	3x	Severe	Severe	Slight	Moderate	Northern red oak Eastern redcedar Yellow-poplar Black locust	79 50 85 ---	Eastern white pine, yellow-poplar, black oak, white oak.
Rock outcrop.								

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
Mg----------------- McGary	3w	Slight	Moderate	Slight	Moderate	White oak----------- Yellow-poplar------- Sweetgum----------- Sugar maple--------- White ash-----------	70 85 80 --- ---	Eastern white pine, white ash, red maple, yellow-poplar, American sycamore.
Ne----------------- Newark	1w	Slight	Moderate	Slight	Severe	Pin oak------------ Eastern cottonwood-- Northern red oak---- Yellow-poplar------- Sweetgum-----------	99 94 85 95 88	Eastern cottonwood, sweetgum, loblolly pine, red maple, American sycamore, eastern white pine, yellow-poplar.
NhB---------------- Nicholson	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Sweetgum----------- White oak----------- Black oak-----------	80 84 72 76	Yellow-poplar, eastern white pine, shortleaf pine, white ash, white oak, black oak.
No----------------- Nolin	1o	Slight	Slight	Slight	Severe	Sweetgum----------- Yellow-poplar------- Red maple----------- White ash-----------	92 107 --- ---	Sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, black walnut, white oak, black oak.
Se----------------- Sensabaugh	2o	Slight	Slight	Slight	Moderate	Yellow-poplar------- White oak----------- Virginia pine-------	100 80 75	Yellow-poplar, black walnut, white ash, white oak, black oak.
TlA, TlB----------- Tilsit	3o	Slight	Slight	Slight	Moderate	Yellow-poplar------- Virginia pine------- Black oak----------- White ash-----------	89 70 62 64	Eastern white pine, Virginia pine, shortleaf pine, black oak, white oak.
TpB, TpC----------- Trappist	3c	Slight	Moderate	Slight	Moderate	Northern red oak---- Virginia pine-------	70 69	Shortleaf pine, Virginia pine, loblolly pine, eastern white pine.
VeC---------------- Vertrees	2c	Slight	Moderate	Slight	Moderate	Yellow-poplar------- White oak----------- Chinkapin oak------- Black oak----------- Northern red oak----	90 80 80 80 80	Yellow-poplar, white ash, Virginia pine, northern red oak, black oak.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Bo------ Boonesboro	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
CaB------ Caleast	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------	Slight.
CaC------ Caleast	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CcD:*					
Caneyville------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
CeD:*					
Caneyville------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Vertrees------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CgB------ Carpenter	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight------	Moderate: small stones.
CgC------ Carpenter	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight------	Moderate: small stones, slope.
ClE:*					
Carpenter------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Lenberg------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: erodes easily.	Severe: slope.
CmB------ Chenault	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight------	Moderate: small stones.
CmC------ Chenault	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight------	Moderate: small stones, slope.
CnD:*					
Chenault------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Caleast------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CoD:*					
Colyer------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: droughty, slope, thin layer.
Trappist------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CuD:*					
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Du Dunning	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
EdD Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, slope, thin layer.
EeE3 Eden	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey, large stones.	Severe: slope, too clayey.	Severe: slope, too clayey.
EkA Elk	Severe: floods.	Slight	Slight	Slight	Slight.
EkB Elk	Slight	Slight	Moderate: slope.	Slight	Slight.
FaC:*					
Fairmount	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, depth to rock.	Severe: erodes easily.	Severe: large stones, thin layer.
Rock outcrop.					
FaD:*					
Fairmount	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.	Severe: erodes easily.	Severe: large stones, slope, thin layer.
Rock outcrop.					
FaF:*					
Fairmount	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.	Severe: erodes easily, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.					
FdC Faywood	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
FdD Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FwD3 Faywood	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey, erodes easily.	Severe: slope, too clayey.
GaF Garmon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LoB Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LoC: Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
LoD: Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LwC3: Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MaA: Maury	Slight	Slight	Slight	Slight	Slight.
MaB: Maury	Slight	Slight	Moderate: slope.	Slight	Slight.
MaC: Maury	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
McB: McAfee	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: thin layer.
McC: McAfee	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
McD: McAfee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MeD:*					
McAfee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Rock outcrop.					
MeF:*					
McAfee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
Mg: McGary	Severe: wetness, percs slowly.	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Ne: Newark	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
NhB: Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
No: Nolin	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.
Pt:* Pits					
Se: Sensabaugh	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TlA Tilsit	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
TlB Tilsit	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
TpB Trappist	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: thin layer.
TpC Trappist	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
VeC Vertrees	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Bo-----------------Boonesboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaB----------------Caleast	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaC----------------Caleast	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CcD:*										
Caneyville---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
CeD:*										
Caneyville---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Vertrees-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CgB----------------Carpenter	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CgC----------------Carpenter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ClE:*										
Carpenter----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lenberg------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CmB----------------Chenault	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CmC----------------Chenault	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnD:*										
Chenault-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Caleast------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CoD:*										
Colyer-------------	Very poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Trappist-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CuD:*										
Culleoka-----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Caneyville---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Du: Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
EdD: Eden	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EeE3: Eden	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EkA, EkB: Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FaC,* FaD:*										
Fairmount	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
FaF:*										
Fairmount	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
FdC: Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdD, FwD3: Faywood	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GaF: Garmon	Very poor	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
LoB: Lowell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC: Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LoD: Lowell	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LwC3: Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaA, MaB: Maury	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC: Maury	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
McB: McAfee	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
McC: McAfee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
McD: McAfee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MeD:*										
McAfee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MeF:*										
