United States Department of Agriculture

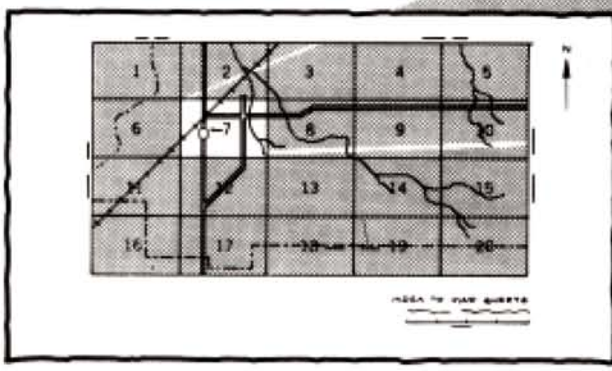
Soil Conservation Service

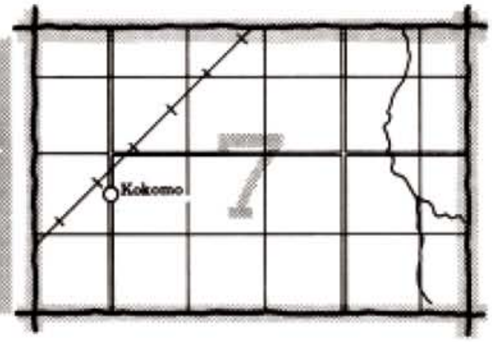
In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

Soil Survey of Washington County, Kentucky

HOW TO USE

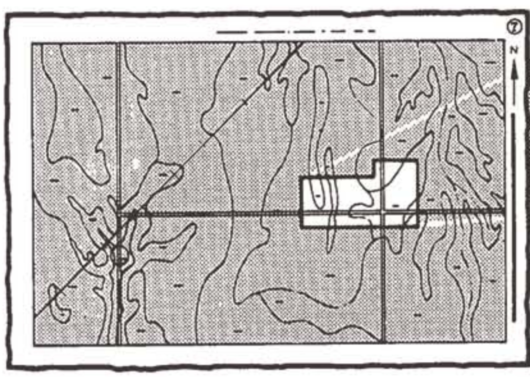
1. Locate your area of interest on the "Index to Map Sheets"

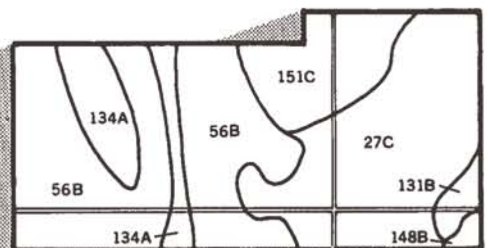




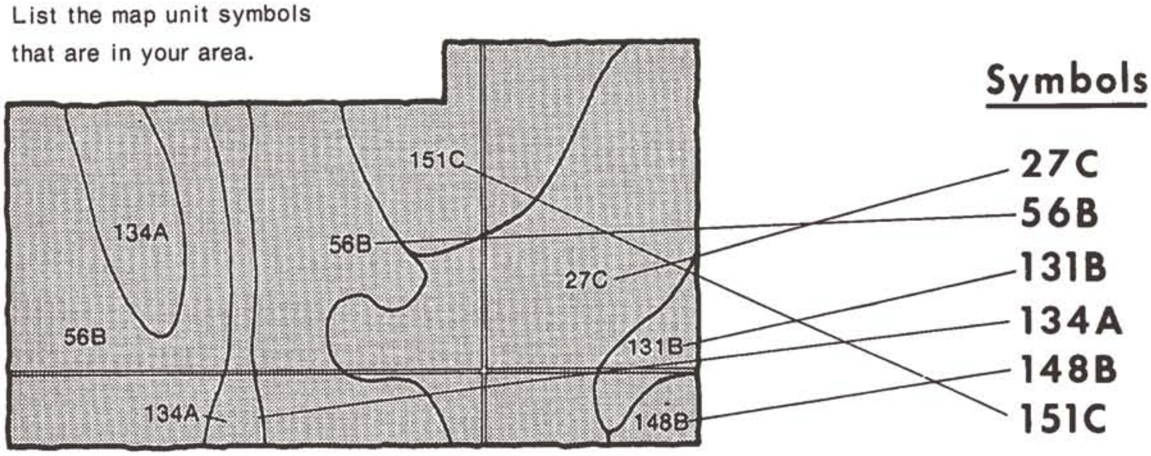
2. Note the number of the map sheet and turn to that sheet.

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



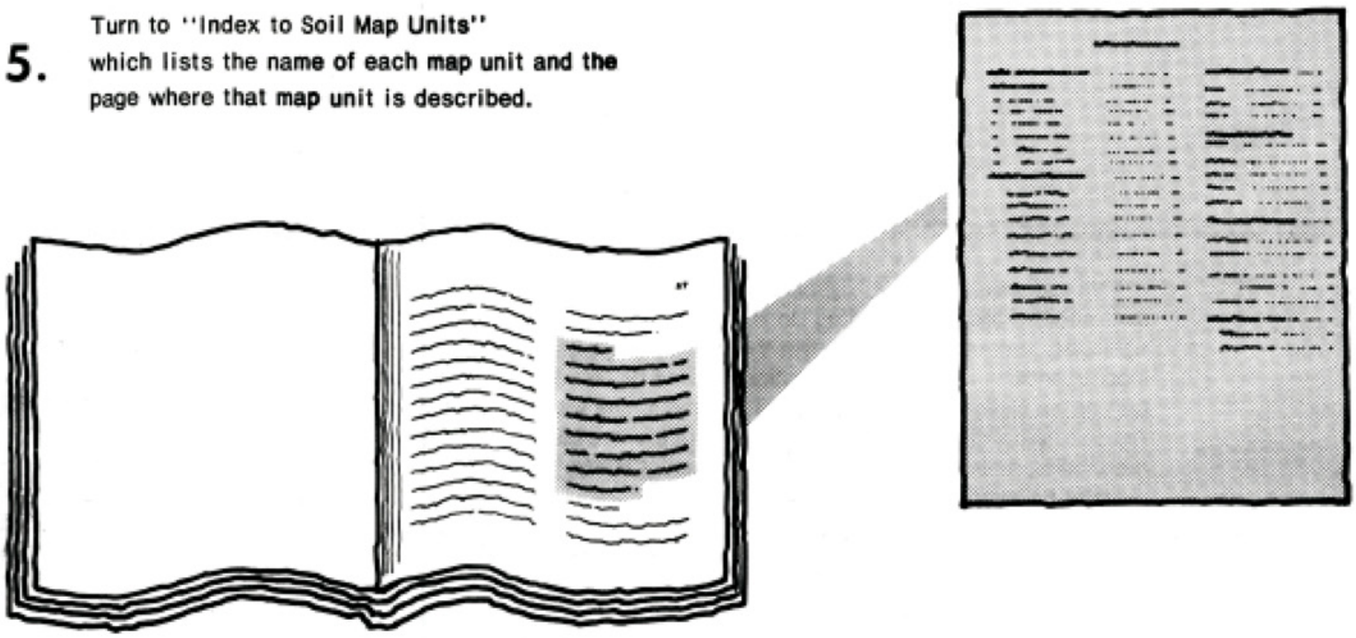


4. List the map unit symbols that are in your area.

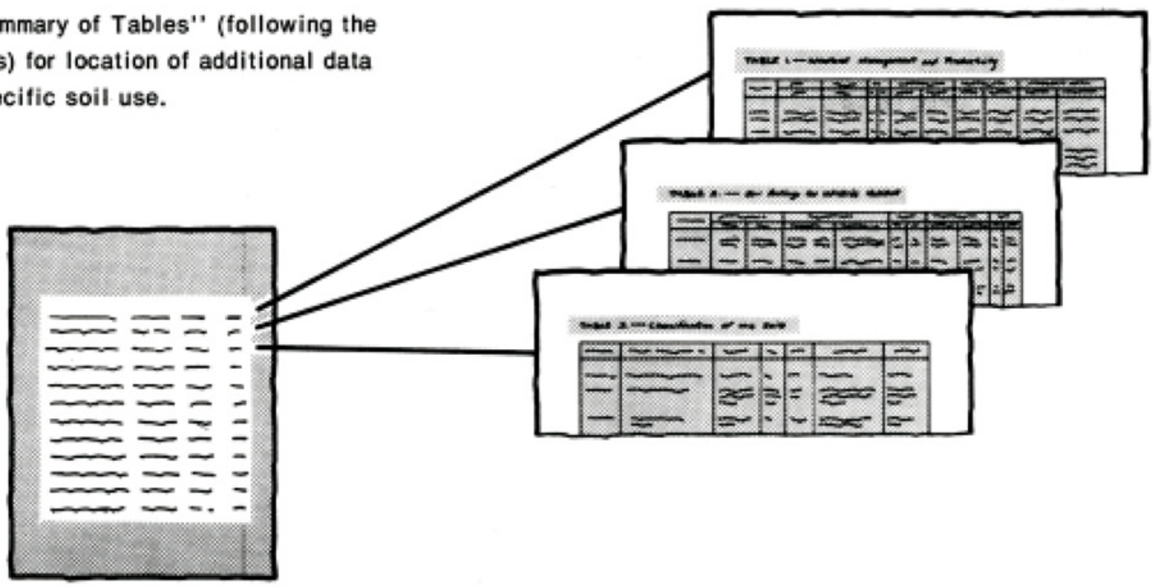


THIS SOIL SURVEY

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 completed in 1983. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service and the Kentucky Natural Resources and Environmental Protection Cabinet and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Washington 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 Berry House is a part of the historical setting at Lincoln Homestead State Park. The soil is Lowell silt loam, 6 to 12 percent slopes, eroded.

Contents

Soil Series

Issued August 1986

Index to Map Units

Summary of Tables

Foreword

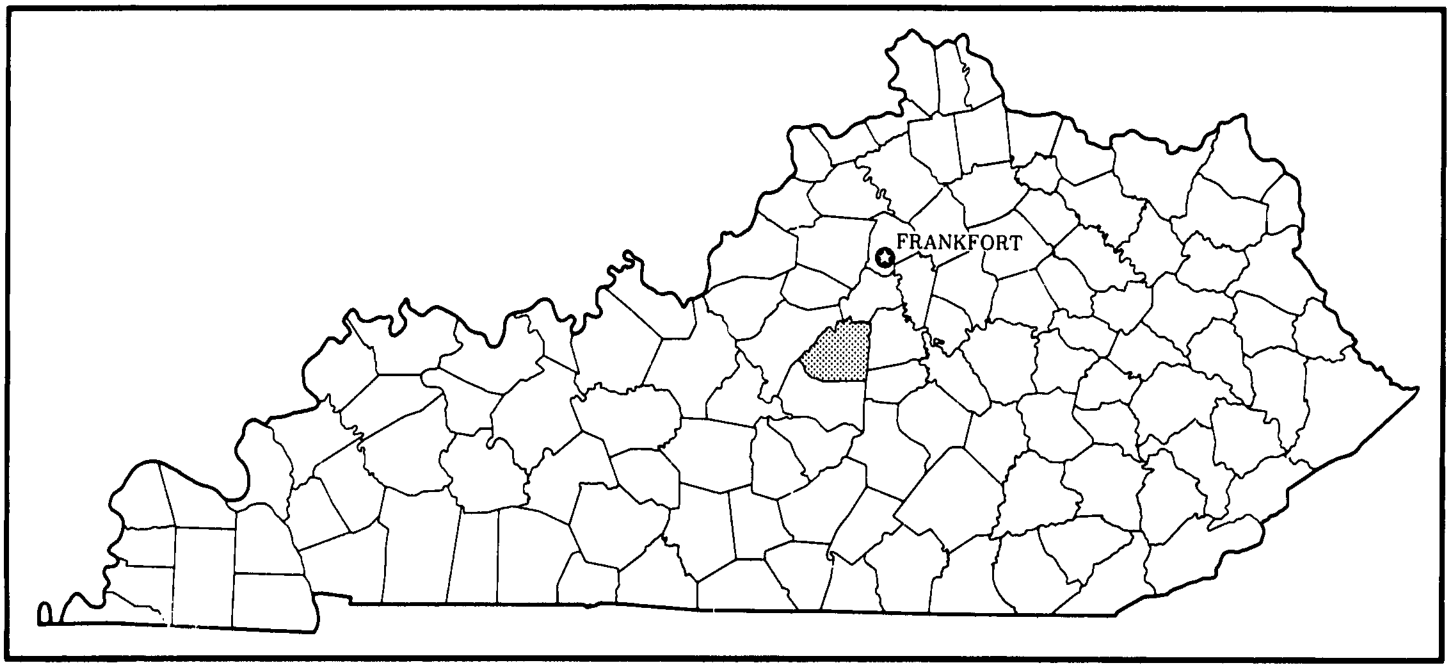
This soil survey contains information that can be used in land-planning programs in Washington County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

Randall W. Giessler
State Conservationist
Soil Conservation Service



Location of Washington County in Kentucky.

Soil Survey of Washington County, Kentucky

By William H. Craddock, Soil Conservation Service

Fieldwork by Robert A. Eigel and William H. Craddock,
Soil Conservation Service, and Alfred H. Guerrant and Stephen R. Hurst,
Kentucky Natural Resources and Environmental Protection Cabinet

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

WASHINGTON COUNTY is in the central part of Kentucky. The total land area is about 301 square miles or 192,730 acres *(30)*. In 1980, Washington County had a population of 7,585. Springfield, the county seat, had a population of 3,179 in 1980 *(29)*.

Washington County is in the Kentucky Bluegrass Land Resource Area *(4)*. The western part of the county is dissected by tributaries of the Beech Fork River. The major tributaries are Hardins Creek and Cartwright Creek, which flow in a northwesterly direction through the county. This area is dominantly moderately steep to steep, but many ridges are undulating to rolling. The soils on gently sloping to sloping ridgetops and upper side slopes and nearly level flood plains are used for row crops, corn, tobacco, small grains, hay, and, to some extent, pasture. The soils on steeper slopes are used mostly for pasture or woodland.

The west-central and central parts of Washington County are dissected by the Beech Fork River and its tributaries. The flood plains are narrow in the southeastern part of the county and widen as the river flows northwestward. The soils on gently sloping to sloping ridgetops and upper side slopes and nearly level flood plains are used for corn, tobacco, small grains and, to some extent, pasture. The soils on steeper side slopes are used mostly for pasture or woodland.

The eastern part of the county is dissected by the Beech Fork River and the Chaplin River and their tributaries. This area is dominantly moderately steep to steep and has rolling ridgetops. The soils in this area are used mainly for pasture, but some small tracts are used for cultivated crops. Most of the woodlands have been cleared for pasture. The elevation ranges from about 470 feet above sea level, which is the approximate stream elevation of the Beech Fork River where Nelson County, Marion County, and Washington County join, to about 1,020 feet in the southeastern corner of the county near Wesley Chapel.

Urban development in Washington County has increased in recent years. Numerous historical landmarks attract tourists to the area, including the Lincoln Homestead State Park. Willisburg Lake is a recreational area for the county (fig. 1).

General Nature of the Survey Area

This section provides general information about settlement, farming, and climate in Washington County.

Settlement

Washington County was formed from territory taken from Nelson County in 1792, the same year Kentucky was admitted to the Union. The county was named for George Washington. Springfield, the county seat, was established in 1793. The courthouse was built in 1814, and is one of the oldest still used as a seat of justice. Washington County is the beginning of the Lincoln Heritage Trail. Thomas Lincoln and Nancy Hanks, parents of Abraham Lincoln, were married in this county in June 1806 *(31)*.

Farming

According to the 1982 Census of Agriculture, about 84 percent of the land in Washington County was used for farming. This was a decrease of about 5 percent from 1978. In 1982, there were 1,191 farms in the county, a decrease from 1,224 farms in 1978. The average farm size in the county decreased from 143 acres in 1978 to 136 acres in 1982 *(28)*. According to the 1982 census, the total number of operators consisted of about 75 percent owner operators, 15 percent part owner operators, and 10 percent tenant operators. This was a slight decrease in owner and part owner operators and a slight increase in tenant operators from 1978.

The main farm enterprises are row crops, hay, pasture, and livestock and livestock products. Corn is the principal grain crop, but wheat and soybeans are important crops. Oats are grown for hay and grain. Burley tobacco makes up about 87 percent of the total value of crops sold in the county. Potatoes, vegetables, sweet corn, melons, berries, apples, peaches, and pears make up 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 harvested cropland, according to the 1982 census, was 41,644 acres. This was an increase in harvested cropland as compared to 1978.

Livestock enterprises made up about 53 percent of the farm income in 1982. Beef cattle and calves and dairy cattle are the main livestock enterprises (fig. 2). From 1974 to 1978, the number of beef cattle decreased and the number of dairy cattle increased. The production of poultry, poultry products, hogs, and sheep is less significant. Racehorses and show horses are kept throughout the county.

Figure 1.—Willisburg Lake is surrounded by hillsides of Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded.

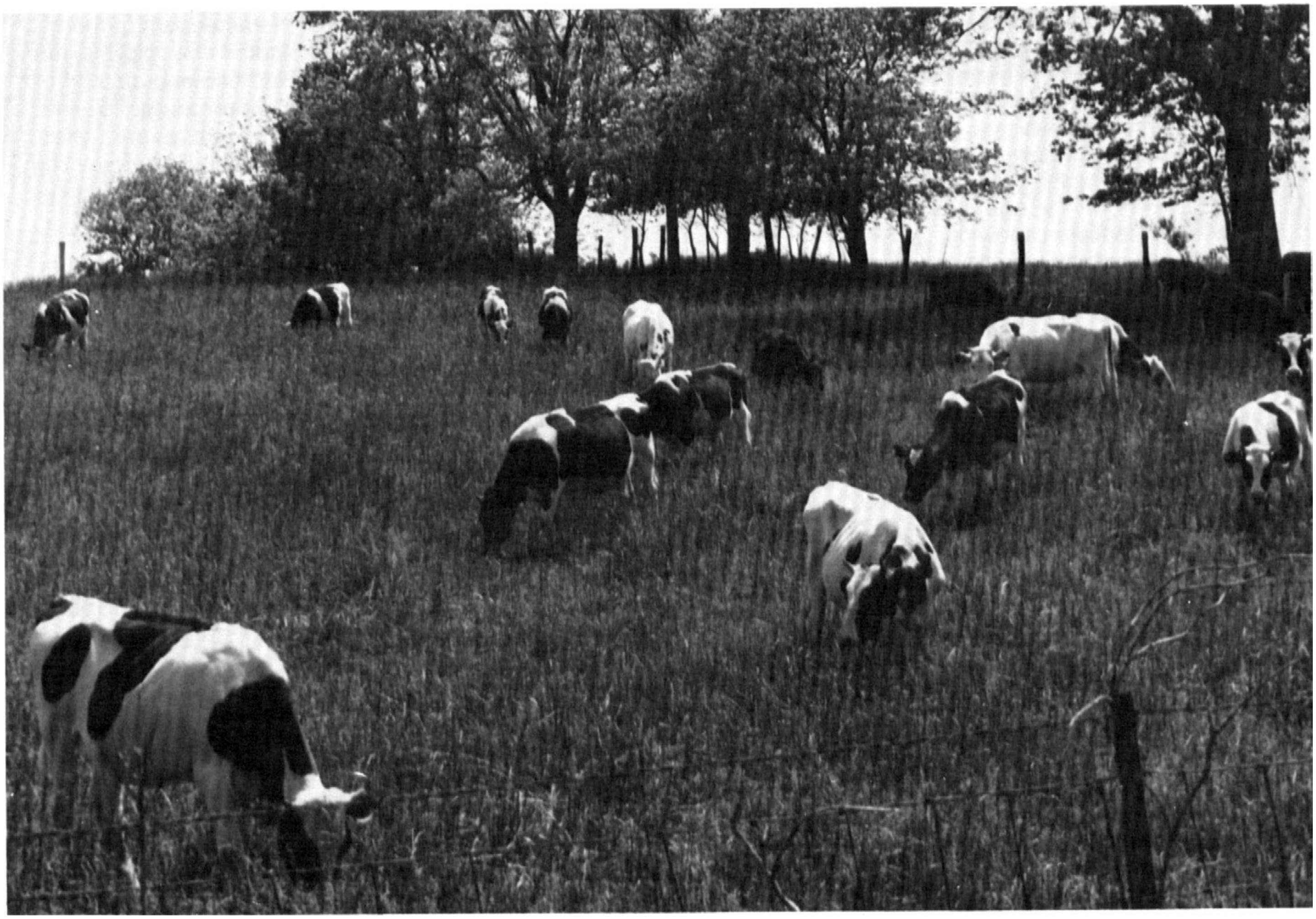


Figure 2.—Dairy cattle grazing in an area of Faywood silty clay loam, 12 to 20 percent slopes, eroded.