McAfee	Very poor	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
Mg McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ne Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NhB Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
No Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pt.* Pits										
Se Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TlA Tilsit	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
TlB Tilsit	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TpB Trappist	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TpC Trappist	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VeC Vertrees	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Bo Boonesboro	Severe: depth to rock.	Severe: floods.	Severe: floods, depth to rock.	Severe: floods.	Severe: floods.	Severe: floods.
CaB Caleast	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
CaC Caleast	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
CcD:*						
Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Rock outcrop.						
CeD:*						
Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Vertrees	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CgB Carpenter	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Moderate: small stones.
CgC Carpenter	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: small stones, slope.
ClE:*						
Carpenter	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CmB Chenault	Moderate: depth to rock, too clayey.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Moderate: small stones.
CmC Chenault	Moderate: depth to rock, too clayey, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: small stones, slope.
CnD:*						
Chenault	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Caleast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CoD:*						
Colyer	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: droughty, slope, thin layer.
Trappist	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CuD:*						
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Du Dunning	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.	Severe: wetness, floods.
EdD Eden	Moderate: too clayey, slope.	Moderate: shrink-swell, large stones, slope.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
EeE3 Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
EkA Elk	Slight	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.	Slight.
EkB Elk	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
FaC:*						
Fairmount	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, low strength.	Severe: large stones, thin layer.
Rock outcrop.						
FaD,* FaF:*						
Fairmount	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.						
FdC Faywood	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
FdD Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
FwD3 Faywood	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, too clayey.
GaF Garmon	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LoB---------------- Lowell	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
LoC---------------- Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
LoD---------------- Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
LwC3--------------- Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
MaA---------------- Maury	Moderate: too clayey.	Slight---------	Slight---------	Slight---------	Severe: low strength.	Slight.
MaB---------------- Maury	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
MaC---------------- Maury	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
McB---------------- McAfee	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer.
McC---------------- McAfee	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
McD---------------- McAfee	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MeD,* MeF:*						
McAfee------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength. slope.	Severe: slope.
Rock outcrop.						
Mg----------------- McGary	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Ne----------------- Newark	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.	Severe: wetness, floods.
NhB---------------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
No----------------- Nolin	Moderate: wetness, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength, floods.	Severe: floods.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pt.* Pits						
Se----------------- Sensabaugh	Moderate: wetness, floods, depth to rock.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
TlA---------------- Tilsit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
TlB---------------- Tilsit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Moderate: wetness.
TpB---------------- Trappist	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer.
TpC---------------- Trappist	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
VeC---------------- Vertrees	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bo: Boonesboro	Severe: floods, depth to rock, poor filter.	Severe: seepage, depth to rock, floods.	Severe: floods, depth to rock, seepage.	Severe: floods, depth to rock, seepage.	Poor: area reclaim, thin layer.
CaB: Caleast	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
CaC: Caleast	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
CcD:*					
Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
CeD:*					
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack, slope.
Vertrees	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CgB: Carpenter	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: area reclaim, too clayey.
CgC: Carpenter	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: area reclaim, too clayey, slope.
ClE:*					
Carpenter	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, slippage.	Severe: slope, slippage.	Poor: slope.
Lenberg	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
CmB: Chenault	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Severe: seepage.	Fair: area reclaim, too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CmC: Chenault	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Severe: seepage.	Fair: area reclaim, too clayey, slope.
CnD:*					
Chenault	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
Caleast	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CoD:*					
Colyer	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope.
Trappist	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack, slope.
CuD:*					
Culleoka	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack, slope.
Du: Dunning	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey, hard to pack, wetness.
EdD: Eden	Severe: percs slowly, depth to rock, slope.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock, slope.	Severe: depth to rock, slope.	Poor: too clayey, area reclaim, hard to pack.
EeE3: Eden	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack.
EkA: Elk	Moderate: floods.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey.
EkB: Elk	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
FaC:*					
Fairmount	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FaD,* FaF:*					
Fairmount	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
FdC Faywood	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
FdD Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack, slope.
FwD3 Faywood	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack, slope.
GaF Garmon	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage, slope.	Severe: slope, seepage, depth to rock.	Poor: slope, thin layer, area reclaim.
LoB Lowell	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
LoC Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
LoD Lowell	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
LwC3 Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
MaA, MaB Maury	Slight	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
MaC Maury	Moderate: slope.	Severe: seepage, slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
McB McAfee	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
McC McAfee	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
McD: McAfee	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
MeD,* MeF:* McAfee	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack, slope.
Rock outcrop.					
Mg: McGary	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ne: Newark	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
NhB: Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
No: Nolin	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Fair: too clayey.
Pt.* Pits					
Se: Sensabaugh	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage, wetness, depth to rock.	Severe: floods, seepage.	Fair: small stones, area reclaim, thin layer.
TlA, TlB: Tilsit	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey, wetness.
TpB: Trappist	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
TpC: Trappist	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
VeC: Vertrees	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Bo: Boonesboro	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
CaB, CaC: Caleast	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CcD:*				
Caneyville	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
CeD:*				
Caneyville	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Vertrees	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
CgB, CgC: Carpenter	Fair: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ClE:*				
Carpenter	Fair: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lenberg	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
CmB, CmC: Chenault	Fair: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CnD:*				
Chenault	Fair: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Caleast	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
CoD:*				
Colyer	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Trappist	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
CuD:*				
Culleoka	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Caneyville	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Du Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
EdD Eden	Poor: thin layer, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
EeE3 Eden	Poor: slope, thin layer, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, large stones.
EkA, EkB Elk	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
FaC,* FaD:*				
Fairmount	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.				
FaF:*				
Fairmount	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones.
Rock outcrop.				
FdC Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FdD Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FwD3 Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GaF Garmon	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
LoB, LoC Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LoD Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
LwC3 Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MaA, MaB: Maury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MaC: Maury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
McB, McC: McAfee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
McD: McAfee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
MeD:* McAfee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Rock outcrop.				
MeF:* McAfee	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
Mg: McGary	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ne: Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NhB: Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
No: Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pt.* Pits				
Se: Sensabaugh	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
TlA, TlB: Tilsit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
TpB, TpC: Trappist	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
VeC: Vertrees	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes and levees	Drainage	Terraces and diversions	Grassed waterways
Bo: Boonesboro	Severe: seepage.	Severe: thin layer, piping.	Deep to water	Depth to rock	Depth to rock.
CaB: Caleast	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Erodes easily	Erodes easily.
CaC: Caleast	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
CcD:*					
Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.					
CeD:*					
Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Vertrees	Slight	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
CgB: Carpenter	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CgC: Carpenter	Moderate: seepage.	Severe: piping.	Deep to water	Slope	Slope.
ClE:*					
Carpenter	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Lenberg	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CmB: Chenault	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Favorable	Favorable.
CmC: Chenault	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Slope	Slope.
CnD:*					
Chenault	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Slope	Slope.
Caleast	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
CoD:*					
Colyer	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
CoD:*					
Trappist	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CuD:*					
Culleoka	Severe: seepage.	Severe: piping, thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Du Dunning	Slight	Severe: wetness.	Percs slowly, floods.	Wetness, percs slowly.	Wetness, percs slowly.
EdD Eden	Moderate: depth to rock.	Moderate: hard to pack, thin layer, large stones.	Deep to water	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
EeE3 Eden	Severe: slope.	Moderate: hard to pack, thin layer, large stones.	Deep to water	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
EkA, EkB Elk	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
FaC:*					
Fairmount	Severe: depth to rock.	Severe: thin layer, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.					
FaD,* FaF:*					
Fairmount	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.					
FdC, FdD Faywood	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
FwD3 Faywood	Moderate: depth to rock.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
GaF Garmon	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
LoB Lowell	Moderate: depth to rock.	Moderate: thin layer.	Deep to water	Erodes easily	Erodes easily.
LoC, LoD, LwC3 Lowell	Moderate: depth to rock.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
MaA, MaB Maury	Severe: seepage.	Slight	Deep to water	Favorable	Favorable.
MaC Maury	Severe: seepage.	Slight	Deep to water	Slope	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
McB---------------- McAfee	Moderate: depth to rock.	Severe: thin layer.	Deep to water----	Depth to rock, erodes easily.	Erodes easily, depth to rock.
McC, McD----------- McAfee	Moderate: depth to rock.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
MeD,* MeF:*					
McAfee------------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
Mg----------------- McGary	Slight-------------	Severe: wetness.	Percs slowly-----	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ne----------------- Newark	Moderate: seepage.	Severe: piping, wetness.	Floods, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
NhB---------------- Nicholson	Slight-------------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
No----------------- Nolin	Severe: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
Pt.* Pits					
Se----------------- Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water----	Large stones-----	Large stones.
TlA---------------- Tilsit	Moderate: depth to rock.	Severe: piping.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
TlB---------------- Tilsit	Moderate: depth to rock.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
TpB---------------- Trappist	Slight-------------	Severe: thin layer.	Deep to water----	Depth to rock, erodes easily.	Erodes easily, depth to rock.
TpC---------------- Trappist	Slight-------------	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
VeC---------------- Vertrees	Slight-------------	Severe: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Bo----------------Boonesboro	0-25	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	80-100	70-95	25-35	4-11
	25-34	Gravelly silt loam, gravelly silty clay loam.	GM, GC, CL, CL-ML	A-4, A-6, A-7	0-20	65-85	60-80	55-75	45-65	25-42	4-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CaB, CaC---------Caleast	0-14	Silt loam--------	ML, CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	85-100	25-40	4-20
	14-48	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	90-100	90-100	85-100	85-100	35-65	12-35
	48-53	Clay, silty clay	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-45
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CcD:* Caneyville------	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	8-26	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	26-35	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CeD:* Caneyville------	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	8-26	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	26-35	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vertrees--------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	7-64	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45
CgB, CgC---------Carpenter	0-6	Gravelly silt loam.	ML, CL-ML	A-4	0-10	70-95	60-85	55-80	55-80	<35	NP-10
	6-13	Gravelly silt loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0-10	60-95	60-90	55-80	55-80	20-40	5-20
	13-43	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0-10	60-95	60-90	55-80	55-80	25-45	5-20
	43-58	Channery silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-10	65-95	65-95	65-90	65-90	30-60	15-40
	58-70	Weathered bedrock	---	---	---	---	---	---	---	---	---
ClE:* Carpenter-------	0-6	Gravelly silt loam.	ML, CL-ML	A-4	0-10	70-95	60-85	55-80	55-80	<35	NP-10
	6-13	Gravelly silt loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0-10	60-95	60-90	55-80	55-80	20-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