According to the 1982 census, the acreage used for farm woodland was 22,219 acres in 1982 as compared to 24,303 acres in 1978. In 1982, about 13,465 acres of woodland was grazed.

Climate

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

In Washington County, summers are hot in valleys and slightly cooler on 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 Bardstown, Kentucky, in the period 1951 to 1980. 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 36 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Bardstown on February 2, 1951, is -21 degrees. In summer the average temperature is 75 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Bardstown on July 14, 1954, is 105 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 48 inches. Of this, 22 inches, or 46 percent, usually falls in April through September. The growing season for most crops falls within this period. 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 4.98 inches at Bardstown on April 28, 1970. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 16 inches. The greatest snow depth at any one time during the period of record was 18 inches. On an average of 3 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 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

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 a 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.

1. Fairmount-Shrouts-Faywood

Shallow and moderately deep, well drained soils that have a clayey subsoil; on steep to gently sloping uplands

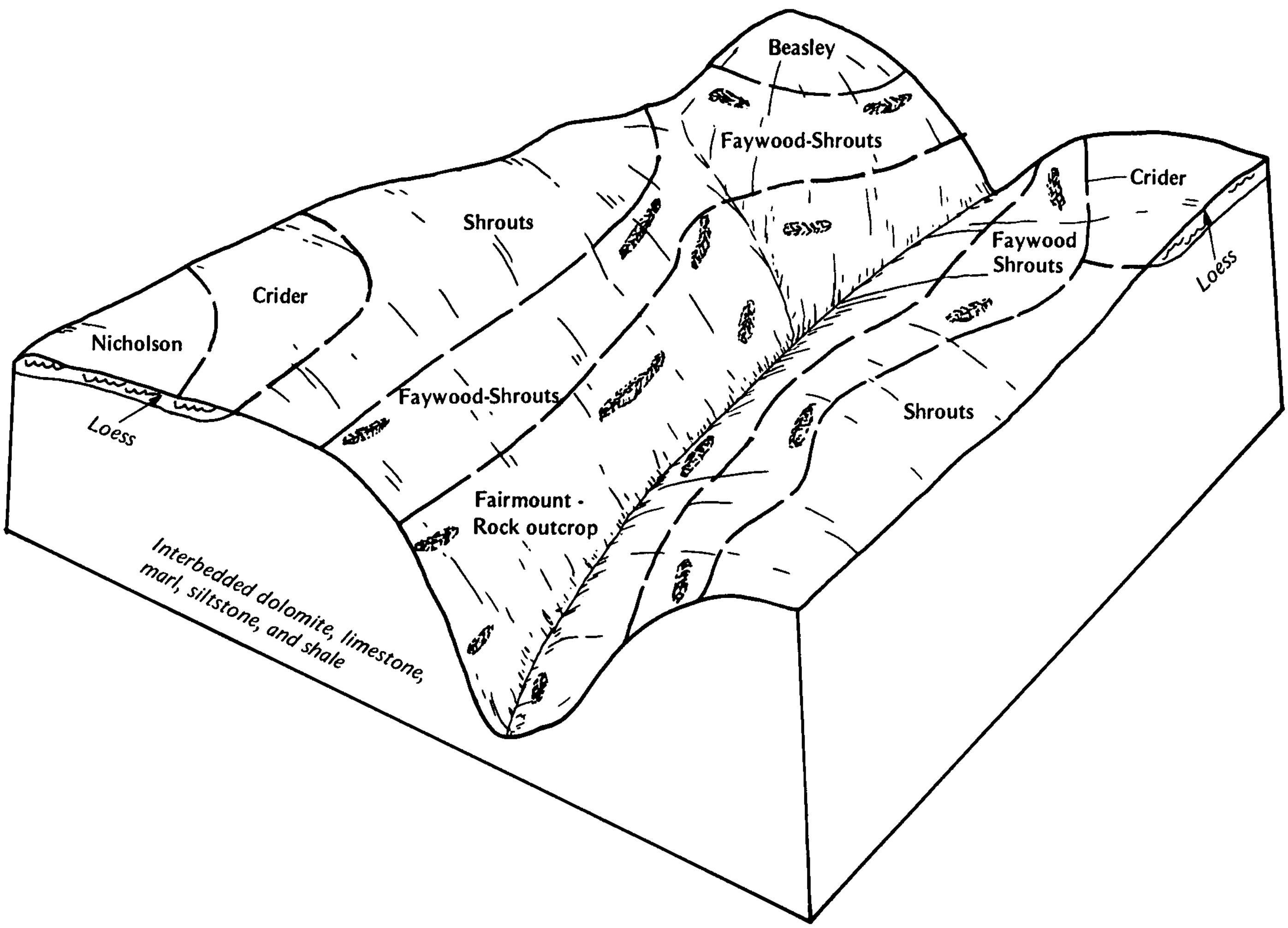


Figure 3.—Typical pattern of soils and underlying material in the Fairmount-Shrouts-Faywood map unit.

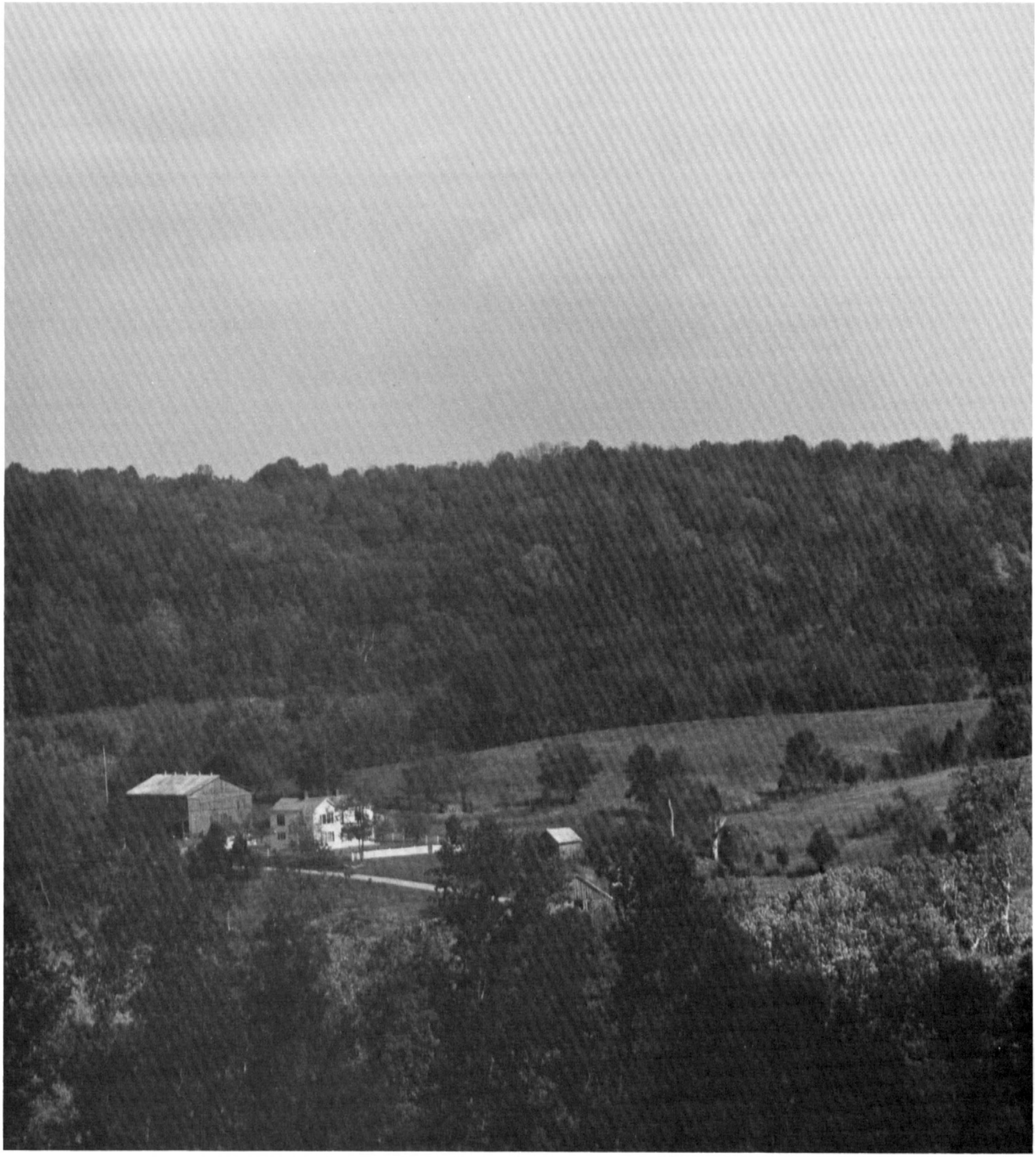


Figure 4.—Landscape and farmstead in the Fairmount-Shrouts-Faywood map unit.

The landscape is steep to gently sloping upland ridges and is in the western part of the county. It is in the Outer Bluegrass physiographic region *(5)*. The soils are underlain by bedrock from the Ordovician, Silurian, and Devonian periods (fig. 3). A few perennial streams, many intermittent streams and branches, and pit ponds and embankment ponds are in this map unit. Except for a few small communities, most of the development in this map unit is farmsteads (fig. 4). The important structures in this map unit are roads, a railroad, and farm related buildings.

This map unit makes up about 11 percent of the county. It is about 30 percent Fairmount soils, 24 percent Shrouts soils, 15 percent Faywood soils, and 31 percent soils of minor extent.

Fairmount soils are mostly on steep hillsides. The surface layer is dark brown silty clay loam, and the subsoil is dark grayish brown silty clay. Fairmount soils are shallow. Permeability is moderately slow or slow.

Shrouts soils are mostly on gently sloping to sloping ridgetops and moderately steep to steep upper hillsides. The surface layer is brown silt,loam, and the subsoil is yellowish brown silty clay in the upper part, light olive brown clay in the middle part, and mottled yellowish brown, light olive brown, and light brownish gray silty clay loam in the lower part. Shrouts soils are moderately deep. Permeability is moderately slow.

Faywood soils are mostly on moderately steep and steep hillsides. The surface layer is brown silty clay loam, and the subsoil is yellowish brown clay in the upper part and yellowish brown clay mottled in shades of brown in the lower part. Faywood soils are moderately deep. Permeability is moderate or moderately slow.

Of minor extent in this map unit are the deep, well drained Lowell, Crider, and Beasley soils and the deep, moderately well drained Nicholson soils on uplands; the deep, well drained Elk soils on terraces; and the deep, well drained Nolin soils on flood plains. These soils are in areas where the ridgetops are broader than typical for the map unit.

The soils of this map unit are used mostly for pasture, hay, and as woodland. The gently sloping soils are used for cultivated crops.

These soils are suited to pasture and hay, and the less sloping soils are suited to cultivated crops if erosion is adequately controlled. Steepness of slopes, depth to bedrock, rock outcrop, and the high clay content are the main limitations. These soils are suited to woodland. The erosion hazard, restricted equipment use, and plant competition are concerns in management. These soils

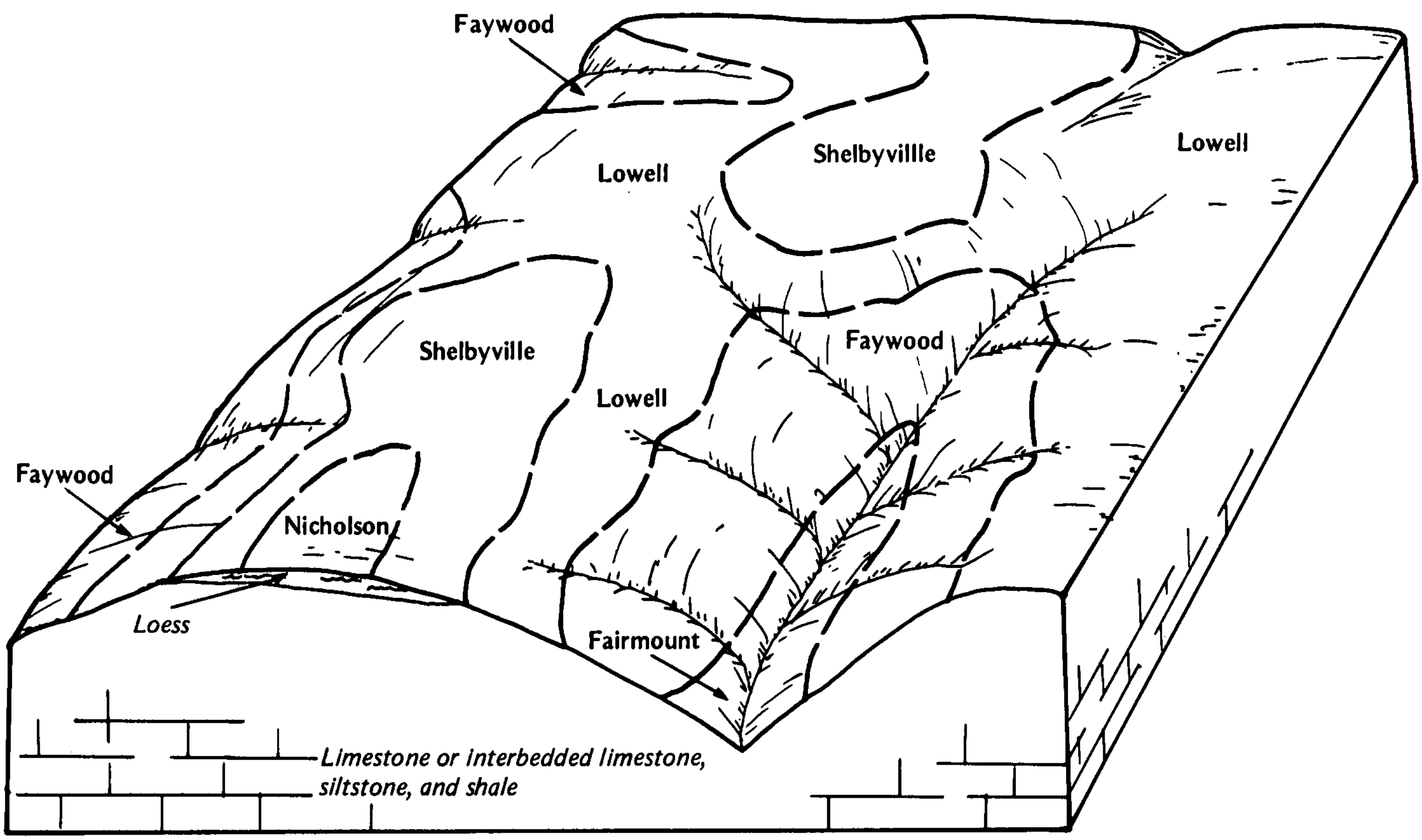


Figure 5.—Typical pattern of soils and underlying material in the Lowell-Faywood-Shelbyville map unit.

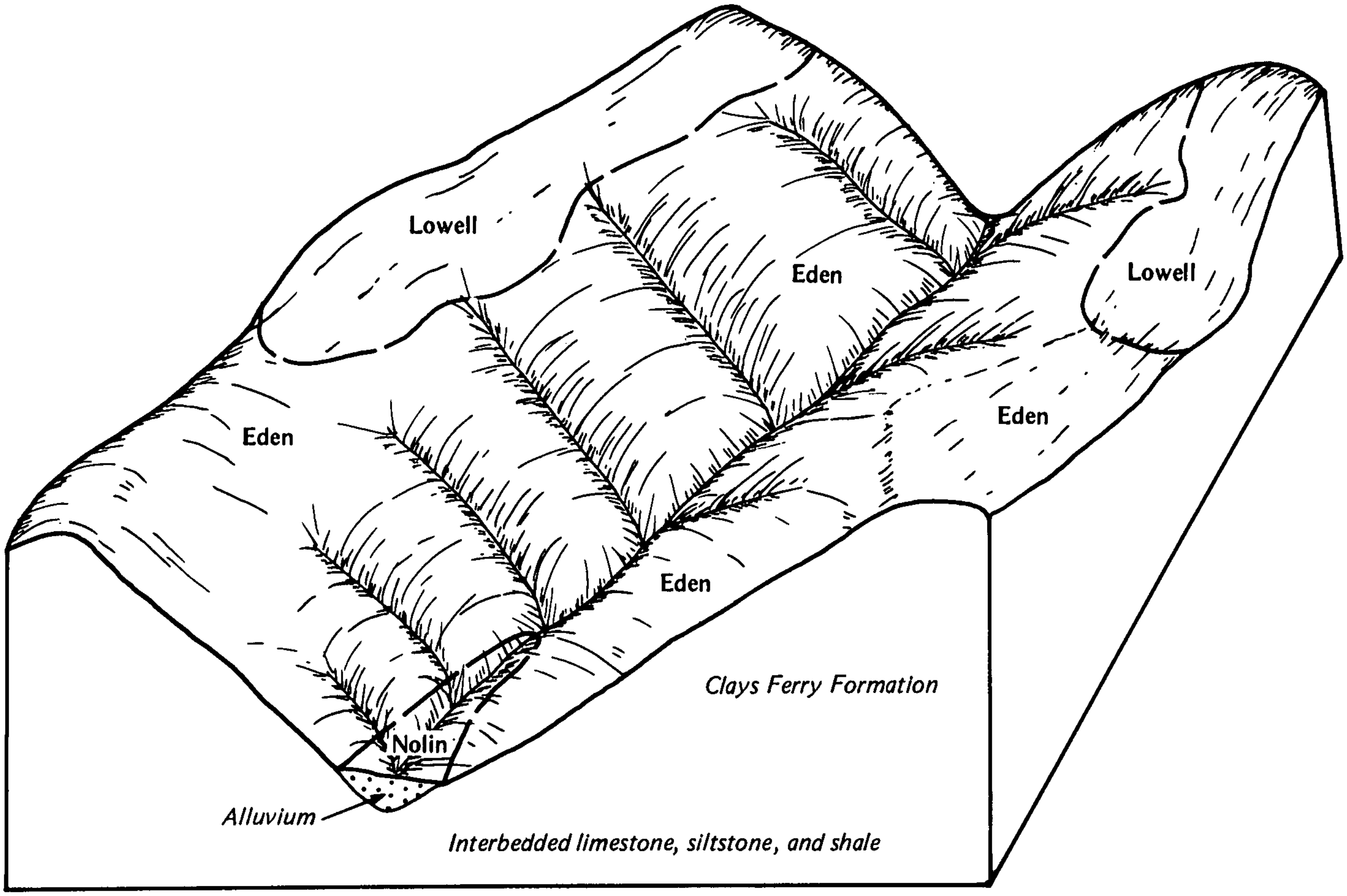


Figure 6.—Typical pattern of soils and underlying material in the Eden-Lowell map unit.

mostly are not suited to urban uses. Steepness of slope, depth to bedrock, and the high clay content are limitations that are difficult to overcome.