ClE:*											
Carpenter	13-43	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0-10	60-95	60-90	55-80	55-80	25-45	5-20
	43-58	Channery silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-10	65-95	65-95	65-90	65-90	30-60	15-40
	58-70	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lenberg	0-10	Gravelly silt loam.	CL, ML, CL-ML	A-6, A-7, A-4	0-5	75-100	60-75	55-95	50-90	20-45	2-22
	10-23	Silty clay loam, silty clay, gravelly clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	23-39	Silty clay, clay, gravelly clay.	CL, CH	A-7	0-5	70-100	60-100	55-95	50-90	45-70	20-40
	39-66	Weathered bedrock	---	---	---	---	---	---	---	---	---
CmB, CmC Chenault	0-11	Gravelly silt loam.	ML, CL-ML	A-4	0-5	65-90	60-90	55-85	55-85	<35	NP-10
	11-41	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0-5	65-85	60-85	55-80	55-80	25-40	5-20
	41-49	Gravelly clay, clay, silty clay.	CL, CH	A-7	0	65-90	60-90	60-90	60-90	45-75	20-45
	49	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CnD:*											
Chenault	0-11	Gravelly silt loam.	ML, CL-ML	A-4	0-5	65-90	60-90	55-85	55-85	<35	NP-10
	11-41	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0-5	65-85	60-85	55-80	55-80	25-40	5-20
	41-49	Gravelly clay, clay, silty clay.	CL, CH	A-7	0	65-90	60-90	60-90	60-90	45-75	20-45
	49	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Caleast	0-14	Silt loam	ML, CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	85-100	25-40	4-20
	14-48	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	90-100	90-100	85-100	85-100	35-65	12-35
	48-53	Clay, silty clay	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-45
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CoD:*											
Colyer	0-6	Silt loam	CL, ML, CL-ML	A-4, A-6	0	80-100	80-95	65-95	55-90	25-40	5-15
	6-14	Shaly clay, very shaly silty clay, very shaly silty clay loam.	GC, GM	A-2, A-6, A-7	0-10	25-60	20-50	20-50	15-45	35-55	11-30
	14-18	Shaly clay, very shaly silty clay, extremely shaly silty clay loam.	GC, GM	A-2, A-6, A-7	0-15	25-60	20-50	20-50	15-45	35-55	11-30
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CoD:* Trappist--------	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-40	2-20
	9-30	Silty clay, clay, shaly silty clay.	CL, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	30-34	Very shaly clay, extremely shaly silty clay, shaly clay.	GC, CL, MH, CH	A-2, A-7, A-6	0-5	30-75	20-65	20-60	15-60	35-60	12-30
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CuD:* Culleoka--------	0-8	Channery silt loam.	ML, CL, SM, CL-ML	A-4	5-25	80-95	75-90	60-90	45-85	<35	NP-10
	8-39	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	39-52	Weathered bedrock	---	---	---	---	---	---	---	---	---
Caneyville------	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	8-26	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	26-35	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Du--------------- Dunning	0-14	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	34-42	15-22
	14-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
EdD-------------- Eden	0-5	Silty clay loam	ML, CL, MH, CH	A-7, A-6	0-15	85-100	80-100	75-100	70-100	35-65	12-35
	5-39	Flaggy silty clay, flaggy clay, silty clay.	MH, CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	39-64	Weathered bedrock	---	---	---	---	---	---	---	---	---
EeE3------------- Eden	0-6	Flaggy silty clay	ML, CL, MH, CH	A-7, A-6	25-40	75-95	70-95	70-95	65-95	35-65	12-35
	6-21	Flaggy silty clay, flaggy clay, silty clay.	MH, CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	21-36	Weathered bedrock	---	---	---	---	---	---	---	---	---
EkA-------------- Elk	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	9-50	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	50-80	Silty clay loam, silt loam, fine sandy loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FaC,* FaD,* FaF:* Fairmount-------	0-6	Flaggy silty clay loam.	CL	A-6, A-7	8-50	80-100	70-100	65-100	60-95	35-45	15-22
	6-14	Flaggy silty clay loam, flaggy clay, flaggy silty clay.	CH, CL	A-7	8-50	80-100	70-100	65-100	60-100	40-70	20-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
FaC,* FaD,* FaF:*											
Fairmount-------	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
FdC, FdD--------- Faywood	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	7-31	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FwD3------------- Faywood	0-3	Silty clay-------	CL, CH, MH	A-7	0-15	90-100	90-100	85-100	80-100	45-60	20-30
	3-25	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GaF-------------- Garmon	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	75-95	75-95	65-95	55-90	20-35	5-15
	10-30	Shaly silt loam, channery silty clay loam, shaly loam.	GM-GC, CL-ML, CL, SM-SC	A-4, A-6	0-15	60-85	50-85	45-80	36-70	20-40	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LoB, LoC, LoD---- Lowell	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	8-38	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	38-61	Clay, silty clay, shaly silty clay.	CH, MH, CL	A-7	0-20	80-100	80-100	75-100	75-100	45-75	20-40
	61	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LwC3------------- Lowell	0-5	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	34-42	15-22
	5-38	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	38-62	Clay, silty clay, shaly silty clay.	CH, MH, CL	A-7	0-20	80-100	80-100	75-100	75-100	45-75	20-40
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaA, MaB, MaC---- Maury	0-10	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	90-100	80-100	25-35	4-10
	10-27	Silty clay loam	ML, CL	A-6, A-7, A-4	0	95-100	95-100	85-100	80-100	30-50	8-26
	27-48	Silty clay loam, silty clay, clay.	CL, MH, CH	A-7, A-6	0	90-100	90-100	85-100	80-100	35-60	15-30
	48-80	Silty clay, clay, silty clay loam.	MH, CH, CL	A-7, A-6	0	85-100	85-100	80-100	75-100	35-65	15-35
McB, McC, McD---- McAfee	0-9	Silt loam--------	ML, CL-ML	A-4	0-10	90-100	85-100	75-100	70-100	25-35	4-10
	9-30	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0-10	90-100	85-100	80-100	75-100	35-65	15-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MeD,* MeF:*											
McAfee----------	0-9	Silt loam--------	ML, CL-ML	A-4	0-10	90-100	85-100	75-100	70-100	25-35	4-10
	9-30	Silty clay, silty clay loam, clay.	CL, CH, MH	A-7, A-6	0-10	85-100	85-100	80-100	75-100	35-65	15-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MeD,* MeF:* Rock outcrop.											
Mg---------------- McGary	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	8-30	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	45-60	25-35
	30-75	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	35-55	20-35
Ne---------------- Newark	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	8-35	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	3-20
	35-64	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NhB--------------- Nicholson	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	9-19	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	95-100	85-100	80-100	25-45	5-20
	19-28	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-95	25-45	5-20
	28-78	Silty clay, clay, channery clay.	CH, CL	A-7	0-10	80-100	70-100	60-100	55-95	40-70	16-40
No---------------- Nolin	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	90-100	95-100	90-100	80-100	25-40	5-18
	10-52	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	90-100	95-100	85-100	75-100	25-46	5-23
	52-60	Loam, silt loam, gravelly loam.	ML, CL, CL-ML, GM	A-4, A-6	0-10	65-100	60-100	50-95	45-95	<30	NP-15
Pt.* Pits											
Se---------------- Sensabaugh	0-10	Gravelly silt loam.	CL-ML, CL, ML, SM	A-4	0-18	75-90	65-75	55-65	40-55	16-29	3-9
	10-30	Gravelly silt loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	30-46	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SM-SC, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15
	46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TlA, TlB---------- Tilsit	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	90-100	85-100	75-100	60-100	20-35	NP-10
	8-23	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-100	25-40	5-20
	23-44	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	65-100	25-45	5-25
	44-60	Silt loam, silty clay loam, silty clay.	CL, CH, CL-ML	A-4, A-6, A-7	0-30	70-100	60-85	60-85	55-80	25-60	5-35
TpB, TpC---------- Trappist	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-40	2-20
	9-30	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	30-34	Very shaly clay, extremely shaly silty clay, shaly clay.	GC, CL, MH, CH	A-2, A-7, A-6	0-5	30-75	20-65	20-60	15-60	35-60	12-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TpB, TpC---------: Trappist	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
VeC--------------: Vertrees	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-90	20-40	3-20
	7-64	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	85-100	75-100	70-95	65-95	41-70	25-45