2. Lowell-Faywood-Shelbyville

Deep and moderately deep, well drained soils that have a clayey or loamy subsoil; on gently sloping to moderately steep uplands

The landscape is gently sloping to moderately steep upland ridges and is primarily in the western and central parts of the county, but two small areas are near Willisburg and Mackville (fig. 5). It is in the Outer Bluegrass physiographic region *(5)*. Soils in this landscape are underlain by bedrock from the Ordovician period. A few perennial streams, many intermittent streams and branches, and pit ponds and embankment ponds are in this map unit. The towns of Springfield, Willisburg, and Mackville are in this map unit. The soils in this map unit are suited to urban development; however, steepness of slopes, depth to bedrock, and high clay content are limitations to consider. The important structures in this map unit are roads, a railroad, Springfield Reservoir embankment, and farm-related buildings.

This map unit makes up about 38 percent of the county. It is about 31 percent Lowell soils, 17 percent Faywood soils, 13 percent Shelbyville soils, and about 39 percent soils of minor extent.

Lowell soils are mostly on the gently sloping ridgetops and sloping to moderately steep hillsides. The surface

Figure 7.—Areas of Eden silty clay loam, 6 to 20 percent slopes, eroded, on ridgetops and Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded, on hillsides are used for pasture and hay.

layer is dark yellowish brown silt loam, and the subsoil is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Lowell soils are deep. Permeability is moderately slow.

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

Shelbyville soils are mostly on the gently sloping ridgetops and sloping side slopes. The surface layer is dark brown silt loam, and the subsoil is brown silty clay loam in the upper part and dark yellowish brown or yellowish brown clay in the lower part. The substratum is yellowish brown clay. Shelbyville soils are deep. Permeability is moderate.

Of minor extent in this map unit are the shallow, well drained Fairmount soils, the moderately deep, well drained Eden soils, and the deep, moderately well drained Nicholson soils on uplands; the deep, well drained Elk soils on terraces; and the deep, well drained Nolin soils on flood plains.

The soils of this map unit are used mostly for cultivated crops, hay, and pasture.

These soils are well suited to hay and pasture and to cultivated crops if erosion is adequately controlled. The steeper soils would be better suited to hay and pasture than to cultivated crops. The soils in this map unit are well suited to woodland production. They are suited to most urban uses. Steepness of slope, depth to bedrock, and the high clay content are limitations.

3. Eden-Lowell

Moderately deep and deep, well drained soils that have a clayey subsoil; on steep to gently sloping uplands

The landscape is steep to gently sloping upland ridges and is in the northern and eastern parts of the county. It is in the Hills of the Bluegrass physiographic region *(5)*. The soils are underlain by bedrock from the Ordovician period (fig. 6). A few perennial streams, many intermittent streams and branches, and pit ponds and embankment ponds are in this map unit. Except for a few small communities, most of the development in this map unit is farmsteads. The important structures in this map unit are roads, the Willisburg Lake embankment, and farm related buildings.

This map unit makes up about 51 percent of the county. It is about 79 percent Eden soils, 12 percent Lowell soils, and about 9 percent soils of minor extent.

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

Lowell soils are mostly on the gently sloping ridgetops and sloping to moderately steep upper 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. Lowell soils are deep. Permeability is moderately slow.

Of minor extent in this map unit are the deep, well drained Shelbyville soils and the deep, moderately well drained Nicholson soils on uplands; and the deep, well drained Nolin soils on flood plains.

The soils of this map unit are used mostly for pasture (fig. 7). A few steep areas are used as woodland. The less sloping areas are used for hay and cultivated crops.

These soils are suited to pasture, and the less sloping soils are suited to hay and cultivated crops if erosion is adequately controlled. Steepness of slopes, limestone fragments, the high clay content, and depth to bedrock are the main limitations. These soils are suited to woodland. The erosion hazard, restricted equipment use, and seedling mortality are concerns in management. These soils are poorly suited to urban use. Steepness of slopes and the high clay content are limitations that are difficult to overcome. Depth to bedrock is a limitation, but it can be overcome by using proper mechanical procedures.

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. Faywood-Shrouts silty clay loams, very rocky, 12 to 30 percent slopes, severely eroded, 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.

BeB—Beasley silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops in the western part of the county. The mapped areas are 4 to 25 acres and about 170 to 450 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil is yellowish brown silty clay loam to a depth of 20 inches and yellowish brown clay mottled in shades of brown to a depth of 40 inches. The substratum, to a depth of about 48 inches, is mottled yellowish brown, gray, and light olive brown silt loam. Soft marl bedrock is at a depth of about 48 inches.

This soil is medium in natural fertility and low to moderate in organic matter content. It is very strongly acid to neutral in the surface layer and upper part of the subsoil and neutral to moderately alkaline in the lower part of the subsoil and in the substratum. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. Runoff is medium. This soil has moderate shrink-swell potential. Soft marl bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are a few intermingled areas of Shrouts, Crider, and Nicholson soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture. This Beasley soil is well suited to these uses. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are white oak, black oak, white ash, and chestnut oak. The high clay content of this soil is a moderate limitation for use of equipment. Plant competition is moderate.

This soil is suited to urban use, but it is limited by moderately slow permeability, high clay content, and moderate shrink-swell potential. Certain engineering techniques can help to overcome these limitations.

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

BeC—Beasley silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on narrow ridgetops and side slopes in the western part of the county. The mapped areas are 4 to 15 acres and about 170 to 300 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil is yellowish brown silty clay loam to a depth of about 20 inches and yellowish brown clay mottled in shades of brown to a depth of about 40 inches. The substratum, to a depth of about 48 inches, is mottled yellowish brown, gray, and light olive brown silt loam. Soft marl bedrock is at a depth of about 48 inches.

This soil is medium in natural fertility and low to moderate in organic matter content. It is very strongly acid to neutral in the surface layer and the upper part of the subsoil and neutral to moderately alkaline in the lower part of the subsoil and in the substratum. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. Runoff is rapid. This soil has moderate shrink-swell potential. Soft marl bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are a few intermingled areas of Shrouts and Nicholson soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture.

This Beasley soil is suited to row crops and small grains. Steepness of slope is the main limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are white oak, black oak, white ash, and chestnut oak. The high clay content of this soil is a moderate limitation for use of equipment. Plant competition is moderate.

This soil is suited to urban use, but it is limited by steepness of slope, moderately slow permeability, high clay content, and moderate shrink-swell potential. Certain engineering techniques can help to overcome these limitations.

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

Bo—Boonesboro silt loam, occasionally flooded. This moderately deep, well drained, nearly level to gently sloping soil is on narrow flood plains throughout the county. The mapped areas are 4 to 75 acres and about 170 to 500 feet wide. Slopes range from 0 to 4 percent.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsurface, to a depth of about 17 inches, is dark brown silt loam. The subsoil, to a depth of about 24 inches, is brown gravelly silt loam. Hard limestone bedrock is at a depth of about 24 inches.

This soil is high in natural fertility and moderate to high in organic matter content. It is slightly acid to moderately alkaline throughout. Permeability is moderate in the surface and subsurface layers and rapid in the gravelly subsoil. The available water capacity is moderate. The root zone is moderately deep. Runoff is medium. This soil is subject to occasional, brief flooding during the winter and early in spring but generally does not flood during the growing season. Hard bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are areas of soils similar to Boonesboro soil but that are moderately well drained and areas that are subject to frequent flooding. Also included are a few intermingled areas of Nolin, Skidmore, Dunning, and Newark soils.

Most of the acreage in this map unit is used for row crops, hay, and pasture. This Boonesboro soil is well suited to these uses and to use for small grains. However, small grains and other winter crops can 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, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern cottonwood, sweetgum, yellow-poplar, white ash, and American sycamore. Plant competition is a concern in management.

This soil is poorly suited to urban use. Moderate depth to bedrock, seepage, and the hazard of flooding are the main limitations. Depth to bedrock and seepage limitations can be altered by certain engineering techniques, but the hazard of flooding is difficult to overcome.

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

CrB—Crider silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad, karst ridgetops and side slopes in the western part of the county. The mapped areas are 5 to 450 acres and about 200 to 1,800 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 79 inches is brown silty clay loam in the upper part, reddish brown silty clay loam in the middle part, and reddish brown silty clay or clay in the lower part.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to neutral in the surface layer and the upper part of the subsoil and very strongly acid to slightly acid in the lower part of the subsoil. Permeability is moderate, and the available water capacity is high. The root zone is deep. Runoff is medium. This soil has moderate shrink-swell potential in the lower part of the subsoil.

Included with this soil in mapping are areas of soils similar to Crider soil but have hard limestone bedrock at a depth of 40 to 60 inches or that have 10 to 20 percent chert fragments in the surface layer. Also included are a few intermingled areas of Nicholson, Beasley, and Shrouts soils.

Most of the acreage in this map unit is used for row crops, small grains, and hay. This Crider soil is well suited to these uses and to use for pasture. Erosion is a hazard if conventional tillage practices are used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to alfalfa and other hay and pasture plants. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are yellow-poplar, black walnut, white ash, northern red oak, shortleaf pine, and eastern white pine. Plant competition is severe.

This soil is well suited to most urban uses. Limitations to consider are the high clay content and moderate shrink-swell potential.

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

CrC—Crider silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on karst, narrow ridgetops and side slopes in the western part of the county. The mapped areas are 4 to 20 acres and about 170 to 350 feet wide.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of about 79 inches is brown silty clay loam in the upper part, reddish brown silty clay loam in the middle part, and reddish brown silty clay or clay in the lower part.

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

Included with this soil in mapping are areas of soils similar to Crider soils but have hard limestone bedrock at a depth of 40 to 60 inches or that have 10 to 20 percent chert fragments in the surface layer. Also included are a few intermingled areas of Nicholson, Beasley, and Shrouts soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture.

This Crider soil is suited to row crops and small grains. Steepness of slope is the main limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including no-till, crop residue use, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to alfalfa and other hay and pasture plants. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are yellow-poplar, black walnut, white ash, eastern white pine, shortleaf pine, and northern red oak. Plant competition is severe.

This soil is suited to most urban uses. Steepness of slope, high clay content, and moderate shrink-swell potential are limitations to consider. Certain engineering techniques can help to overcome these limitations.

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

Du—Dunning silty clay loam, frequently flooded. This deep, very poorly drained or poorly drained, nearly level soil is on flood plains and in depressions throughout the county. The mapped areas are 4 to 25 acres and about 170 to 1,000 feet wide. Slopes range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown silty clay loam about 8 inches thick. The subsurface layer is very dark gray silty clay loam to a depth of about 23 inches. The subsoil, to a depth of about 59 inches, is grayish brown clay mottled in shades of brown in the upper and middle parts and light brownish gray clay mottled in shades of brown in the lower part. The substratum to a depth of about 64 inches is light brownish gray clay mottled in shades of brown.

This soil is high in natural fertility and moderate to high in organic matter content. It is medium acid to mildly alkaline. Permeability is slow, and the available water capacity is high. The root zone is deep. Runoff is slow or very slow. This soil has moderate shrink-swell potential. It is subject to frequent, brief flooding during the winter and spring but generally does not flood during the growing season. A seasonal high water table is within 6 inches of the surface for long periods late in winter and early in spring.

Included with this soil in mapping are areas of soils similar to Dunning soil but are in a fine family and are moderately well drained or somewhat poorly drained. Also included are a few intermingled areas of Newark, Boonesboro, Nolin, Lawrence, and Otwell soils.

Most of the acreage in this map unit is used for row crops, hay, and pasture.

This Dunning soil is suited to row crops and is poorly suited to small grains. The high water table and hazard of flooding are the main limitations. Good water management practices, such as tile drainage, open ditches, and diversions, and the use of plants that are moderately tolerant to wetness help overcome these limitations.

This soil is well suited to pasture and hay plants that are somewhat tolerant to wetness, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of fertilizer, proper stocking, adequate drainage, rotation grazing, and control of weeds are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are American sycamore, swamp white oak, and pin oak. Equipment limitations, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to urban use. Wetness, the hazard of flooding, and slow permeability are the main limitations. Wetness limitations can be altered by the use of diversions, open ditches, and tile drainage, but the hazard of flooding is difficult to overcome. Slow permeability problems can be minimized by certain engineering techniques.

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

EdD2—Eden silty clay loam, 6 to 20 percent slopes, eroded. This moderately deep, well drained, sloping to moderately steep, moderately eroded soil is on narrow ridgetops and side slopes in the northern and eastern parts of the county. Moderate erosion has exposed some areas of substratum and bedrock. A few rills occur. The mapped areas are 5 to 400 acres and about 200 to 2,000 feet wide.

Typically, the surface layer is dark yellowish brown silty clay loam about 9 inches thick. The subsoil, to a depth of about 23 inches, is yellowish brown clay in the upper part and light olive brown flaggy silty clay mottled in shades of brown or gray in the lower part. Soft bedrock of interbedded limestone, siltstone, and shale is at a depth of about 23 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid to moderately alkaline in the surface layer and subsoil and mildly alkaline to strongly alkaline in the substratum. Permeability is slow, and the available water capacity is low. The root zone is moderately deep. Runoff is rapid. 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 moderately deep, loamy soils and, near the Willisburg and Mackville areas, soils similar to Eden soil but more acid than typical for Eden soil. Also included are a few intermingled areas of Lowell, Faywood, Fairmount, and Nicholson soils.

Most of the acreage in this map unit is used for hay and pasture.

This Eden soil is suited to limited row crops and small grains. Steepness of slope, moderate depth of the root zone, and the low available water capacity are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland. Preferred trees for planting are Scotch pine, black oak, white oak, and white ash. The erosion hazard, equipment limitations, seeding mortality, and plant competition are concerns in management.

This soil is poorly suited to urban use. Steepness of slope, moderate depth to bedrock, slow permeability, moderate shrink-swell potential, and high clay content are the main limitations. Certain engineering techniques can help to overcome these limitations.

This Eden soil is in capability subclass IVe and in 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 side slopes in the northern and eastern parts of the county. Severe sheet erosion has exposed subsoil, substratum, and limestone or siltstone flagstones in most areas. Rills and gullies are common. Flagstones are more common on south- and west-facing slopes. The mapped areas are 5 to 1,600 acres and about 200 to 2,500 feet wide.

Typically, the surface layer is olive brown flaggy silty clay about 4 inches thick. The subsoil, to a depth of about 24 inches, is light olive brown clay in the upper part and light olive brown flaggy clay mottled in shades of brown in the lower part. Soft, interbedded limestone, siltstone, and shale bedrock is at a depth of about 24 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid to moderately alkaline in the surface layer and subsoil and mildly alkaline to strongly alkaline in the substratum. Permeability is slow, and the available water capacity is low. The root zone is moderately deep. Runoff is rapid. 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 areas of moderately deep, loamy soils, a few areas of exposed bedrock, and, near the Willisburg and Mackville areas, soils similar to Eden soil but more acid than typical for Eden soil. Also included are a few intermingled areas of Lowell, Faywood, and Fairmount soils.

Most of the acreage in this map unit is used for pasture and woodland (fig. 8).

This soil is poorly suited to row crops, small grains, and hay. Steepness of slope, sheet erosion, rills, gullies, high clay content, low available water capacity, and flagstones on the surface are the main limitations.

This soil is suited to pasture plants; however, grasses and legumes that provide adequate forage and ground cover and that require infrequent renovation are needed. Steepness of slope and flagstones limit the use of modern machinery to establish and maintain grasses. Overgrazing and grazing when wet reduce ground cover and cause excessive runoff and erosion.

This soil has moderate potential productivity for woodland. Preferred trees for planting are Virginia pine, Scotch pine, black oak, white oak, and white ash. Equipment limitations, the erosion hazard, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to urban use. Steepness of slope, slow permeability, high clay content, moderate depth to bedrock, and moderate shrink-swell potential are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

EkA—Elk silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on low stream terraces throughout the county. The mapped areas are 4 to 40 acres and about 170 to 400 feet wide.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil, to a depth of about 54 inches, is brown silt loam in the upper part and brown silty clay loam in the lower part. The substratum to a depth of about 66 inches is dark yellowish brown silt loam.

This soil is high in natural fertility and low to moderate in organic matter content. It is very strongly acid to slightly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is high. The root zone is deep. Runoff is slow to medium. This soil is subject to rare flooding.

Included with this soil in mapping are areas of deep, well drained, clayey soils. Also included are a few intermingled areas of Otwell, Lawrence, Lowell, Skidmore, and Nolin soils.

Most of the acreage in this map unit is used for row crops, small grains, and hay (fig. 9). This Elk soil is well suited to these uses and to pasture. The hazard of flooding is a limitation.

All pasture and hay crops commonly grown in the area are well suited to this soil, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, pin oak, shortleaf pine, sweetgum, and white ash. Plant competition is a concern in management.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation and is difficult to overcome.

This Elk soil is in capability class I and in 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 county. The mapped areas are 4 to 35 acres and 170 to 750 feet wide.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil, to a depth of about 54 inches, is brown silt loam in the upper part and brown silty clay loam in the lower part. The substratum to about 66 inches is dark yellowish brown silt loam.

This soil is medium in natural fertility and low to moderate in organic matter content. It is very strongly acid to slightly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is high. The root zone is deep. Runoff is medium.

Included with this soil in mapping are areas of deep, well drained, clayey soils and a few small, low-lying areas of soils that are subject to rare flooding. Also included are a few intermingled areas of Otwell, Lawrence, and Lowell soils.

Most of the acreage in this map unit is used for row crops, small grains, and hay. This Elk soil is well suited to these uses and to pasture. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, pin oak, shortleaf pine, sweetgum, and white ash. Plant competition is a concern in management.

This soil is well suited to urban use. Low strength is a limitation for local roads and streets.