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
Bo---------------- Boonesboro	0-25	18-27	1.20-1.40	0.6-2.0	0.18-0.23	6.1-8.4	Low-----------	0.37	3	3-5
	25-34	18-35	1.20-1.40	6.0-20	0.06-0.12	6.1-8.4	Low-----------	0.17		
	34	---	---	---	---	---	-------------	----		
CaB, CaC---------- Caleast	0-14	15-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.8	Low-----------	0.37	3	2-5
	14-48	27-50	1.30-1.50	0.2-2.0	0.13-0.19	5.6-7.8	Moderate------	0.37		
	48-53	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.6-7.8	Moderate------	0.28		
	53	---	---	---	---	---	-------------	----		
CcD:*										
Caneyville-------	0-8	10-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low-----------	0.43	3	2-4
	8-26	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate------	0.28		
	26-35	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.3	Moderate------	0.28		
	35	---	---	---	---	---	-------------	----		
Rock outcrop.										
CeD:*										
Caneyville-------	0-8	10-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low-----------	0.43	3	2-4
	8-26	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate------	0.28		
	26-35	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.3	Moderate------	0.28		
	35	---	---	---	---	---	-------------	----		
Vertrees---------	0-7	15-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-7.3	Low-----------	0.37	4	2-4
	7-64	40-60	1.40-1.65	0.2-0.6	0.14-0.18	4.5-6.0	Moderate------	0.28		
CgB, CgC---------- Carpenter	0-6	10-27	1.20-1.40	2.0-6.0	0.16-0.22	4.5-6.5	Low-----------	0.28	4	1-4
	6-13	18-30	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.28		
	13-43	18-35	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.28		
	43-58	30-55	1.20-1.60	0.06-0.6	0.07-0.16	4.5-6.0	Moderate------	0.28		
	58	---	---	---	---	---	-------------	----		
ClE:*										
Carpenter--------	0-6	10-27	1.20-1.40	2.0-6.0	0.16-0.22	4.5-6.5	Low-----------	0.28	4	1-4
	6-13	18-30	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.28		
	13-43	18-35	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.28		
	43-58	30-55	1.20-1.60	0.06-0.6	0.07-0.16	4.5-6.0	Moderate------	0.28		
	58	---	---	---	---	---	-------------	----		
Lenberg----------	0-10	12-35	1.30-1.50	0.6-2.0	0.12-0.22	4.5-5.5	Low-----------	0.37	3	.5-3
	10-23	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-5.5	Moderate------	0.37		
	23-39	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate------	0.37		
	39	---	---	---	---	---	-------------	----		
CmB, CmC---------- Chenault	0-11	10-27	1.20-1.40	2.0-6.0	0.16-0.22	5.1-7.3	Low-----------	0.28	4	1-4
	11-41	18-35	1.20-1.50	0.6-2.0	0.10-0.20	5.1-6.5	Low-----------	0.28		
	41-49	35-55	1.30-1.60	0.6-2.0	0.07-0.16	5.6-7.3	Moderate------	0.28		
	49	---	---	---	---	---	-------------	----		
CnD:*										
Chenault---------	0-11	10-27	1.20-1.40	2.0-6.0	0.16-0.22	5.1-7.3	Low-----------	0.28	4	1-4
	11-41	18-35	1.20-1.50	0.6-2.0	0.10-0.20	5.1-6.5	Low-----------	0.28		
	41-49	35-55	1.30-1.60	0.6-2.0	0.07-0.16	5.6-7.3	Moderate------	0.28		
	49	---	---	---	---	---	-------------	----		
Caleast----------	0-14	15-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.8	Low-----------	0.37	3	2-5
	14-48	27-50	1.30-1.50	0.2-2.0	0.13-0.19	5.6-7.8	Moderate------	0.37		
	48-53	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.6-7.8	Moderate------	0.28		
	53	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
CoD:*										
Colyer----------	0-6	15-34	1.20-1.50	0.6-2.0	0.15-0.21	3.6-5.0	Low----------	0.37	2	.5-2
	6-14	35-59	1.30-1.60	0.06-0.2	0.03-0.10	3.6-5.0	Low----------	0.17		
	14-18	35-59	1.30-1.60	0.06-0.2	0.03-0.10	3.6-5.0	Low----------	0.17		
	18	---	---	---	---	---	-------------	----		
Trappist--------	0-9	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	9-30	30-60	1.40-1.60	0.2-0.6	0.08-0.18	3.6-5.5	Low----------	0.37		
	30-34	35-60	1.40-1.60	0.06-0.2	0.05-0.18	3.6-5.5	Moderate-----	0.28		
CuD:*										
Culleoka--------	0-8	15-27	1.20-1.40	2.0-6.0	0.10-0.18	5.1-6.0	Low----------	0.28	3	1-4
	8-39	18-35	1.20-1.50	0.6-6.0	0.12-0.20	5.1-6.0	Low----------	0.28		
	39	---	---	---	---	---	-------------	----		
Caneyville------	0-8	10-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low----------	0.43	3	2-4
	8-26	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	26-35	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.3	Moderate-----	0.28		
	35	---	---	---	---	---	-------------	----		
Du--------------- Dunning	0-14	27-40	1.20-1.40	0.6-2.0	0.19-0.23	6.1-7.8	Moderate-----	0.28	5	2-10
	14-60	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate-----	0.28		
EdD-------------- Eden	0-5	27-50	1.35-1.55	0.06-0.6	0.12-0.18	5.1-8.4	Moderate-----	0.43	3	.5-3
	5-39	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	39-64	---	---	---	---	---	-------------	0.17		
EeE3------------- Eden	0-6	27-60	1.45-1.65	0.06-0.6	0.11-0.17	5.1-8.4	Moderate-----	0.28	3	.5-3
	6-21	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	21	---	---	---	---	---	-------------	0.17		
EkA, EkB--------- Elk	0-9	10-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-6.5	Low----------	0.32	4	.5-3
	9-50	18-34	1.20-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.28		
	50-80	15-40	1.20-1.50	0.6-2.0	0.14-0.20	5.1-6.5	Low----------	0.28		
FaC,* FaD,* FaF:*										
Fairmount-------	0-6	27-40	1.20-1.40	0.06-0.6	0.12-0.20	6.6-8.4	Moderate-----	0.37	2	3-7
	6-14	35-60	1.40-1.60	0.06-0.6	0.10-0.18	6.6-8.4	Moderate-----	0.37		
	14	---	---	---	---	---	-------------	----		
Rock outcrop.										
FdC, FdD--------- Faywood	0-7	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.6-7.3	Low----------	0.37	3	1-4
	7-31	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.6-7.3	Moderate-----	0.28		
	31	---	---	---	---	---	-------------	----		
FwD3------------- Faywood	0-3	40-60	1.30-1.60	0.2-0.6	0.14-0.18	5.6-7.3	Moderate-----	0.37	2	<2
	3-25	35-60	1.35-1.60	0.06-0.6	0.12-0.17	5.6-7.3	Moderate-----	0.28		
	25	---	---	---	---	---	-------------	----		
GaF-------------- Garmon	0-10	7-27	1.20-1.40	2.0-6.0	0.14-0.20	5.6-7.3	Low----------	0.32	3	<3
	10-30	18-34	1.20-1.50	2.0-6.0	0.05-0.16	5.6-7.3	Low----------	0.20		
	30	---	---	---	---	---	-------------	----		
LoB, LoC, LoD---- Lowell	0-8	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low----------	0.37	3	1-4
	8-38	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	38-61	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	61	---	---	---	---	---	-------------	----		