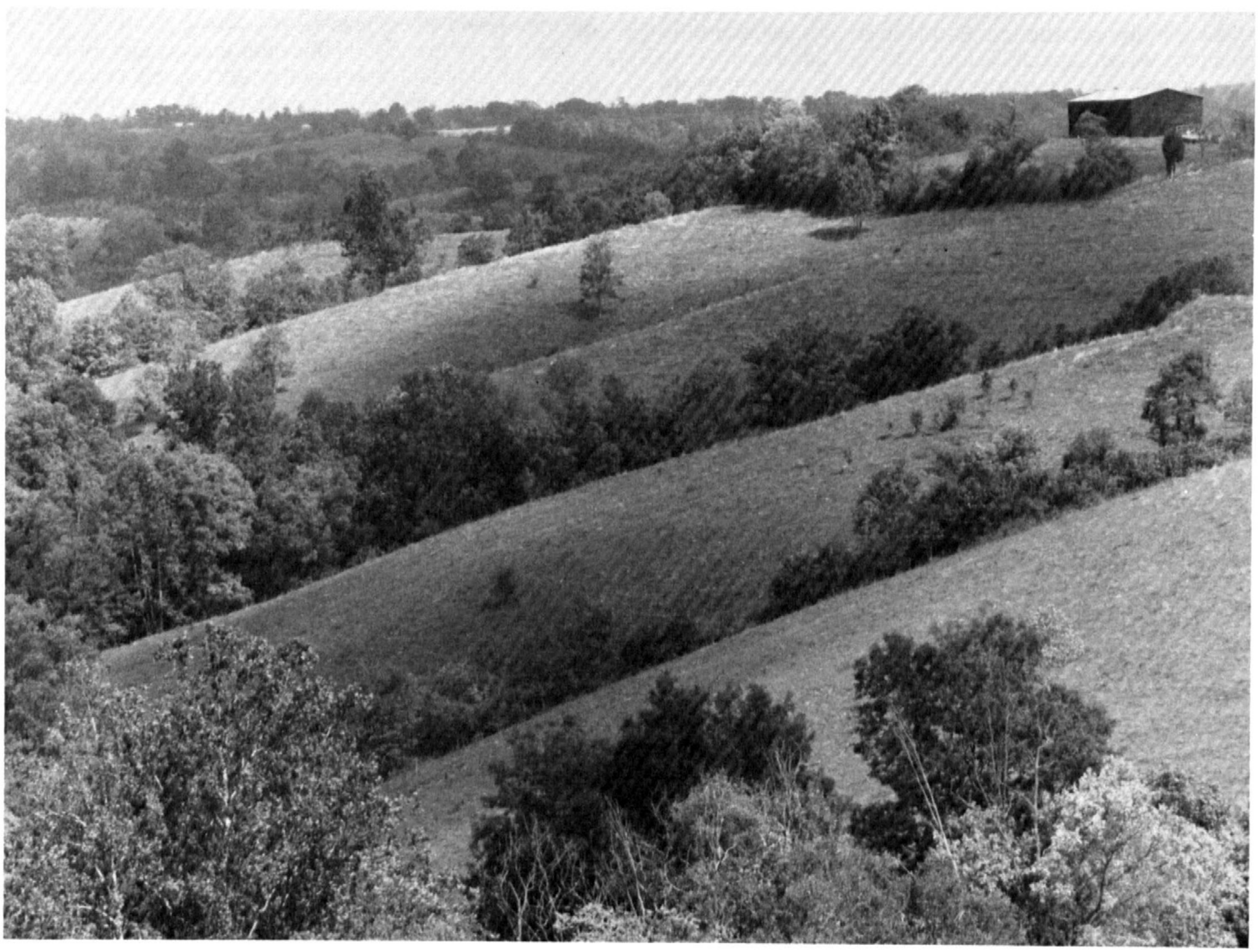


Figure 8.—Pasture and woodland in an area of Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded.

Figure 9.—Soybeans in an area of Elk silt loam, 0 to 2 percent slopes. Lowell soils are in the foreground.

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

EkC—Elk silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on side slopes of stream terraces throughout the county. The mapped areas are 4 to 20 acres and about 170 to 350 feet wide.

Typically, the surface layer is brown silt loam about 11 inches thick. The subsoil, to a depth of about 54 inches, is brown silt loam in the upper part and brown silty clay loam in the lower part. The substratum to a depth of about 66 inches is dark yellowish brown silt loam.

This soil is medium in natural fertility and low to moderate in organic matter content. It is very strongly acid to slightly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is high. The root zone is deep. Runoff is medium.

Included with this soil in mapping are areas of deep, well drained, clayey soils. Also included are a few intermingled areas of Otwell and Lowell soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture.

This Elk soil is suited to row crops and small grains. Steepness of slope is the main limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to alfalfa and other hay and pasture plants. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, pin oak, shortleaf pine, sweetgum, and white ash. Plant competition is a concern in management.

This soil is suited to urban use. Steepness of slope is a limitation. Certain engineering techniques can help to overcome this limitation.

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

FaD—Fairmount-Rock outcrop complex, 6 to 20 percent slopes. This map unit consists of small areas of Fairmount soil and limestone Rock outcrop that were so intermingled they could not be separated at the scale selected for mapping. Fairmount soil is well drained and shallow. This soil and Rock outcrop are on narrow ridgetops and side slopes throughout most of the county. Many areas are karst. Individual areas of Fairmount soil are 0.1 acre to 4 acres and are intermingled with the exposed limestone bedrock in bands 3 to 15 feet wide. The mapped areas are 5 to 200 acres and about 400 feet wide.

Fairmount silty clay loam makes up about 75 percent of the map unit. Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil, to a depth of about 16 inches, is dark grayish brown silty clay. Hard limestone bedrock is at a depth of about 16 inches.

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

Limestone Rock outcrop makes up about 15 percent of the map unit.

Included with this complex in mapping are a few intermingled areas of Faywood and Lowell soils.

Most of the acreage in this map unit is used as pasture and woodland (fig. 10).

The soil in this map unit is not suited to row crops, small grains, and hay. Steepness of slope, shallow depth of the root zone, Rock outcrop, and very low available water capacity are the main limitations.

The soil in this map unit is suited to pasture, although very low available water capacity and shallow depth of

Figure 10.—Dairy cattle graze in an area of Fairmount-Rock outcrop complex, 6 to 20 percent slopes.

the root zone are limitations to consider. Grasses and legumes that provide adequate forage and ground cover and that require infrequent renovation are needed. Very low available water capacity and steepness of slopes limits establishing and maintaining grasses. Overgrazing and grazing when wet reduce ground cover and cause excessive runoff and erosion.

Fairmount soil has moderate potential productivity for woodland. Preferred trees for planting are eastern redcedar, black oak, and white oak. The erosion hazard, equipment limitations, and seedling mortality are concerns in management.

The soil in this map unit is poorly suited to urban use. Shallow depth to bedrock, Rock outcrop, steepness of slope, moderately slow or slow permeability, and high clay content are the main limitations. Certain engineering techniques can help to overcome these limitations, but alterations would probably be very expensive.

The Fairmount soil is in capability subclass VIe, and Rock outcrop is in VIIIs. Fairmount soil is in woodland suitability group 4x.

FaF—Fairmount-Rock outcrop complex, 20 to 50 percent slopes. This map unit consists of small areas of Fairmount soil and limestone Rock outcrop that were so intermingled that they could not be separated at the scale selected for mapping. Fairmount soil is well drained and shallow. This soil and Rock outcrop are on side slopes throughout most of the county. Individual areas of Fairmount soil are 0.1 acre to 4 acres and are intermingled with the exposed limestone bedrock in bands 3 to 30 feet wide. The mapped areas are 5 to 225 acres and about 900 feet wide.

Fairmount silty clay loam makes up about 65 to 80 percent of the map unit. Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil, to a depth of about 16 inches, is dark grayish brown silty clay. Hard limestone bedrock is at a depth of about 16 inches.

Fairmount soil is low in natural fertility and moderate to high in organic matter content. It is neutral to moderately alkaline throughout. Permeability is moderately slow or slow, and the available water capacity is very low. The root zone is shallow. Runoff is rapid. 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 the map unit.

Included with this complex in mapping are a few intermingled areas of Faywood and Lowell soils.

Most of the acreage in this map unit is used as woodland.

The soil in this map unit is not suited to row crops, small grains and hay, and is poorly suited to pasture. Steepness of slope, shallow depth of the root zone, Rock outcrop, and very low available water capacity are the main limitations.

The soil in this map unit has moderate potential productivity for woodland. Preferred trees for planting are eastern redcedar, black oak, and white oak. The erosion hazard, equipment limitations, and seedling mortality are concerns in management. Although this soil has moderate woodland productivity, the soil's most practical use is as woodland or as habitat for wildlife.

The soil in this map unit is poorly suited to urban use. Steepness of slope, shallow depth to bedrock, Rock outcrop, moderately slow or slow permeability, and high clay content are the main limitations. Engineering techniques to help overcome these limitations would probably be limited and very expensive.

Fairmount soil is in capability subclass VIIe, and Rock outcrop is in VIIIs. Fairmount soil is in woodland suitability group 4x.

FdB—Faywood silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on ridgetops throughout the county. The mapped areas are 4 to 50 acres and about 170 to 500 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of about 22 inches, is yellowish brown clay in the upper part and olive brown clay mottled in shades of brown in the lower part. Hard limestone bedrock is at a depth of about 22 inches.

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

Included with this soil in some mapped areas are small areas of limestone rock outcrop and areas of soils that have a thin layer of soft, loamy bedrock underlain by hard bedrock. Also included are a few intermingled areas of Eden, Lowell, Fairmount, and Shrouts soils.

Most of the acreage in this map unit is used for hay and pasture.

This Faywood soil is suited to row crops and small grains. Moderately slow or slow permeability, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are black oak, white oak, and white ash. This soil has a moderate equipment limitation because of high clay content, and plant competition is moderate.

This soil is poorly suited to urban use. Moderate depth to bedrock, moderately slow or slow permeability, high clay content, and moderate shrink-swell potential are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

FoC2—Faywood silty clay loam, 6 to 12 percent slopes, eroded. This moderately deep, well drained, sloping, moderately eroded soil is on narrow ridgetops and side slopes throughout the county. Moderate erosion has exposed some areas of subsoil, substratum, and bedrock. A few rills occur. The mapped areas are 4 to 180 acres and about 170 to 1,600 feet wide.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil, to a depth of about 22 inches, is yellowish brown clay in the upper part and olive brown clay mottled in shades of brown in the lower part. Hard limestone bedrock is at a depth of about 22 inches.

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

Included with this soil in some mapped areas are small areas of limestone rock outcrop and areas of soils that have a thin layer of soft, loamy bedrock underlain by hard bedrock. Also included are a few intermingled areas of Eden, Lowell, Fairmount, and Shrouts soils.

Most of the acreage in this map unit is used for hay and pasture.

This Faywood soil is suited to row crops and small grains. Steepness of slope, moderately slow or slow permeability, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to pasture and hay. Plants and seeding rates for hay and pasture need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are black oak, white oak, and white ash. Equipment limitations, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to urban use. Moderate depth to bedrock, moderately slow or slow permeability, high clay content, and moderate shrink-swell potential are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

FoD2—Faywood silty clay loam, 12 to 20 percent slopes, eroded. This moderately deep, well drained, moderately steep, moderately eroded soil is on side slopes throughout the county. Moderate erosion has exposed some areas of subsoil, substratum, and bedrock. A few rills occur. The mapped areas are 4 to 100 acres and about 170 to 2,000 feet wide.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil, to a depth of about 22 inches, is yellowish brown clay in the upper part and olive brown clay mottled in shades of brown in the lower part. Hard limestone bedrock is at a depth of about 22 inches.

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

Included with this soil in some mapped areas are small areas of limestone rock outcrop and areas of soils that have a thin layer of loamy, soft bedrock underlain by hard bedrock. Also included are a few intermingled areas of Eden, Lowell, Fairmount, and Shrouts soils.

Most of the acreage in this map unit is used for hay, pasture, and woodland.

This Faywood soil is suited to some row crops and small grains. Steepness of slope, moderately slow or slow permeability, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is suited to pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland. Preferred trees for planting are white oak, white ash, and black oak. The erosion hazard, equipment limitations, seedling mortality, and plant competition are concerns in management.

This soil is poorly suited to urban use. Steepness of slope, moderate depth to bedrock, moderately slow or slow permeability, moderate shrink-swell potential, and high clay content are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

FwC3—Faywood silty clay, 6 to 20 percent slopes, severely eroded. This moderately deep, well drained, sloping to moderately steep, severely eroded soil is on side slopes and narrow ridgetops throughout the county. Severe erosion has exposed subsoil and substratum in many areas. Rills and gullies are common. The mapped areas are 4 to 80 acres and about 170 to 500 feet wide.

Typically, the surface layer is olive brown silty clay about 5 inches thick. The subsoil, to a depth of about 23 inches, is light olive brown clay. Hard limestone bedrock is at a depth of about 23 inches.

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

Included with this soil in some mapped areas are small areas of limestone rock outcrop and areas of soils that have a thin layer of loamy, soft bedrock underlain by hard bedrock. Also included are a few intermingled areas of Eden, Lowell, Fairmount, and Shrouts soils.

Most of the acreage in this map unit is used for pasture and second growth timber.

This Faywood soil is suited to some row crops and small grains. Steepness of slope, sheet erosion, rills, gullies, high clay content, moderately slow or slow permeability, moderate depth of the root zone, and moderate available water capacity are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

Although this soil is suited to row crops and small grains, it is better suited to hay and pasture. Sheet erosion, rills, gullies, and high clay content are limitations to consider. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Applications of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderate potential productivity for woodland. Preferred trees for planting are Virginia pine, black oak, white oak, and eastern redcedar. Equipment limitations and seedling mortality are concerns in management.

This soil is poorly suited to urban use. Moderate depth to bedrock, moderately slow or slow permeability, high clay content, and moderate shrink-swell potential are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

FyE3—Faywood-Shrouts silty clay loams, very rocky, 12 to 30 percent slopes, severely eroded. This complex consists of well drained, moderately deep, severely eroded Faywood and Shrouts soils. These soils were so intricately intermingled that to separate them at the scale selected for mapping was not practical. They are on moderately steep to steep side slopes in the western part of the county. The Shrouts soil formed from soft, calcareous bedrock (marl) and is on the landscape above the Faywood soil, which formed from hard limestone. Erosion has exposed areas of loamy subsoil and substratum and hard, brown dolomitic limestone in the Shrouts soil. In the Faywood soil, erosion has exposed areas of clayey subsoil and hard, gray limestone. Rills and gullies are common. Most areas of these soils contain 2 to 10 percent rock outcrop. The brown, dolomitic limestone rock outcrop is 2 to 20 feet wide, and the gray limestone rock outcrop is 1 to 3 feet wide. The mapped areas are 4 to 150 acres and about 100 to 1,000 feet wide.

The Faywood soil makes up about 45 to 60 percent of the map unit. Typically, the surface layer is brown silty clay loam about 4 inches thick. The subsoil, to a depth of about 31 inches, is yellowish brown clay. The lower part of the subsoil is mottled in shades of light olive brown. Hard limestone bedrock is at a depth of about 31 inches.

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

The Shrouts soil makes up about 25 to 40 percent of the map unit. Typically, the surface layer is dark yellowish brown silty clay loam about 4 inches thick. The subsoil, to a depth of about 20 inches, is light olive brown clay. Soft, calcareous bedrock (marl) is at a depth of about 20 inches.

The Shrouts soil is low in natural fertility and low in organic matter content. It is medium acid to moderately alkaline in the surface layer and subsoil and neutral to moderately alkaline in the substratum. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep. Runoff is rapid. This soil has moderate shrink-swell potential. Soft, calcareous bedrock (marl) is at a depth of 20 to 40 inches.

Included with these soils in mapping are shallow and moderately deep, loamy soils and similar soils that have a loam or clay loam substratum. These soils are near the upper edge of delineations. Soils near the lower edge of delineations that are 5 to 40 percent coral heads 3 to 24 inches across are included. Also included are a few intermingled areas of Beasley, Lowell, and Fairmount soils.

Most of the acreage of the Faywood and Shrouts soils is used for pasture or as woodland.

The soils in this unit are not suited to row crops, small grains, or hay. Steepness of slope, rock outcrop, moderate depth of root zone, and the moderate available water capacity are the main limitations.

The soils in this map unit are suited to pasture; however, grasses and legumes that provide adequate forage and ground cover and do not require frequent renovation are needed (fig. 11). Steepness of slope limits the use of equipment in establishing and maintaining grasses. Overgrazing and grazing when wet reduce ground cover and cause excessive runoff and erosion.

The soils in this map unit are not used extensively for woodland production, but they have moderately high potential productivity. On Faywood soil, the preferred trees for planting are black oak, white oak, white ash, and Virginia pine. On Shrouts soil, the preferred trees are white oak, black oak, chestnut oak, and Virginia pine. The erosion hazard, equipment limitations, plant competition, and seedling mortality are concerns in management.

The soils in this map unit are poorly suited to urban use. Steepness of slope, rock outcrop, moderate depth to bedrock, the high clay content, moderately slow or slow permeability, and the moderate shrink-swell potential are the main limitations. Certain engineering techniques can be used to help overcome these limitations.

The soils in this map unit are in capability subclass VIe. Faywood soil is in woodland suitability group 3c, and Shrouts soil is in woodland suitability group 5c.

Figure 11.—Pasture in an area of Faywood-Shrouts silty clay loams, very rocky, 12 to 30 percent slopes, severely eroded.

La—Lawrence silt loam. This deep, somewhat poorly drained, nearly level soil is on stream terraces and colluvial fans throughout the county. The mapped areas are 4 to 25 acres and about 170 to 700 feet wide. Slopes range from 0 to 2 percent.

Typically, the surface layer is olive brown silt loam about 7 inches thick. The subsoil, to a depth of about 56 inches, is light olive brown silty clay loam mottled in shades of gray in the upper part; hard, compact, and brittle, yellowish brown silty clay loam mottled in shades of gray or brown in the middle part; and mottled yellowish brown, light brownish gray, and light olive brown silty clay loam in the lower part. The substratum to a depth of about 64 inches is mottled light brownish gray, light olive brown, and yellowish brown silty clay loam.

This soil is low in natural fertility and low to moderate in organic matter content. Except where the surface layer has been limed, it is very strongly acid or strongly acid through the fragipan and medium acid to neutral below the fragipan. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep and is restricted in the fragipan. Runoff is slow. This soil is subject to rare flooding during the winter and early in spring. A perched high water table is at a depth of 12 to 24 inches during the winter and early in spring.

Included with this soil in mapping are areas of poorly drained soils that have a fragipan and somewhat poorly drained, clayey soils. Also included are a few intermingled areas of Otwell, Dunning, and Newark soils.

Most of the acreage in this map unit is used for row crops, hay, and pasture.

This Lawrence soil is suited to row crops and is poorly suited to small grains. The perched high water table and moderate depth of the root zone are the main limitations. The hazard of flooding is a limitation to consider. Good water management practices, such as open ditches and grass waterways, and the use of plants that are moderately tolerant to wetness help to overcome these limitations.

This soil is well suited to pasture and hay plants that are moderately tolerant to wetness, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, adequate drainage, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are yellow-poplar, white ash, black oak, white oak, sweetgum, willow oak, and American sycamore. Wetness is a moderate limitation to the use of equipment. Plant competition is moderate.

This soil is poorly suited to most urban uses. Slow permeability, wetness, and the hazard of flooding are the main limitations. Certain engineering techniques can help to overcome these limitations; however, the hazard of flooding is very difficult to overcome.

This Lawrence soil is in capability subclass IIIw and in woodland suitability group 2w.

LoB—Lowell silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops and foot slopes throughout the county except in the western part. The mapped areas are 4 to 200 acres and about 170 to 1,200 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 8 inches thick. The subsoil, to a depth of about 60 inches, is yellowish brown silty clay in the upper part and yellowish brown clay in the middle and lower parts.

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

Included with this soil in mapping are areas of moderately well drained, clayey soils on uplands, foot slopes, and terraces. Also included are well drained, clayey soils on terraces; some deep, loamy soils; and soils near Willisburg and Mackville that are more acid than Lowell soil. A few intermingled areas of Faywood, Beasley, Nicholson, Shelbyville, Eden, Fairmount, and Elk soils are included.

Most of the acreage in this map unit is used for row crops, small grains, hay, or pasture (fig. 12). This Lowell soil is well suited to these uses. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increase infiltration.

This soil is well suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are northern red oak, black oak, and white ash. Equipment limitations and plant competition are concerns in management.

This soil is suited to urban use. The moderately slow permeability, high clay content, depth to bedrock, and moderate shrink-swell potential are limitations. Certain engineering techniques can help overcome these limitations.

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

Figure 12.—Burley tobacco in an area of Lowell silt loam, 2 to 6 percent slopes.

LoC2—Lowell silt loam, 6 to 12 percent slopes, eroded. This deep, well drained, sloping, moderately eroded soil is on narrow ridgetops, side slopes, and foot slopes throughout the county. Moderate erosion has exposed some areas of subsoil, substratum, and bedrock. A few rills occur. The mapped areas are 4 to 300 acres and about 170 to 1,800 feet wide.

Typically, the surface layer is yellowish brown silt loam about 5 inches thick. The subsoil, to a depth of about 55 inches, is yellowish brown silty clay in the upper part and yellowish brown clay in the middle and lower parts. Hard limestone bedrock is at a depth of about 55 inches.

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

Included with this soil in mapping are areas of moderately well drained, clayey soils on uplands, foot slopes, and terraces. Also included are well drained, clayey soils on terraces; some deep, loamy soils; and soils near Willisburg and Mackville that are more acid than Lowell soil. A few intermingled areas of Faywood, Beasley, Nicholson, Shelbyville, Eden, Fairmount, and Elk soils are included.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture (fig. 13).

This Lowell soil is suited to row crops and small grains. Steepness of slopes is a limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, use of rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are northern red oak, black oak, and white ash. Equipment limitations and plant competition are concerns in management.

This soil is suited to urban use. Moderately slow permeability, steepness of slope, high clay content, depth to bedrock, and moderate shrink-swell potential are limitations. Certain engineering techniques can help to overcome these limitations.

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

LoD2—Lowell silt loam, 12 to 20 percent slopes, eroded. This deep, well drained, moderately steep, moderately eroded soil is on side slopes throughout the county. The mapped areas are 5 to 50 acres and about 200 to 800 feet wide.

Typically, the surface layer is yellowish brown silt loam about 5 inches thick. The subsoil, to a depth of about 55 inches, is yellowish brown silty clay in the upper part and yellowish brown clay in the middle and lower parts. Hard limestone bedrock is at a depth of about 55 inches.

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

Included with this soil in mapping are areas of deep, loamy soils and soils near Willisburg and Mackville that are more acid than Lowell soil. Also included are a few intermingled areas of Eden, Beasley, Faywood, Fairmount, and Shrouts soils.

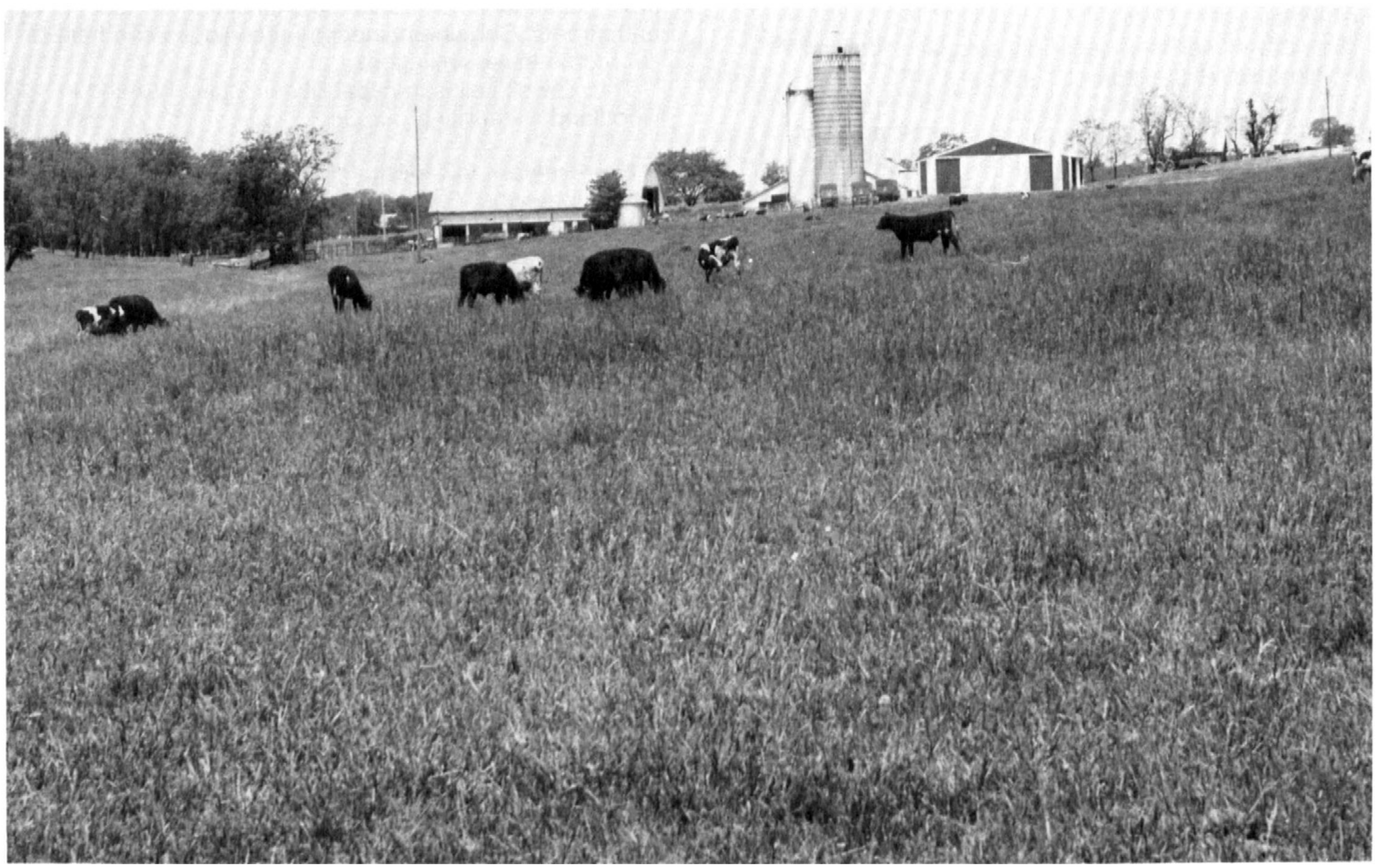


Figure 13.—Lush pasture in an area of Lowell silt loam, 6 to 12 percent slopes, eroded.

Most of the acreage in this map unit is used for hay and pasture.

This Lowell soil is suited to limited row crops and small grains. Steepness of slope is a limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are northern red oak, white ash, and black oak. The erosion hazard, equipment limitations, and plant competition are concerns in management.

This soil is poorly suited to urban use. Moderately slow permeability, steepness of slope, and moderate shrink-swell potential are the main limitations. Proper engineering techniques can help to overcome these limitations.

This Lowell soil is in capability subclass IVe and in 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 throughout the county except in the western part. Severe sheet erosion has exposed subsoil and substratum in many areas. Rills and gullies are common. The mapped areas are 4 to 50 acres and about 170 to 600 feet wide.

Typically, the surface layer is yellowish brown silty clay loam about 5 inches thick. The subsoil, to a depth of about 41 inches, is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. The substratum, to about 53 inches, is light olive brown clay mottled in shades of brown. Hard limestone bedrock is at a depth of about 53 inches.

This soil is low in natural fertility and organic matter content. It is very strongly acid to slightly acid in the surface layer and the upper part of the subsoil and strongly acid to mildly alkaline in the lower part the subsoil. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. Runoff is rapid. This soil has moderate shrink-swell potential. Hard limestone 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 in some delineations. Also included are a few intermingled areas of Eden, Faywood, Beasley, Shrouts, and Fairmount soils.

Most of the acreage in this map unit is used for hay and pasture.

This Lowell soil is suited to limited row crops and small grains. Steepness of slope, sheet erosion, rills, gullies, and high clay content are limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are Virginia pine, black oak, northern red oak, and white ash. Equipment limitations, seedling mortality, and plant competition are concerns in management.

This soil is suited to urban use. Moderately slow permeability, high clay content, steepness of slope, depth to bedrock, and moderate shrink-swell potential are limitations. Low strength is a limitation for local roads and streets. Certain engineering techniques can help to overcome these limitations.

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

Ne—Newark silt loam, frequently flooded. This deep, somewhat poorly drained, nearly level soil is on flood plains throughout the county. The mapped areas are 4 to 85 acres and about 170 to 800 feet wide. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 13 inches thick. The subsoil, to a depth of about 38 inches, is light olive brown silt loam mottled in shades of gray in the upper part and light brownish gray silty clay loam mottled in shades of brown in the lower part. The substratum to a depth of about 89 inches is light brownish gray silty clay loam mottled in shades of brown in the upper part and dark yellowish brown silty clay loam mottled in shades of brown in the lower part.

This soil is high in natural fertility and low to moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. Runoff is very slow. This soil is subject to frequent, brief flooding during the winter and early in spring but generally does not flood in 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 and poorly drained, loamy and clayey soils. Also included are a few intermingled areas of Nolin, Dunning, Skidmore, Boonesboro, and Lawrence soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture. This Newark soil is well suited to these uses. Small grains and other winter crops are best adapted to areas where the water table is controlled; however, these crops are sometimes damaged by flooding. Wetness and the hazard of flooding are limitations. Good water management practices, such as tile drainage, open ditches and diversions, and the use of plants that are moderately tolerant to wetness help to overcome these limitations.

This soil is well suited to pasture and hay plants that are moderately tolerant to wetness, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern cottonwood, sweetgum, red maple, American sycamore, eastern white pine, and yellow-poplar. Wetness and the hazard of flooding are moderate limitations to the use of equipment. Plant competition is severe.

This soil is poorly suited to urban use. Wetness and the hazard of flooding are the main limitations. The wetness limitation can be altered by the use of diversions, open ditches, and tile drainage, but the hazard of flooding is difficult to overcome.

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

NhB—Nicholson silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on ridgetops throughout the county. The mapped areas are 4 to 50 acres and about 170 to 1,800 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil to a depth of about 62 inches is yellowish brown silty clay loam in the upper part; hard, compact, and brittle, yellowish brown silty clay loam mottled in shades of brown and gray in the middle part; and yellowish brown clay mottled in shades of gray in the lower part.

This soil is low in natural fertility and low to moderate in organic matter content. Except where the surface layer has been limed, it is very strongly acid to medium acid through the fragipan and strongly acid to mildly alkaline below the fragipan. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep and is restricted by the fragipan. Runoff is medium. A perched water table stands at a depth of 18 to 30 inches generally during the winter and early in spring.

Included with this soil in mapping are areas of moderately well drained, clayey soils. Also included are a few intermingled areas of Lowell, Crider, Shelbyville, Shrouts, and Beasley soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture. This Nicholson soil is well suited to these uses. Wetness, moderate depth of the root zone, and moderate available water capacity are limitations to consider. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Wetness, moderate depth of the root zone, and moderate available water capacity during dry periods are limitations to consider. Alfalfa is not well suited to this soil. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are sweetgum, eastern white pine, white oak, northern red oak, yellow-poplar, white ash, and black oak. Plant competition is a concern in management.

This soil is poorly suited to urban use. Wetness and slow permeability are limitations for building sites and sanitary facilities. Certain engineering techniques can help to overcome these limitations.

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

NhC—Nicholson silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on narrow ridgetops and side slopes throughout the county. The mapped areas are 4 to 30 acres and about 170 to 800 feet wide.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil to a depth of about 62 inches is yellowish brown silty clay loam in the upper part; hard, compact, and brittle, yellowish brown silty clay loam mottled in shades of brown and gray in the middle part; and yellowish brown clay mottled in shades of gray in the lower part.

This soil is low in natural fertility and low to moderate in organic matter content. Except where the surface layer has been limed, it is very strongly acid to medium acid through the fragipan and strongly acid to mildly alkaline below the fragipan. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep and is restricted by the fragipan. Runoff is medium. A perched high water table is at a depth of 18 to 30 inches generally during the winter and early in spring.

Included with this soil in mapping are areas of moderately well drained, clayey soils. Also included are a few intermingled areas of Lowell, Crider, Shelbyville, Shrouts, Beasley, Faywood, and Eden soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture.

This soil is suited to row crops and small grains. Steepness of slope is a limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Wetness, moderate depth of the root zone, and moderate available water capacity during dry periods are limitations to consider. Alfalfa is not well suited to this soil. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are sweetgum, eastern white pine, white oak, northern red oak, yellow-poplar, white ash, and black oak. Plant competition is a concern in management.

This soil is poorly suited to most urban uses. Wetness and slow permeability are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

No—Nolin silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains and alluvial uplands throughout the county. The mapped areas are 4 to 100 acres and about 200 to 1,500 feet wide. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 11 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 lower part. The substratum to a depth of about 63 inches is dark yellowish brown silt loam in the upper part and brown loam in the lower part.

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 the available water capacity is high. The root zone is deep. Runoff is slow. This soil is subject to occasional brief flooding during the winter and early in spring but generally does not flood during the growing season. A seasonal high water table is at a depth of 3 to 6 feet generally during the winter and early in spring.

Included with this soil in mapping are areas of loamy, moderately well drained soils; clayey, well drained soils; clayey, moderately well drained soils; and soils that are subject to frequent flooding. Also included are a few intermingled areas of Newark, Dunning, Skidmore, Boonesboro, and Elk soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture (fig. 14). This Nolin soil is well suited to these uses. The hazard of flooding is a limitation to consider. Flooding sometimes damages winter crops, such as small grains and hay.

All pasture and hay crops grown in the area are well suited to this soil, although some hay crops can be damaged by flooding. Application of fertilizer, proper stocking, maintenance of desired plants, rotation grazing, and weed control are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are sweetgum, yellow-poplar, eastern cottonwood, white ash, northern red oak, and black walnut. Plant competition is a concern in management.

This soil is poorly suited to urban use. The hazard of flooding is the main limitation. This hazard is difficult to overcome.

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

OtA—Otwell silt loam, 0 to 2 percent slopes. This deep, moderately well drained, rarely flooded, nearly level soil is on stream terraces throughout the county. The mapped areas are 4 to 50 acres and about 170 to 1,600 feet wide.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of about 74 inches, is yellowish brown silty clay loam in the upper part; hard, compact, and brittle, yellowish brown silty clay loam mottled in shades of brown and gray in the middle part; and is yellowish brown silty clay loam mottled in shades of brown in the lower part. The substratum to a depth of about 89 inches is pale olive silty clay loam mottled in shades of brown.

This soil is low in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, it is very strongly acid to medium acid through the fragipan and medium acid to moderately alkaline below the fragipan. Permeability is very slow, and the available water capacity is moderate. The root zone is moderately deep and is restricted by the fragipan. Runoff is medium. A perched high water table is at a depth of 24 to 36 inches generally during the winter and early in spring. This soil is subject to rare flooding but generally does not flood during the growing season.

Included with this soil in mapping are areas of moderately well drained, clayey soils. Also included are a few intermingled areas of Lawrence, Elk, Lowell, Dunning, Skidmore, Newark, and Nolin soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture. This Otwell soil is

Figure 14.—Corn and burley tobacco in an area of Nolin silt loam, occasionally flooded. Hay in the foreground is on Elk silt loam, 2 to 6 percent slopes.

well suited to these uses. Wetness and moderate depth of the root zone are limitations to consider.

This soil is well suited to most pasture and hay. Wetness, moderate depth of the root zone, and moderate available water capacity during dry periods are limitations to consider. Alfalfa is not well suited to this soil. Plants and seeding rates need to provide adequate forage. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, black oak, white oak, shortleaf pine, yellow-poplar, and white ash. Plant competition is a concern in management.

This soil is poorly suited to urban use. Wetness and very slow permeability are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

OtB—Otwell silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on stream terraces throughout the county. The mapped areas are 4 to 20 acres and about 170 to 1,600 feet wide.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of about 74 inches, is yellowish brown silty clay loam in the upper part; hard, compact, and brittle, yellowish brown silty clay loam mottled in shades of brown and gray in the middle part;

and yellowish brown silty clay loam mottled in shades of brown in the lower part. The substratum to a depth of about 89 inches is pale olive silty clay loam mottled in shades of brown.

This soil is low in natural fertility and low to moderate in organic matter content. Except where the surface layer has been limed, it is very strongly acid to medium acid through the fragipan and medium acid to moderately alkaline below the fragipan. Permeability is very slow, and the available water capacity is moderate. The root zone is moderately deep and is restricted by the fragipan. Runoff is medium. A perched high water table is at a depth of 24 to 36 inches generally during the winter and early in spring.

Included with this soil in mapping are areas of moderately well drained, clayey soils. Also included are a few intermingled areas of Lawrence, Elk, Lowell, Dunning, Newark, and Nolin soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture. This Otwell soil is well suited to these uses. Wetness and moderate depth of the root zone are limitations to consider. Erosion is a hazard if conventional tillage is used. Conservation tillage, including no-till, crop residue use, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Wetness, moderate depth of the root zone, and moderate available water capacity during dry periods are limitations to consider. Alfalfa is not well suited to this soil. Plants and seeding rates need to provide adequate forage. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has moderately high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, black oak, white oak, shortleaf pine, yellow-poplar, and white ash. Plant competition is a concern in management.

This soil is poorly suited to urban use. Wetness and very slow permeability are the main limitations. Certain engineering techniques can help to overcome these limitations.

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

Pt—Pits, quarries. Quarries are open excavations from which soil and commonly underlying material have been removed, exposing limestone rock or other material that supports few or no plants. The excavations are limestone quarries and have almost vertical deep walls. Pits with an area of less than 4 acres are designated with a pick and shovel spot symbol on the maps. This miscellaneous land type is in capability subclass VIIIs.

SeB—Shelbyville silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridgetops in the central and southern parts of the county. The mapped areas are 5 to 200 acres and about 200 to 500 feet wide.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil, to a depth of about 56 inches, is brown silty clay loam in the upper part and dark yellowish brown or yellowish brown clay in the lower part. The substratum to a depth of about 61 inches is yellowish brown clay.