LwC3------------- Lowell	0-5	27-40	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low----------	0.37	3	.5-2
	5-38	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	38-62	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	62	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH				Pct
MaA, MaB, MaC---- Maury	0-10	12-27	1.20-1.40	2.0-6.0	0.18-0.23	5.1-7.3	Low----------	0.32	4	2-5
	10-27	35-40	1.30-1.55	0.6-6.0	0.18-0.22	5.1-6.5	Low----------	0.28		
	27-48	35-60	1.40-1.60	0.6-6.0	0.15-0.20	5.1-6.5	Low----------	0.28		
	48-80	35-60	1.40-1.60	0.6-2.0	0.13-0.18	4.5-6.0	Low----------	0.28		
McB, McC, McD---- McAfee	0-9	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.37	3	2-5
	9-30	35-60	1.30-1.50	0.2-0.6	0.13-0.18	5.6-7.3	Moderate-----	0.28		
	30	---	---	---	---	---	-------------	----		
MeD,* MeF:* McAfee----------	0-9	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.37	3	2-5
	9-30	35-60	1.30-1.50	0.2-0.6	0.13-0.18	5.6-7.3	Moderate-----	0.28		
	30	---	---	---	---	---	-------------	----		
Rock outcrop.										
Mg--------------- McGary	0-8	22-27	1.35-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.43	3	1-4
	8-30	35-50	1.60-1.75	<0.2	0.11-0.13	5.1-7.8	Moderate-----	0.32		
	30-75	35-50	1.60-1.75	<0.2	0.14-0.16	6.1-7.8	Moderate-----	0.32		
Ne--------------- Newark	0-8	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
	8-35	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	35-64	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
NhB-------------- Nicholson	0-9	12-30	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.43	3	2-4
	9-19	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.43		
	19-28	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.5	Low----------	0.43		
	28-78	40-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-7.8	Moderate-----	0.37		
No--------------- Nolin	0-10	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	2-4
	10-52	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43		
	52-60	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.6-8.4	Low----------	0.43		
Pt.* Pits										
Se--------------- Sensabaugh	0-10	8-25	1.25-1.40	0.6-6.0	0.10-0.16	5.6-7.3	Low----------	0.20	5	1-3
	10-30	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.3	Low----------	0.20		
	30-46	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.3	Low----------	0.20		
	46	---	---	---	---	---	-------------	----		
TlA, TlB--------- Tilsit	0-8	10-25	---	0.6-2.0	0.16-0.22	3.6-5.5	Low----------	0.43	3	1-3
	8-23	18-35	---	0.6-2.0	0.16-0.22	3.6-5.5	Low----------	0.43		
	23-44	18-35	---	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.43		
	44-60	10-50	---	0.06-0.6	0.08-0.12	3.6-5.5	Low----------	0.43		
TpB, TpC--------- Trappist	0-9	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	9-30	30-60	1.00-1.60	0.2-0.6	0.10-0.18	3.6-5.5	Moderate-----	0.28		
	30-34	40-60	1.40-1.65	0.06-0.2	0.05-0.12	3.6-5.5	Moderate-----	0.24		
	34	---	---	---	---	---	-------------	----		
VeC-------------- Vertrees	0-7	15-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-7.3	Low----------	0.37	4	2-4
	7-64	40-60	1.40-1.65	0.2-0.6	0.14-0.18	4.5-6.0	Moderate-----	0.28		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
Bo----------------- Boonesboro	B	Frequent----	Brief-----	Jan-Apr	>6.0	---	---	20-40	Hard	Low------	Low.
CaB, CaC---------- Caleast	C	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Moderate.
CcD:*											
Caneyville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Rock outcrop.											
CeD:*											
Caneyville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Vertrees---------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CgB, CgC---------- Carpenter	B	None--------	---	---	>6.0	---	---	>40	Soft	Low------	Moderate.
ClE:*											
Carpenter--------	B	None--------	---	---	>6.0	---	---	>40	Soft	Low------	Moderate.
Lenberg----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
CmB, CmC---------- Chenault	B	None--------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
CnD:*											
Chenault---------	B	None--------	---	---	>6.0	---	---	>40	Hard	Low------	Moderate.
Caleast----------	C	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Moderate.
CoD:*											
Colyer-----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	High-----	High.
Trappist---------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
CuD:*											
Culleoka---------	B	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Moderate.
Caneyville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Du---------------- Dunning	D	Frequent----	Brief-----	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	High-----	Moderate.
EdD, EeE3--------- Eden	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low.
EkA--------------- Elk	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
EkB--------------- Elk	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FaC,* FaD,* FaF:*											
Fairmount--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
Rock outcrop.											
FdC, FdD, FwD3---- Faywood	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
GaF--------------- Garmon	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
LoB, LoC, LoD, LwC3------------ Lowell	C	None--------	---	---	>6.0	---	---	>40	Hard	High-----	Moderate.
MaA, MaB, MaC----- Maury	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
McB, McC, McD----- McAfee	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
MeD,* MeF:* McAfee-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Rock outcrop.											
Mg---------------- McGary	C	None--------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	Low.
Ne---------------- Newark	C	Frequent----	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Moderate.
NhB--------------- Nicholson	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High-----	Moderate.
No---------------- Nolin	B	Frequent----	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
Pt.* Pits											
Se---------------- Sensabaugh	B	Frequent----	Very brief	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>40	Hard	Low------	Low.
TlA, TlB---------- Tilsit	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>40	Hard	High-----	High.
TpB, TpC---------- Trappist	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
VeC--------------- Vertrees	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOIL

Soil name, report number, horizon, and depth in inches	Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Int. IV Clay (<0.002)	Size class and particle diameter — Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.1)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments >2 mm
	Pct <2 mm											Pct
Lenberg gravelly silt loam:[1] (76KY-21-13)												
A1------------------------0-2	14.8	71.2	14.0	4.7	2.9	1.8	2.9	2.5	12.3	73.7	Grsil	8.3
A2-----------------------2-10	13.5	67.8	18.7	4.3	2.4	1.6	2.3	2.9	10.6	70.7	Grsil	21.3
IIB21t-----------------10-23	5.3	56.2	38.5	1.7	0.9	0.6	1.1	1.0	4.3	57.2	Sicl	1.4
IIB22t-----------------23-33	3.3	51.5	45.2	0.7	0.5	0.4	0.8	0.9	2.4	52.4	Sic	2.2
IIB3-------------------33-39	3.7	53.5	42.8	1.1	0.7	0.4	0.8	0.7	3.0	54.2	Sic	3.7

[1]This is the typical pedon for the series. Some of the coarse fragments that were in and on the surface were discarded in sampling.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOIL

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation exchange capacity		Extractable acidity	Aluminum	Base saturation		Organic matter	Calcium carbonate equivalent	Phosphorus
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	TEC	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations			
			---------------Milliequivalents per 100 grams of soil---------------										Pct	Pct	Pct	Ppm
Lenberg gravelly silt loam:[1] (76KY-21-13)																
A1----------0-2	4.1	3.1	---	0.38	0.26	0.03	0.67	14.31	22.66	21.99	1.00	5	3	9.62	0.20	6.3
A2----------2-10	4.9	3.6	---	0.21	0.13	0.01	0.35	7.28	7.78	7.43	0.35	5	5	1.04	0.15	2.3
IIB21t-----10-23	4.7	3.4	---	0.85	0.20	0.03	1.08	14.28	8.51	7.43	0.97	8	13	0.62	0.18	1.0
IIB22t-----23-33	4.7	3.4	---	2.06	0.28	0.03	2.37	16.74	16.08	13.71	1.02	14	15	0.36	0.17	0.3
IIB3-------33-39	4.7	3.3	---	2.59	0.29	0.05	2.93	14.56	16.92	13.99	0.52	20	17	0.27	0.13	0.5