This soil is medium in natural fertility and moderate to high in organic matter content. It is strongly acid to neutral throughout except where the surface layer has been limed. Permeability is moderate in the surface layer and upper part of the subsoil and moderately slow in the lower part, and the available water capacity is high. The root zone is deep. Runoff is medium. This soil has moderate shrink-swell potential in the lower part of the subsoil and in the substratum.

Included with this soil in mapping are a few intermingled areas of Lowell, Nicholson, Beasley, and Faywood soils.

Most of the acreage in this map unit is used for row crops, small grain, hay, and pasture. This Shelbyville soil is well suited to these uses. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to alfalfa and other hay and pasture plants. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, black oak, northern red oak, white oak, shortleaf pine, yellow-poplar, black walnut, and white ash. Plant competition is moderate.

This soil is well suited to most urban uses; however, it is poorly suited to septic tank absorption fields because of moderately slow permeability in the lower part of the subsoil and in the substratum. Moderate shrink-swell potential in the lower part of the subsoil and in the substratum is also a limitation.

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

SeC—Shelbyville silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on side slopes and narrow ridgetops in the central and southern parts of the county. The mapped areas are 4 to 25 acres and about 170 to 350 feet wide.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil, to a depth of about 56 inches, is brown silty clay loam in the upper part and dark yellowish brown or yellowish brown clay in the lower part. The substratum to a depth of about 61 inches is yellowish brown clay.

This soil is medium in natural fertility and moderate to high in organic matter content. It is strongly acid to neutral throughout except where the surface layer has been limed. Permeability is moderate in the surface layer and upper part of the subsoil and moderately slow in the lower part. The available water capacity is high. The root zone is deep. Runoff is medium. This soil has moderate shrink-swell potential in the lower part of the subsoil and in the substratum.

Included with this soil in mapping are a few intermingled areas of Lowell, Nicholson, Beasley, and Faywood soils.

Most of the acreage in this map unit is used for row crops, small grains, hay, and pasture.

This Shelbyville soil is suited to row crops and small grains. Steepness of slope is a limitation. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to alfalfa and other hay and pasture plants. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are eastern white pine, black oak, northern red oak, white oak, shortleaf pine, yellow-poplar, black walnut, and white ash. Plant competition is moderate.

This soil is suited to most urban uses. Moderately slow permeability and moderate shrink-swell potential in the lower part of the subsoil and in the substratum and steepness of slope are limitations to consider.

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

ShB—Shrouts silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on ridgetops in the western part of the county. The mapped areas are 4 to 50 acres and about 170 to 1,800 feet wide.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil, to a depth of about 32 inches, is yellowish brown silty clay in the upper part, light olive brown clay in the middle part, and mottled yellowish brown, light olive brown, and light brownish gray silty clay loam in the lower part. Soft marl bedrock is at a depth of about 32 inches.

This soil is medium in natural fertility and low to moderate in organic matter content. It is medium acid to moderately alkaline in the surface layer and subsoil and neutral to moderately alkaline in the substratum. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep. Runoff is rapid. This soil has moderate shrink-swell potential. Soft marl bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are areas of moderately deep and shallow, loamy soils; a few areas of hard, brown dolomitic limestone rock outcrop; and a few areas of soils that have loam and clay loam textures in the lower part of the subsoil. Also included are a few intermingled areas of Beasley, Crider, Faywood, and Nicholson soils.

Most of the acreage in this map unit is used for hay and pasture.

This Shrouts soil is suited to row crops and small grains. Moderate depth of the root zone and moderate available water capacity are the main limitations. Erosion is a hazard if conventional tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is well suited to most pasture and hay. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderate potential productivity for woodland. Preferred trees for planting are black oak, white oak, and chestnut oak. This soil has a moderate equipment limitation because of the high clay content.

This soil is suited to most urban uses. Moderately slow permeability, moderate depth to soft bedrock, and moderate shrink-swell potential are limitations. Certain engineering techniques can help to overcome these limitations.

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

ShC2—Shrouts silt loam, rocky, 6 to 12 percent slopes, eroded. This moderately deep, well drained, sloping, moderately eroded soil is on narrow ridgetops and upper side slopes in the western part of the county. Hard, brown dolomitic limestone outcrop comprises up to 2 percent of most mapped areas. Erosion has exposed areas of subsoil, substratum, soft calcareous bedrock (marl), and hard, brown dolomitic limestone. The soft, calcareous bedrock is generally loamy and gravelly. A few rills occur. The mapped areas are 4 to 140 acres and about 170 to 1,800 feet wide.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil to a depth of about 32 inches is yellowish brown silty clay in the upper part, light olive brown clay in the middle part, and mottled yellowish brown, light olive brown, and light brownish gray silty clay loam in the lower part. Soft marl bedrock is at a depth of about 32 inches.

This soil is low in natural fertility and low to moderate in organic matter content. It is medium acid to moderately alkaline in the surface layer and subsoil and neutral to moderately alkaline in the substratum. Permeability is slow, and the available water capacity is moderate. The root zone is moderately deep. Runoff is rapid. These soils have moderate shrink-swell potential. Soft marl bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are areas of shallow and moderately deep, loamy soils; shallow to deep soils that have hard, dolomitic limestone bedrock; and a few areas of soils that have loam and clay loam textures in the lower part of the subsoil. Also included are a few intermingled areas of Beasley, Faywood, Crider, and Nicholson soils.

Most of the acreage in this map unit is used for pasture and hay (fig. 15).

This Shrouts soil is suited to limited row crops and small grains. The hazard of erosion, moderate available water capacity, moderate depth of the root zone, exposed hard bedrock, and steepness of slope are limitations. Erosion is a hazard if conventional crop tillage is used. Conservation tillage, including crop residue use, no-till, stripcropping, and contour farming, helps to control erosion and increases infiltration.

This soil is suited to most hay and pasture. Plants and seeding rates need to provide adequate forage and ground cover. Frequent renovation of pastures helps to maintain the desired plants. Application of lime and fertilizer, proper stocking, rotation grazing, and control of weeds are important management practices.

This soil has moderate potential productivity for woodland. Preferred trees for planting are black oak, white oak, and chestnut oak. Equipment limitations are a concern in management.

This soil is suited to most urban uses. Moderately slow permeability, steepness of slope, moderate depth to soft bedrock, moderate shrink-swell potential, and exposed hard bedrock are limitations. Certain engineering techniques can help to overcome these limitations.

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

Figure 15.—Hay in an area of Shrouts silt loam, rocky, 6 to 12 percent slopes, eroded.

Figure 16.—Content of coarse fragments is high in this area of Skidmore gravelly loam, occasionally flooded.

Sk—Skidmore gravelly loam, occasionally flooded. This deep, well drained, nearly level to gently sloping soil is on narrow flood plains and alluvial fans in the northwestern part of the county near Fredericktown. The mapped areas are 4 to 100 acres and about 170 to 350 feet wide. Slopes range from 0 to 4 percent.

Typically, the surface layer is dark brown gravelly loam about 7 inches thick. The subsoil, to a depth of about 33 inches, is dark brown very gravelly loam in the upper part and dark yellowish brown extremely gravelly loam in the lower part. The substratum, to a depth of about 50 inches, is dark brown extremely gravelly clay loam. Hard, gray limestone bedrock is at a depth of about 50 inches (fig. 16).

This soil is medium in natural fertility and moderate in organic matter content. It is medium acid to mildly alkaline throughout. Permeability is moderately rapid, and the available water capacity is low to moderate. The root zone is deep; however, effective root penetration is restricted by the high content of fragments. Runoff is medium. This soil is subject to occasional, very brief flooding during the winter and early in spring but generally does not flood during the growing season. A seasonal high water table is at a depth of 3 to 6 feet generally during the winter and early in spring. Depth to bedrock is more than 40 inches.

Included with this soil in mapping are areas of moderately deep soils that average more than 35 percent fragments between a depth of 10 inches and bedrock and soils that have less than 10 percent fragments in the surface layer. Also included are a few intermingled areas of Nolin and Boonesboro soils.

Most of the acreage in this map unit is used for pasture and hay. This soil is suited to row crops and small grains; however, the high content of fragments in the plow layer restricts tillage. Also, small grains and other winter crops can be damaged by flooding. Rock fragments, field size and location, and the hazard of flooding are limitations to consider in management.

This soil is well suited to most pasture and hay, although some hay crops can be damaged by flooding. Frequent renovation of pastures helps to maintain the desired plants. Application of fertilizer, proper stocking, rotation grazing, and weed control are important management practices.

This soil has very high potential productivity for woodland, but it is not used extensively for woodland production. Preferred trees for planting are black walnut, yellow-poplar, white ash, American sycamore, and eastern white pine. Plant competition is a concern in management.

This soil is poorly suited to most urban uses. Seepage, the hazard of flooding, and high content of fragments are the main limitations.

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

Prime Farmland

In this section, prime farmland is defined and discussed. The prime farmland soils in Washington County are listed in table 5.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage 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 wise 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

Figure 17.—Burley tobacco in an area of Elk silt loam, 2 to 6 percent slopes.

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. 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 either are 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. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is 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 subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

About 39,920 acres, or 21 percent of Washington County, meets the soil requirements for prime farmland. Areas of prime farmland are scattered throughout the county, but most are in map units 1 and 2 on the general soil map.

About 25,000 acres of this prime farmland is used for crops. Crops grown on this land, mainly corn, burley tobacco (fig. 17), soybeans, wheat, and alfalfa, account for an estimated one-third of the county's total agricultural income each year *(17)*.

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

The map units, or soils, in table 5 make up prime farmland in Washington County. The location of each map unit is shown on the detailed soil maps 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." The list of soils in table 5 does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. The measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

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 for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as 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 that is in harmony with nature.

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, Pasture and Hayland

Henry Amos, conservation agronomist, and Carl Hail, assistant state soil scientist, Soil Conservation Service, helped 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 125,000 acres in the county was used for cropland in 1978 *(28)*. Of this total, 77,000 acres was used for pasture; 13,000 acres for row crops, mainly corn and tobacco; and 27,000 acres for hay. A small acreage was set aside in federal farm programs. The rest of the acreage was mainly idle cropland.

The soils in Washington County have good potential for increased food production. In 1970, about 4,000 acres of potentially good cropland was used as woodland, and about 30,000 acres was used as pasture *(16)*. These figures are probably lower as the total acres of woodland and pasture have decreased from the above data as compared to the 1978 census figures. In addition to the reserve productive capacity represented by this land, food production could be increased considerably by using the latest crop production technology. This soil survey can help facilitate the application of such technology.

About 1,600 acres of Washington County is urban and built-up land *(27)*. This is less than 1 percent of the total area of the county. There is not a major trend of changing cropland and pasture to urban and built-up land, but this could change in future years.

Soil erosion is a major concern in the management of soils on about 94 percent of the cropland and pasture in Washington County. If slope is more than 2 percent, erosion is a hazard. Beasley, Eden, Faywood, Lowell, and Shrouts soils, for example, have slopes of more than 2 percent (fig. 18).

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 Beasley, Eden, Faywood, and Lowell soils, and on soils that have a layer in or below the subsoil that limits depth of the root zone. Such layers include a fragipan, as in Nicholson and Otwell soils, or bedrock, as in Eden, Fairmount, and Faywood soils.

Figure 18.—Poor quality pasture in an area of Faywood-Shrouts silty clay loams, very rocky, 12 to 30 percent slopes, severely eroded; on the ridgetop is burley tobacco in an area of Beasley silt loam, 2 to 6 percent slopes.

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 productive capacity of the soil. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land. They also provide nitrogen and improve tilth for the following crop.

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

Terraces and diversions reduce the length of slope and thus reduce runoff and the risk of erosion. They are most practical on deep, well drained soils that have regular slopes, such as Elk and Shelbyville soils. Other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the 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 help to control erosion in the county. They are best adapted to soils that have smooth uniform slopes, including most areas of Elk, Nicholson, Shelbyville, Lowell, Faywood, and Eden soils.

Information on erosion control practices for each kind of soil is available at the local office of the Soil Conservation Service.

Soil drainage is a concern in management on about 4 percent of the acreage in Washington County that is used for crops and pasture. Some soils are so wet that the production of crops common to the area is generally difficult unless they are artificially drained. An example is the very poorly drained Dunning soils. Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years. In this group are the Newark soils. These soils make up about 1,400 acres in the county.

Small areas of wetter soils along drainageways are commonly included in areas of the moderately well drained Nicholson and Otwell soils. Artificial drainage is generally not practiced on these soils nor on the somewhat poorly drained Lawrence soils. These soils 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 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 Newark soils and the poorly or very poorly drained Dunning soils that are used for intensive row cropping. Drains need to be at closer intervals in the more slowly permeable soils than in the more permeable soils. Intervals would be closer in Dunning soils than in Newark soils.

Soil fertility is naturally low or medium in the soils on uplands in the county. The soils on the flood plains, such as Boonesboro, Dunning, Newark, Nolin, and Skidmore soils, range from medium acid to moderately alkaline and are naturally higher in plant nutrients than most soils on 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 soils, which have a medium level of phosphorus. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crops, and on the expected level of yields. The Cooperative Extension Service can help determine the kind and amount of fertilizer and lime needed.

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

Some of the soils in the county that are used for crops 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 material can improve soil structure and reduce crust formation. Fall plowing is generally not a good practice on soils that have a light colored silt loam surface layer because a crust forms during the winter and spring. Many of these soils are nearly as dense and hard at planting time after fall plowing as they were before they were plowed. About nine-tenths of the cropland consists of sloping soils that are subject to damaging erosion if they are plowed in the fall.

The dark colored Dunning soils are clayey, and tilth is a concern because they generally stay wet until late in spring. If wet when plowed, these soils tend to be 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 Lowell and Faywood soils, become cloddy if they are plowed beyond the narrow range of moisture content that is optimum to prevent or minimize clodding.

Field crops suited to the soils and climate of Washington County 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 most common close-grown crop. Rye, barley, and oats could be grown, and grass seed could be produced from fescue, orchardgrass, and bluegrass.

Special crops grown in Washington County are vegetables, small fruits, tree fruits, flowers, 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 county.

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 soils include Beasley, Crider, Elk, Lowell, and Shelbyville soils that have slopes of less than 6 percent. They make up about 25,000 acres. The Elk soils on slopes of less than 2 percent are less suited to vegetables 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 county 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.

The 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 management is needed to produce large quantities of adequate quality forage for a successful livestock program (fig. 19). Such a program can furnish up to 78 percent of the feed for beef cattle and 66 percent for dairy cattle *(14)*.

In Washington County, about 104,000 acres is used for hay and pasture *(28)*. A sizeable acreage needs reestablishment, improvement, brush control, or protection from overgrazing.

The soils in Washington County vary in depth to rock or limiting layers, internal drainage, ability to supply moisture, and many other properties. Grasses and legumes and grass-legume combinations vary widely in their ability to persist and produce on different soils. The plant species or mixture of species needs to be planted in compatible soils to get the greatest return and to maximize soil and water conservation.

The best use of level to gently sloping, deep, well drained soils would be to plant the highest producing crops, such as corn, silage, alfalfa, or a mixture of alfalfa-orchardgrass or alfalfa-timothy. Soils that have steeper slopes need to be maintained in sod-forming grasses, such as tall fescue or bluegrass, to minimize soil erosion (see fig. 12). Alfalfa should be used with a cool-season grass where the soils are at least 2 feet deep and well drained. On soils less than 2 feet deep or not well drained, clover-grass mixtures or pure grass stands can be used. Legumes can be established in grass-dominant sods through renovation.

Plants need to be adapted not only to the soil but also to the intended use. Selected plants should provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses, resulting in higher animal performance. They

Figure 19.—Rolled hay in an area of Nicholson silt loam, 2 to 6 percent slopes.

should be used to the maximum extent possible. Taller growing legumes, such as alfalfa and red clover, are more versatile than a legume, such as white clover, which is used primarily for grazing. Grasses, such as orchardgrass, timothy, and tall fescue, are better adapted to hay and silage.

Tall fescue is an important cool-season grass suited to a wide range of soil conditions. It is used for both pasture and hay. Growth that occurs from August to November is commonly permitted to accumulate in the field and is "stockpiled" for deferred grazing late in fall and in winter. Nitrogen fertilizer is important for maximum production during the stockpiling period. The desired production level should determine the rate of application.

Renovation with a good stand of grass can increase the yields of pasture and hay fields. Renovation is the improvement of pasture and hay fields by partial destruction of the sod, plus liming, fertilizing, and seeding to reestablish desirable forage plants. Adding legumes to these grass fields provides high quality feed. Legumes increase summer production and take nitrogen from the air. Under Kentucky growing conditions, alfalfa can fix 200 to 300 pounds of nitrogen per acre every year; red clover, 100 to 200 pounds; and Ladino clover, 100 to 150 pounds. An acre of Korean lespedeza, vetch, and other annual forage legumes can fix 75 to 100 pounds of nitrogen a year *(15)*.

Some important steps in successful renovation and management are:

- Graze or mow close before disking or disturbing the sod.
- Disturb 40 to 60 percent of the grass for sowing clovers and 80 to 100 percent for alfalfa. A disk, field cultivator, or field tiller can be used.
- Take soil tests and apply the needed lime, phosphate, and potash. Do not use nitrogen when renovating old grass fields. It increases grass competition to the legume seedlings.
- Prepare a smooth, firm seedbed and distribute the seed evenly over the area, covering the seed about 1/8 to 1/4 inch deep to assure a good seed to soil contact.
- Seed an adapted variety that has a high percent germination and inoculate with the proper nitrogen-fixing bacteria.
- Seed fescue, bluegrass, timothy, orchardgrass, ryegrass, and small grain for forage late in summer or early in fall. Alfalfa, red clover, white clover, and lespedeza are most successfully seeded in the spring.
- Keep renovated fields grazed short until livestock start biting on the young legumes, then remove livestock and allow legumes to become established.
- Control grazing and leave 2 to 3 inches of top growth on established grass-legume mixtures.
- Mow pastures as needed to remove grass seed heads and to control weeds and woody vegetation.
- Topdress annually with phosphate and potash according to the soil test and add lime to maintain soil pH for the legume that is being grown.
- Check renovated fields for insect damage or disease.

For additional information on pasture and hayland management, contact the local office of the Soil Conservation Service or the Kentucky Cooperative Extension Service.

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 6. 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 6 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 for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. 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 criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include 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 *(24)* 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 they 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 a 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.

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

The acreage of soils in each capability class and subclass is shown in table 7. 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, helped prepare this section.

Washington County is a part of the Western Mesophytic Forest region. Chinkapin oak, white oak, hackberry, sugar maple, black walnut, black cherry, Kentucky coffeetree, American elm, shagbark, bitternut hickory, and eastern redcedar are characteristic trees in this region. The commercial woodland acreage totals 34,600 acres, or 18 percent of the total land area *(18)*. The oak-hickory type, the most extensive, comprises about 51 percent of the total woodland acreage; oak-pine makes up 19 percent; loblolly-shortleaf pine, 16 percent; elm-ash-red maple, 9 percent; and maple-beech birch, 5 percent.

Woodland tracts in the soil survey are primarily unmanaged, small private holdings of about 24 acres. The average forest stand in Kentucky produces only 33 cubic feet per acre per year of wood. However, 75 percent of the forest land is capable of producing 50 cubic feet or more per acre per year.

Tree growth, stocking and tree quality can be improved with proper management. This involves removal of low quality trees in fully stocked and understocked stands of all sizes and regeneration of sawtimber stands after harvest. Soil surveys are useful management tools to identify Kentucky's most productive forest lands, soil limitations for management, and preferred trees to plant.

The only commercial wood using industry in the county is a sawmill that does custom sawing and produces rough lumber and tobacco sticks. However, mills in adjacent counties purchase logs and standing trees from Washington County.

Table 8 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 symbol (woodland suitability) 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; *d*, restricted root depth; and *c*, clay in the upper part of the soil. 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, d, and c.

In table 8, *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 a 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. The site index applies to fully stocked, even-aged, unmanaged stands *(6, 8, 9, 10, 11, 13, 20, 21)*. 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

In table 9, the soils of the survey area are rated according to the 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 recreational 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 9, 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 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

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 gentle 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, 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 and horseback riding 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 (fig. 20).

Wildlife Habitat

William H. Casey, biologist, Soil Conservation Service, helped prepare this section.

The wildlife population of Washington County is made up of an estimated 33 species of mammals, 34 species of terrestrial reptiles and amphibians, and 89 species of birds that nest here. More than 200 other bird species visit Kentucky each year.

The kinds of wildlife most important at present are those that furnish recreation, such as sport hunting, or are used for economic gain. In Washington County, the gray squirrel, fox squirrel, white-tailed deer, cottontail rabbit, raccoon, red fox, mink, muskrat, bobwhite quail, and mourning dove are important wildlife. Birdwatching for nongame species is a popular activity for many outdoor enthusiasts.

There is much overlap in the habitat requirements of these animals. The gray squirrel, fox squirrel, and white-tailed deer are generally classified as woodland wildlife. The rabbit, quail, and dove are openland wildlife; and the mink and muskrat that spend most of their time in or about water are 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

Figure 20.—A golf fairway at Lincoln Homestead State Park in an area of Lowell silt loam, 2 to 6 percent slopes.

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 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife *(32)*. 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, orchardgrass, white clover, and alfalfa.

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 cinque foil.

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 and seeds. 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, meadowlark, field sparrow, cottontail, and red fox.

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 turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, 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, herons, shore birds, muskrat, mink, and beaver.

Engineering

John L. Buie, area engineer, Soil Conservation Service, helped prepare 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 must 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: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables (fig. 21); evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and 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 11 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

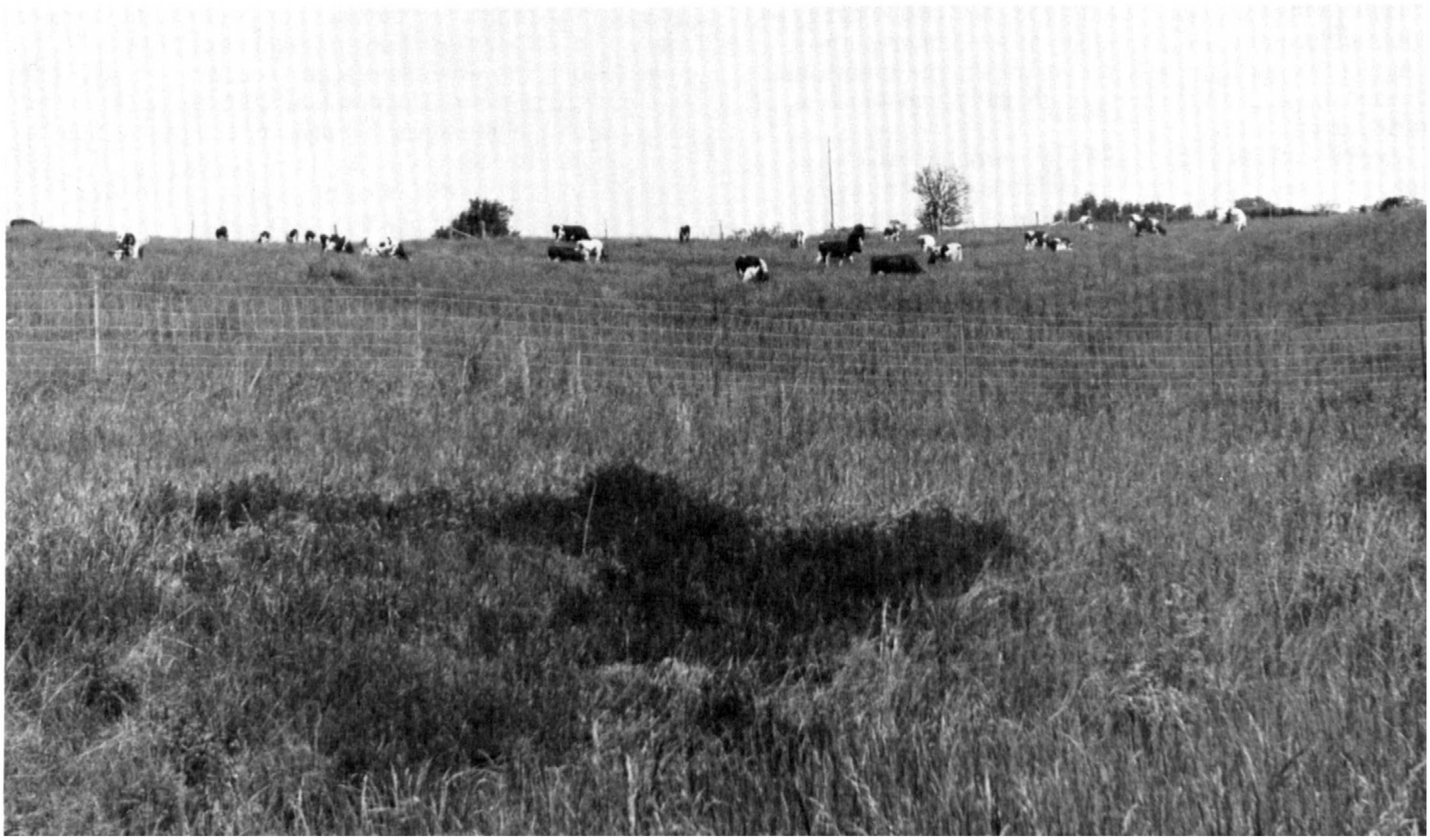


Figure 21.—Crown vetch and fescue are used to stabilize a road bank (in foreground) in an area of Faywood silty clay loam, 6 to 12 percent slopes, eroded; the dairy cattle are grazing in an area of Shelbyville silt loam, 2 to 6 percent slopes.

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 12 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 12 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 that 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 filter the effluent effectively. 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 12 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 12 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, and soil reaction 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 13 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 13, 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 or stones, 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 or stones, 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 14 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 for 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 the restrictive features that affect each soil for 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 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, boulders, or organic matter. 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 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

Figure 22.—Grassed waterway conducts the runoff from the surrounding areas of Shelbyville silt loam, 6 to 12 percent slopes.

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 (fig. 22). Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of low available water capacity, restricted rooting depth, 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.

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 *(25)*. 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 15 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 the content of particles coarser than sand is as much as 15 percent, 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.

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 ovendry 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 16 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, or component, 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, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving 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 *(22)* 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 in each major soil layer is stated in inches of water per inch of soil. 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. Losses are expressed in tons per acre per year. These 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 0.02 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 over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter 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 17 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 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. There are no known examples of this group in the survey area.

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. Some examples are the Boonesboro, Crider, Elk, Nolin, and Skidmore soils.

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. Some examples are the Beasley, Eden, Faywood, Lawrence, Newark, and Nicholson soils.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have 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. Some examples are the Dunning, Fairmount, and Shrouts soils.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depressions is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding 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, which are characteristic of 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 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

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. 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.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

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 severely corrosive 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 the amount of sulfates in the saturation extract.

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 on laboratory measurements. Table 18 shows the classification of the soils in the survey area. 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. There can be some variation in the texture of the surface layer or of the substratum 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 (23)*. 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."

Beasley Series

The Beasley series consists of deep, well drained soils that have moderately slow permeability. They formed in loess underlain by residuum of weathered, calcareous siltstone, sandstone, shale, and soft limestone or in residuum of weathered, calcareous rocks, commonly called marl. These gently sloping to sloping soils are on ridgetops and side slopes in the western part of the county. Slopes range from 2 to 12 percent.

Beasley soils are associated with Shrouts, Crider, and Nicholson soils. Shrouts soils are on ridgetops and side slopes adjacent to Beasley soils and have marl bedrock at a depth of 20 to 40 inches. Crider soils are on slightly higher, broad ridgetops and side slopes and are fine-silty and have bedrock at a depth of more than 60 inches. Nicholson soils are on slightly higher ridgetops and side slopes and have a fragipan.

Typical pedon of Beasley silt loam, 2 to 6 percent slopes; about 9 miles northwest of Springfield, 0.4 mile north of U.S. Highway 150 on Booker-Croakes-Fredericktown Road, and 1,900 feet north of Booker-Croakes-Fredericktown Road; Kentucky Coordinate System 2,117,390/525,425; Maud quadrangle:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

Bt1—7 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint light yellowish brown mottles; moderate medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; strongly acid; abrupt smooth boundary.

2Bt2—20 to 34 inches; yellowish brown (10YR 5/6) clay; common medium faint light yellowish brown (2.5Y 6/4) mottles and few fine distinct brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; firm; few fine roots; common clay films on faces of peds; many medium black concretions; medium acid; clear smooth boundary.

2BC—34 to 40 inches; yellowish brown (10YR 5/6) clay; common medium faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; few medium black concretions; moderately alkaline; clear smooth boundary.

2C—40 to 48 inches; mottled yellowish brown (10YR 5/6), gray (N 6/0), and light olive brown (2.5Y 5/6) silt loam; massive; friable; few fine roots; moderately alkaline; clear smooth boundary.

2Cr—48 to 54 inches; soft marl bedrock.

Thickness of the solum ranges from 20 to 40 inches, and depth to soft marl bedrock is 40 inches or more. Content of coarse fragments ranges from 0 to 10 percent in the solum and from 0 to 20 percent in the C horizon. The soil ranges from very strongly acid to neutral in the A and Bt horizons and neutral to moderately alkaline in the BC and C horizons. Free carbonates are in the BC and C horizons.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam.

The Bt1 horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam. Mottles are in shades of brown. The 2Bt2 horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay or clay. Mottles are in shades of brown. The 2BC horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silty clay or clay. Mottles are in shades of brown or gray.

The 2C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 4 to 8. It is silt loam, silty clay loam, loam, silty clay, or clay or their gravelly analogs. Mottles are in shades of brown, olive, or gray.

These soils are taxadjunct to the Beasley series in that most have a loess mantle over the clayey residuum, and they have silt loam, silty clay loam, or loam texture ranges in the 2C horizon. The use, management, and behavior of these soils are the same as those of the Beasley series.

Boonesboro Series

The Boonesboro series consists of moderately deep, well drained, moderately permeable soils that formed in mixed alluvium over limestone bedrock. These nearly level to gently sloping soils are on narrow flood plains throughout the county. Slopes range 0 to 4 percent.

Boonesboro soils are associated with Nolin, Skidmore, Dunning, and Newark soils. Nolin soils have bedrock at a depth of more than 60 inches. Dunning soils are very poorly drained or poorly drained, are in a fine family, and have bedrock at a depth of more than 60 inches. Newark soils are somewhat poorly drained and have bedrock at a depth of more than 60 inches. Skidmore soils are loamy-skeletal.

Typical pedon of Boonesboro silt loam, occasionally flooded; about 3.4 miles north of Springfield, 1.1 miles northeast of Kentucky Highway 55 on Seibert Creek Road, and 225 feet east of Seibert Creek Road; Kentucky Coordinate System 2,149,100/511,650; Springfield quadrangle:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many fine roots; moderately alkaline; clear smooth boundary.

A—8 to 17 inches; dark brown (10YR 3/3) silt loam; weak fine and medium subangular blocky structure; friable; common fine roots; about 2 percent, by volume, pebbles up to 1 inch across; moderately alkaline; clear smooth boundary.

Bw—17 to 24 inches; brown (10YR 4/3) gravelly silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; about 15 percent, by volume, pebbles up to 2 inches across; common fine black concretions; moderately alkaline; abrupt smooth boundary.

R—24 inches; hard limestone bedrock.

Thickness of the solum and depth to hard limestone bedrock range from 20 to 40 inches. Content of pebbles ranges from 0 to 5 percent in the A horizon and from 15 to 20 percent in the Bw and C horizons. The soil ranges from slightly acid to moderately alkaline throughout the profile.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3. It is silt loam, silty clay loam, or loam.

The Bw horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is gravelly silt loam or gravelly silty clay loam.

Some pedons have a C horizon that has color and texture ranges similar to those of the Bw horizon.

Crider Series

The Crider series consists of deep, well drained, moderately permeable soils that formed in loess underlain by residuum of weathered limestone. These gently sloping to sloping soils are on broad, karst ridgetops and side slopes in the western part of the county. Slopes range from 2 to 12 percent.

Crider soils are associated with Nicholson, Beasley, and Shrouts soils. Nicholson soils are on ridgetops adjacent to Crider soils and have a fragipan. Beasley soils are on slightly lower ridgetops and side slopes, are in a fine family, and have marl bedrock. Shrouts soils are on slightly lower ridgetops and side slopes, are clayey, and have marl bedrock at a depth of 20 to 40 inches.

Typical pedon of Crider silt loam, 2 to 6 percent slopes; about 5.5 miles west of Springfield, 0.7 miles north of Kentucky Highway 152 on Lanham Road, and 1,150 feet east of Lanham Road; Kentucky Coordinate System 2,121,600/494,900; St. Catharine quadrangle:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; neutral; clear smooth boundary.

Bt1—9 to 23 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common clay films on faces of peds; neutral; clear smooth boundary.

Bt2—23 to 39 inches; reddish brown (5YR 4/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; common clay films on faces of peds; about 2 percent, by volume, fragments of dolomitic limestone up to 1 inch across; common fine black concretions; neutral; clear smooth boundary.

2Bt3—39 to 60 inches; reddish brown (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; about 2 percent, by volume, fragments of dolomitic limestone up to 1 inch across; common fine and medium black concretions; strongly acid; abrupt smooth boundary.

2Bt4—60 to 79 inches; reddish brown (5YR 4/6) clay; few fine prominent light olive brown (2.5Y 5/6) mottles; moderate medium angular blocky structure; firm; few fine roots; patchy clay films on faces of peds; common fine and medium black concretions; strongly acid.

Thickness of the solum and depth to limestone or dolomitic limestone bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in the upper part of the profile and from 0 to 15 percent in the lower part of the profile. The soil ranges from strongly acid to neutral in the Ap, Bt1, and Bt2 horizons except where the surface layer has been limed and from very strongly acid to slightly acid in the 2Bt3 and 2Bt4 horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 2 to 4. It is silt loam.

The Bt horizon has hue of 7.5YR or 5YR, value of 4, and chroma of 4 to 6. It is silty clay loam or silt loam.

The 2Bt horizon has hue of 5YR or 2.5YR, value of 4, and chroma of 6. Mottles are in shades of brown or red. The 2Bt horizon is silty clay or clay or their cherty analogs.

Some pedons have a 2C horizon that has the same color and texture ranges as the 2Bt horizon.

Dunning Series

The Dunning series consists of deep, very poorly drained or poorly drained, slowly permeable soils that formed in slack water alluvium that washed chiefly from soils formed in residuum of weathered limestone. These nearly level soils are on flood plains and in depressions throughout the county. Slopes range from 0 to 2 percent.

Dunning soils are associated with Otwell, Lawrence, Newark, and Nolin soils. Otwell and Lawrence soils are on slightly higher stream terraces than Dunning soils, and they have a fragipan. Otwell soils are moderately well drained, and Lawrence soils are somewhat poorly drained. Newark and Nolin soils are on flood plains adjacent to Dunning soils, and they are fine-silty. Newark soils are somewhat poorly drained, and Nolin soils are well drained.

Typical pedon of Dunning silty clay loam, frequently flooded; about 10 miles northwest of Springfield, 1,900 feet north of the intersection of Booker-Croakes-Fredericktown Road and the Louisville and Nashville railroad, and 475 feet east of the Louisville and Nashville railroad; Kentucky Coordinate System 2,120,700/527,400; Maud quadrangle:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Ag—8 to 23 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine angular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

Bg1—23 to 34 inches; grayish brown (2.5Y 5/2) clay; common fine prominent yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

Bg2—34 to 56 inches; grayish brown (2.5Y 5/2) clay; many medium prominent yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

Bg3—56 to 59 inches; light brownish gray (2.5Y 6/2) clay; many coarse prominent yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; neutral; gradual smooth boundary.

Cg—59 to 64 inches; light brownish gray (2.5Y 6/2) clay; common fine and medium prominent yellowish brown (10YR 5/8) mottles; massive; firm; neutral.

Thickness of the solum ranges from 30 to 60 inches, and depth to bedrock is more than 60 inches; thickness of the mollic epipedon ranges from 12 to 24 inches. The soil ranges from medium acid to mildly alkaline throughout.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. The A horizon is silt loam or silty clay loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 4 to 6. The Bg horizon is silty clay loam, silty clay, or clay. Mottles are in shades of brown, olive, or gray.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 4 to 6. The Cg horizon is silty clay or clay. Mottles are in shades of brown, olive, or gray.

Eden Series

The Eden series consists of moderately deep, well drained, slowly permeable soils that formed in residuum of weathered, interbedded siltstone, limestone, and shale. These sloping to steep soils are on narrow ridgetops and side slopes in the northern and eastern parts of the county. Slopes range from 6 to 30 percent.

Eden soils are associated with Lowell, Faywood, Fairmount, and Nicholson soils. Lowell soils are on higher ridgetops and side slopes and on lower foot slopes than Eden soils and have bedrock at a depth of more than 40 inches. Faywood soils are on higher ridgetops and side slopes than Eden soils and have hard bedrock at a depth of 20 to 40 inches. Fairmount soils are on higher and adjacent, narrow ridgetops and side slopes above Eden soils and have bedrock at a depth of 10 to 20 inches. Nicholson soils are on higher ridgetops and side slopes than Eden soils and have a fragipan.

Typical pedon of Eden silty clay loam, 6 to 20 percent slopes, eroded; about 15 miles northeast of Springfield, 1 mile north of the intersection of Kays Road and Huffman-West Road, and 1,580 feet west of Huffman-West Road; Kentucky Coordinate System 2,213,450/528,725; Cardwell Quadrangle:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine granular structure; friable; many very fine roots; about 5 percent, by volume, fragments of limestone up to 2 inches across; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/6) clay; moderate very fine and fine angular blocky structure; firm; common very fine roots; patchy clay films on faces of peds; about 10 percent, by volume, fragments of siltstone and limestone up to 6 inches long; strongly acid; clear smooth boundary.

Bt2—18 to 23 inches; light olive brown (2.5Y 5/4) flaggy silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; patchy clay films on faces of peds; about 25 percent, by volume, fragments of siltstone and limestone up to 8 inches long; medium acid; clear smooth boundary.