[1] This is the typical pedon for the series. Some of the coarse fragments that were in and on the surface were discarded in sampling.

TABLE 19.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution										Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--							Percentage smaller than--						
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture
													Pct		Lb/ft[3]	Pct
Caleast silt loam:[1] (S77KY-167-006)																
B21t-------8 to 14	A-4 (08)	ML	100	100	100	95	95	93	90	66	39	30	39	7	103	20
B22t------14 to 41	A-7-6(16)	CL	100	98	95	92	92	88	86	65	44	35	42	17	104	21
Carpenter gravelly silt loam:[2] (S76KY-021-012)																
B21t------20 to 33	A-6 (05)	CL	100	79	75	73	73	68	63	45	26	19	33	11	105	17
B23t------49 to 70	A-7-5(08)	ML	100	86	81	72	72	70	64	46	31	26	45	14	100	21
2C--------70 to 89	A-7-6(19)	CH	100	84	76	68	68	68	67	49	35	27	55	30	97	21
Lenberg gravelly silt loam:[3] (S76KY-021-013)																
IIB21t----10 to 23	A-7-6(13)	ML	100	95	84	73	73	71	69	48	30	23	47	19	99	16
Lowell silt loam:[4] (S77KY-021-008)																
B21t-------9 to 21	A-7-6(17)	CL	100	96	91	86	86	83	79	50	33	25	44	21	99	23
C---------42 to 66	A-7-6(12)	CL	100	87	81	75	75	71	68	52	36	28	43	19	105	17
Maury silt loam:[5] (S77KY-021-007)																
B21t------17 to 27	A-7-6(22)	CL	100	99	97	95	95	87	85	64	39	31	45	26	104	19
B23t------48 to 65	A-7-6(15)	CL	100	96	93	89	89	84	81	56	34	27	43	18	103	20
McAfee silt loam:[6] (S77KY-167-009)																
B22t------18 to 30	A-7-5(21)	MH	100	99	92	89	89	83	80	59	51	43	54	23	94	25

[1]Caleast silt loam: 0.5 mile east of U.S. Highway 127, 350 feet north of junction of private road and Southern Railroad, about 5 miles south of Harrodsburg.

[2]Carpenter gravelly silt loam: 300 yards south of Kentucky Highway 34, 0.5 mile east of Mitchellsburg, about 9 miles southwest of Danville.

[3]Lenberg gravelly silt loam: 100 yards east of Kentucky Highway 1108, 2 miles south of Mitchellsburg, about 11 miles southwest of Danville. The data indicate an ML Unified Classification, and the clay content is 3 percent below the minimum. These differences are outside the range of the series; however, they are within the range of laboratory error. Therefore, the pedon is not considered to be a taxadjunct.

[4]Lowell silt loam: 1.3 miles east of the Champlin River, 0.4 mile south of U.S. Highway 150, about 0.9 mile west of Danville. The percent passing each sieve for the B21t horizon and the C horizon is slightly below the minimum allowed for the series. The percent clay is also a little low for the B21t horizon. For these reasons, this pedon is considered to be a taxadjunct.

[5]Maury silt loam: 0.4 mile south of junction of U.S. Highway 127 and bypass U.S. Highway 127, 325 feet west of U.S. Highway 127, about 2.3 miles north of Danville.

[6]McAfee silt loam: 1,850 feet east of the Salt River, 700 feet north of Kentucky Highway 1989, about 1.3 miles west of Harrodsburg.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
*Boonesboro	Fine-loamy, mixed, mesic Fluventic Hapludolls
Caleast	Fine, mixed, mesic Mollic Hapludalfs
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Carpenter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Chenault	Fine-loamy, mixed, mesic Typic Hapludalfs
Colyer	Clayey-skeletal, mixed, mesic Lithic Dystrochrepts
Culleoka	Fine-loamy, mixed, mesic Ultic Hapludalfs
Dunning	Fine, mixed, mesic Fluvaquentic Haplaquolls
Eden	Fine, mixed, mesic Typic Hapludalfs
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Fairmount	Clayey, mixed, mesic Lithic Hapludolls
Faywood	Fine, mixed, mesic Typic Hapludalfs
Garmon	Fine-loamy, mixed, mesic Dystric Eutrochrepts
*Lenberg	Fine, mixed, mesic Ultic Hapludalfs
Lowell	Fine, mixed, mesic Typic Hapludalfs
Maury	Fine, mixed, mesic Typic Paleudalfs
McAfee	Fine, mixed, mesic Mollic Hapludalfs
*McGary	Fine, mixed, mesic Aeric Ochraqualfs
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
*Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
*Tilsit	Fine-silty, mixed, mesic Typic Fragiudults
Trappist	Clayey, mixed, mesic Typic Hapludults
Vertrees	Fine, mixed, mesic Typic Paleudalfs

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

TABLE 21.--GEOLOGIC SYSTEMS, GROUPS, FORMATIONS, AND MEMBERS

System	Group	Formation	Member	Thickness	Predominant soils
				Ft	
Quaternary or Tertiary	---	---	---	Up to 60	Chenault.
Mississippian	---	St. Louis Limestone	---	50	Vertrees, Caneyville.
	---	Salem and Harrodsburg Limestone	---	60-65	Vertrees, Caneyville.
	---	Borden	Muldraugh	40-50	Culleoka, Caneyville.
			Halls Gap	80-100	Garmon.
			Nancy	40	Garmon.
			New Providence	100-110	Carpenter, Lenberg.
Devonian	---	New Albany Shale	---	40-60	Colyer, Trappist, Tilsit.
	---	Boyle	---	20-60	Caleast, McAfee.
Silurian	---	Brassfield Dolomite	---	15	---
Ordovician	---	Drakes	---	60-100	McAfee.
	---	Grant Lake Limestone	---	15-25	---
	---	Ashlock	---	65-100	Maury, Caleast, McAfee.
	---	Calloway Creek	---	120-140	Maury, Caleast, McAfee.
	---	Garrard Siltstone	---	50-60	Lowell, Eden.
	---	Clays Ferry	---	280	Lowell, Eden, Faywood, Fairmount.
	---	Lexington Limestone	---	200-300	Maury, Caleast, McAfee, Fairmount.
	High Bridge	Tyrone Limestone	---	80-110	Fairmount.
		Oregon	---	6-31	Fairmount.
		Camp Nelson Limestone	---	---	Fairmount.

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