Cr—23 to 30 inches; interbedded limestone, siltstone, and shale bedrock.

Thickness of the solum ranges from 14 to 40 inches, and depth to interbedded limestone, siltstone, and shale bedrock ranges from 20 to 40 inches. Content of coarse fragments of limestone, siltstone, or shale ranges 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. The soil ranges from strongly acid to moderately alkaline in the A and Bt horizons and from mildly alkaline to strongly alkaline in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam or silty clay or their flaggy analogs.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is silty clay or clay or their flaggy analogs. Mottles are in shades of brown, olive, or gray.

Some pedons have a C horizon that has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 to 4; or it is neutral and has value of 4 to 6. The C horizon is the flaggy, very flaggy, or extremely flaggy analogs of silty clay or clay. Mottles are in shades of gray, olive, or brown.

Elk Series

The Elk series consists of deep, well drained, moderately permeable soils that formed in mixed alluvium derived from limestone, siltstone, shale, sandstone, and loess. These nearly level to sloping soils are on stream terraces throughout the county. Slopes range from 0 to 12 percent.

Elk soils are associated with Otwell, Lawrence, and Lowell soils. Otwell soils have a fragipan and are moderately well drained. Lawrence soils have a fragipan and are somewhat poorly drained. Lowell soils are in a fine family.

Typical pedon of Elk silt loam, 2 to 6 percent slopes; about 9 miles northwest of Springfield, 0.8 mile north of U.S. Highway 150 on Booker-Croakes-Fredericktown Road, 1,050 feet north of Booker-Croakes-Fredericktown Road, 260 feet west of a private drive; Kentucky Coordinate System 2,119,200/525,025; the Maud quadrangle:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; neutral; clear smooth boundary.

Bt1—11 to 28 inches; brown (7.5YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; common medium roots; few clay films on faces of peds; neutral; clear smooth boundary.

Bt2—28 to 54 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; few fine black concretions; slightly acid; gradual smooth boundary.

C—54 to 66 inches; dark yellowish brown (10YR 4/6) silt loam; common medium faint yellowish brown (10YR 5/4) mottles; massive; friable; about 5 percent, by volume, pebbles up to 1 inch across; common fine black concretions; slightly acid.

Thickness of the solum ranges from 40 to 60 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 Ap and Bt horizons and from 0 to 10 percent in the C horizon. Reaction ranges from slightly acid to very strongly acid throughout except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. In some pedons, the Bt horizon has mottles in shades of brown.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. In some pedons, the C horizon is stratified layers of silty clay loam, silt loam, silty clay, or loam. Mottles are in shades of brown or gray.

Fairmount Series

The Fairmount series consists of shallow, well drained soils that have slow or moderately slow permeability. They formed in residuum of weathered limestone. These sloping to very steep soils are on narrow ridgetops and side slopes throughout the county. Slopes range from 6 to 50 percent.

Fairmount soils are associated with Faywood, Eden, and Lowell soils. Faywood soils are on ridgetops and side slopes adjacent to Fairmount soils and have hard bedrock at a depth of 20 to 40 inches. Eden soils are on adjacent, narrow ridgetops and side slopes below Fairmount soils in the northern and eastern parts of the county and have soft bedrock at a depth of 20 to 40 inches. Lowell soils are on higher ridgetops and adjacent side slopes above Fairmount soils and have bedrock at a depth of more than 40 inches.

Typical pedon of Fairmount silty clay loam in an area of Fairmount-Rock outcrop complex, 20 to 50 percent slopes; about 9 miles northwest of Springfield, 0.5 mile north of U.S. Highway 150 on Booker-Croakes-Fredericktown Road, and 675 feet north of Booker-Croakes-Fredericktown Road; Kentucky Coordinate System 2,117,900/524,275; Maud quadrangle:

Ap—0 to 10 inches; dark brown (10YR 3/3) silty clay loam; strong fine subangular blocky structure; friable; many fine roots; about 10 percent, by volume, flat fragments of limestone up to 8 inches long; neutral; clear smooth boundary.

Bw—10 to 16 inches; dark grayish brown (10YR 4/2) silty clay; strong fine and medium subangular blocky structure; firm; common fine roots; about 10 percent, by volume, flat fragments of limestone up to 10 inches long; neutral; abrupt smooth boundary.

R—16 inches; hard limestone bedrock.

Thickness of the solum and depth to limestone bedrock range from 10 to 20 inches. Content of coarse fragments ranges from 5 to 30 percent throughout. The soil ranges from neutral to moderately alkaline throughout.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It is silty clay loam or silty clay or their flaggy analogs.

The Bw 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 clay or their channery or flaggy analogs.

Faywood Series

The Faywood series consists of moderately deep, well drained soils that have moderate or moderately slow permeability. They formed in residuum of weathered limestone or interbedded limestone, siltstone, and shale. These gently sloping to steep soils are on ridgetops and side slopes throughout the county. Slopes range from 2 to 30 percent.

Faywood soils are associated with Eden, Lowell, Fairmount, Shelbyville, and Nicholson soils. Eden soils are on lower, narrow ridgetops and side slopes adjacent to Faywood soils in the northern and eastern parts of the county and have soft bedrock at a depth of 20 to 40 inches. Lowell soils are on ridgetops, side slopes, and foot slopes and have bedrock at a depth of more than 40 inches. Fairmount soils are on narrow ridgetops and steep side slopes, have bedrock at a depth of 10 to 20 inches, and do not have an argillic horizon. Shelbyville soils are on broad ridgetops and side slopes, are fine-silty, and have bedrock at a depth of more than 60 inches. Nicholson soils are on ridgetops and side slopes and have a fragipan.

Typical pedon of Faywood silty clay loam, 6 to 12 percent slopes, eroded; about 9.7 miles north of Springfield, 0.7 mile west of Kentucky Highway 55 on Kentucky Highway 529, and 650 feet south of Kentucky Highway 529; Kentucky Coordinate System 2,135,375/531,525; Maud quadrangle:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine granular structure; friable; many fine roots; mildly alkaline; abrupt smooth boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/6) clay; moderate fine angular blocky structure; firm; common fine roots; patchy clay films on faces of peds; few medium black concretions; strongly acid; clear smooth boundary.

Bt2—13 to 22 inches; olive brown (2.5Y 4/4) clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; firm; common fine roots; patchy clay films on faces of peds; common fine black concretions; neutral; abrupt smooth boundary.

R—22 inches; hard limestone bedrock.

Thickness of the solum and depth to limestone or interbedded limestone, siltstone, and shale bedrock range from 20 to 40 inches. Content of limestone, shale, or siltstone fragments ranges from 0 to 10 percent throughout. The soil ranges from strongly acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam, silty clay loam, or silty clay.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is silty clay or clay. Mottles are in shades of brown.

Some pedons have a C horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is silty clay or clay. Mottles are in shades of brown, olive, or gray.

Lawrence Series

The Lawrence series consists of deep, somewhat poorly drained, slowly permeable soils that formed in old mixed alluvium or colluvium derived from limestone, siltstone, sandstone, or shale. These nearly level soils are on stream terraces and colluvial fans throughout the county. Slopes range from 0 to 2 percent.

Lawrence soils are associated with Otwell, Elk, Lowell, Dunning, and Newark soils. Otwell and Elk soils are on stream terraces adjacent to Lawrence soils. Otwell soils are moderately well drained, and Elk soils are well drained. Lowell soils are on slightly higher foot slopes adjacent to Lawrence soils. They are in a fine family and are well drained. Dunning soils are in lower depressions and on flood plains. They are clayey and very poorly drained and have a mollic epipedon. Newark soils are on lower flood plains and do not have a fragipan.

Typical pedon of Lawrence silt loam; about 10 miles northwest of Springfield, 2,500 feet north of the intersection of Booker-Croakes-Fredericktown Road and the Louisville and Nashville railroad, and 700 feet east of the Louisville and Nashville railroad in a soybean field; Kentucky Coordinate System 2,121,075/527,875; Maud quadrangle:

Ap—0 to 7 inches; olive brown (2.5Y 4/4) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—7 to 21 inches; light olive brown (2.5Y 5/6) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; common clay films on faces of peds; strongly acid; clear smooth boundary.

Btx1—21 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) mottles and common medium faint light olive brown (2.5Y 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, compact and brittle; few fine roots between prisms; common clay films on faces of peds; light brownish gray coatings between prisms; strongly acid; clear smooth boundary.

Btx2—28 to 39 inches; yellowish brown (10YR 5/8) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, compact and brittle; few fine roots between prisms; common clay films on faces of peds; light brownish gray coatings between prisms; common fine black concretions; strongly acid; clear smooth boundary.

BC—39 to 56 inches; mottled yellowish brown (10YR 5/6), light brownish gray (2.5Y 6/2), and light olive brown (2.5Y 5/4) silty clay loam; weak medium subangular blocky structure; firm; few clay films on faces of peds; common medium soft black concretions; neutral; clear smooth boundary.

C—56 to 64 inches; mottled light brownish gray (2.5Y 6/2), light olive brown (2.5Y 5/4), and yellowish brown (10YR 5/6) silty clay loam; massive; firm; many fine soft black concretions; neutral.

Thickness of the solum ranges from 40 to 80 inches, and depth to bedrock is more than 60 inches. The soil is very strongly acid or strongly acid through the fragipan except where the surface layer has been limed. It is medium acid to neutral below the fragipan.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is silt loam or silty clay loam. Mottles are in shades of gray. The Btx horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is silt loam or silty clay loam. Mottles are in shades of gray or brown. Clay coatings between prisms are in shades of gray. The BC horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 8. The BC is silt loam or silty clay loam. Mottles are in shades of brown or gray.

The C horizon has the same color and texture ranges as the BC horizon.

Lowell Series

The Lowell series consists of deep, well drained soils that have moderately slow permeability. They formed in residuum or colluvium of weathered limestone or interbedded limestone, shale, and siltstone. These gently sloping to moderately steep soils are on ridgetops, side slopes, and foot slopes throughout the county except in the western part near Bear Wallow. Slopes range from 2 to 20 percent.

Lowell soils are associated with Eden, Faywood, Shelbyville, Nicholson, Fairmount, and Elk soils. Eden soils are on narrow ridgetops and side slopes in the northern and eastern parts of the county and have soft bedrock at a depth of 20 to 40 inches. Faywood soils are on narrow ridgetops and side slopes and have hard bedrock at a depth of 20 to 40 inches. Shelbyville and Nicholson soils are on ridgetops and side slopes adjacent to Lowell soils. Shelbyville soils are fine-silty, and Nicholson soils have a fragipan. Fairmount soils are on narrow ridgetops and steep side slopes, have bedrock at a depth of 10 to 20 inches, and do not have an argillic horizon. Elk soils are below the foot slopes on stream terraces and are fine-silty.

Typical pedon of Lowell silt loam, 2 to 6 percent slopes; about 1.2 miles north of Springfield on Kentucky Highway 528, 1,000 feet west of Kentucky Highway 528, and 750 feet northwest of Kentucky Highway 555; Kentucky Coordinate System 2,151,750/499,250; Springfield quadrangle:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common clay films on faces of peds; few fine black concretions; strongly acid; abrupt smooth boundary.

Bt2—15 to 30 inches; yellowish brown (10YR 5/6) clay; moderate medium angular blocky structure; firm; common fine roots; common clay films on faces of peds; few fine black concretions; very strongly acid; clear smooth boundary.

Bt3—30 to 44 inches; yellowish brown (10YR 5/6) clay; few medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium angular blocky structure; very firm; few fine roots; common clay films on faces of peds; common fine black concretions; strongly acid; gradual smooth boundary.

Bt4—44 to 58 inches; yellowish brown (10YR 5/6) clay; few medium distinct pale brown (10YR 6/3) mottles; moderate medium angular blocky structure; very firm; few fine roots; common clay films on faces of peds; common fine black concretions; strongly acid; clear smooth boundary.

BC—58 to 60 inches; yellowish brown (10YR 5/4) clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate fine and medium angular blocky structure; very firm; few fine roots; few clay films on faces of peds; common medium black concretions; slightly acid.

Thickness of the solum ranges from 30 to 60 inches, and depth to limestone or interbedded limestone, shale, and siltstone bedrock ranges from 40 to 80 inches. Content of limestone, shale, and siltstone fragments ranges from 0 to 5 percent in the upper part of the solum, from 0 to 15 percent in the lower part of the solum, and from 1 to 30 percent in the substratum. The soil ranges from very strongly acid to slightly acid in the A horizon and the upper part of the B horizon and from strongly acid to mildly alkaline in the lower part of the B horizon and in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam.

Some pedons have a BE horizon that has hue of 10YR, value of 5, and chroma of 4. It is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silty clay or clay. In most pedons, the lower part of the Bt horizon has mottles in shades of brown or gray.

Most pedons have a BC horizon that has hue of 10YR or 2.5Y, value of 5, and chroma of 4 to 6. The BC horizon is silty clay, clay, or their channery or flaggy analogs. Mottles are in shades of brown or gray.

Some pedons have a C horizon that has hue of 10YR or 2.5Y, value of 5, and chroma of 4 to 6. Texture of the C horizon is the same as the BC horizon. Mottles are in shades of brown, olive, or gray.

Newark Series

The Newark series consists of deep, somewhat poorly drained, moderately permeable soils that formed in mixed alluvium derived from limestone, shale, siltstone, or sandstone. These nearly level soils are on flood plains throughout the county. Slopes range from 0 to 2 percent.

Newark soils are in similar positions on the landscape to Nolin, Dunning, Skidmore, Boonesboro, and Lawrence soils. Nolin soils are well drained. Dunning soils are very poorly drained to poorly drained, are in a fine family, and have a mollic epipedon. Boonesboro soils have hard bedrock at a depth of 20 to 40 inches. Lawrence soils are on slightly higher stream terraces than Newark soils and have a fragipan. Skidmore soils are well drained and are loamy-skeletal.

Typical pedon of Newark silt loam, frequently flooded; about 8.5 miles northwest of Springfield, 1,600 feet southwest of the intersection of old U.S. Highway 150 and Kentucky Highway 2231 at Fredericktown, and 600 feet south of old U.S. Highway 150; Kentucky Coordinate System 2,117,350/518,975; Maud quadrangle:

Ap—0 to 13 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; mildly alkaline; abrupt smooth boundary.

Bw—13 to 20 inches; light olive brown (2.5Y 5/4) silt loam, many medium distinct light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bg—20 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct light olive brown (2.5Y 5/4) mottles and few medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; few fine roots; few medium black concretions; medium acid; clear smooth boundary.

Cg—38 to 61 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few medium black concretions; slightly acid; clear smooth boundary.

C—61 to 89 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; massive; friable; neutral.

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 Ap, Bw, and Bg horizons and 0 to 15 percent in the Cg and C horizons. The soil ranges from medium acid to mildly alkaline.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The Bw horizon has hue of 10YR or 2.5Y, 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. About 60 percent or more of the Bg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2, or hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 1, or it is neutral and has value of 4 to 7. The Bg horizon is silt loam or silty clay loam. Mottles are in shades of brown or gray.

The Cg horizon has color and texture ranges similar to those of the Bg horizon. The C horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or silty clay loam. In some pedons, the C horizon is thin layers of loam, sandy loam, or silty clay. Mottles are in shades of gray or brown.

Nicholson Series

The Nicholson series consists of deep, moderately well drained, slowly permeable soils that formed in loess underlain by residuum of weathered limestone. These gently sloping to sloping soils are on ridgetops and side slopes predominantly throughout the county. Slopes range from 2 to 12 percent.

Nicholson soils are associated with Lowell, Shelbyville, Crider, Eden, Shrouts, Beasley, and Faywood soils. Lowell and Shelbyville soils are on ridgetops and side slopes adjacent to Nicholson soils and are well drained. Lowell soils are in a fine family. Crider soils are on ridgetops and side slopes adjacent to Nicholson soils in the western part of the county and are well drained. Eden soils are on lower, narrow ridgetops and side slopes in the northern and eastern parts of the county, are in a fine family, and have soft bedrock at a depth of 20 to 40 inches. Shrouts and Beasley soils are on slightly lower ridgetops and side slopes in the western part of the county and are in a fine family. Shrouts soils have marl bedrock at a depth of 20 to 40 inches, and Beasley soils have marl bedrock at a depth of more than 40 inches. Faywood soils are on lower ridgetops and side slopes adjacent to Nicholson soils, are in a fine family, and have hard bedrock at a depth of 20 to 40 inches.

Typical pedon of Nicholson silt loam, 2 to 6 percent slopes; about 2.6 miles south of Kentucky Highway 152 at Mackville on the Texas-Mackville Road and 4,150 feet east of the intersection of the Texas-Mackville Road and John Russell West Road; Kentucky Coordinate System 2,196,100/498,900; Mackville quadrangle:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—6 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; few clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—12 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; common clay films on faces of peds; few fine black concretions; strongly acid; clear smooth boundary.

Btx1—23 to 35 inches; yellowish brown (10YR 5/8) silty clay loam; common fine and many medium light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, compact and brittle; common fine roots between prisms; common clay films on faces of peds; light brownish gray clay coatings between prisms; few coarse black concretions; strongly acid; clear smooth boundary.

Btx2—35 to 51 inches; yellowish brown (10YR 5/8) silty clay loam; many medium distinct light yellowish brown (2.5Y 6/4) mottles and common medium prominent light brownish gray (2.5Y 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; compact and brittle; few fine roots between prisms; common clay films on faces of peds; common fine and medium black concretions; medium acid; clear smooth boundary.

2Bt3—51 to 62 inches; yellowish brown (10YR 5/6) clay; common medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; common clay films on faces of peds; common fine and medium black concretions; strongly acid.

Thickness of the solum ranges from 40 to 80 inches, and depth to limestone bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 10 percent in the 2B and 2C horizons. The soil ranges from very strongly acid to medium acid through the fragipan except where the surface layer has been limed and from strongly acid to mildly alkaline below the fragipan.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The Bt horizon has hue of 7.5YR or 10YR, 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. The Btx horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam. Mottles are in shades of brown or gray. Clay coatings between the prism faces are in shades of gray. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is silty clay or clay. Mottles are in shades of gray or brown.

Some pedons have a 2C horizon that has the same color and texture ranges as the 2Bt horizon.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils that formed in mixed alluvium derived from limestone, shale, siltstone, or sandstone. These nearly level soils are on flood plains and in local alluvial upland areas throughout the county. Slopes range from 0 to 2 percent.

Nolin soils are in similar positions on the landscape to Skidmore, Newark, Dunning, and Boonesboro soils. Newark soils are somewhat poorly drained. Dunning soils are in a fine family and are very poorly drained. Boonesboro soils have bedrock at a depth of 20 to 40 inches. Skidmore soils are loamy-skeletal.

Typical pedon of Nolin silt loam, occasionally flooded; about 2.5 miles west of Springfield on Kentucky Highway 152, 1,000 feet south of Kentucky Highway 152, and 50 feet east of Cartwright Creek in a cornfield; Kentucky Coordinate System 2,141,250/494,500; the Saint Catharine quadrangle:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bw1—11 to 23 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bw2—23 to 50 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

C1—50 to 58 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; common fine roots; common fine and medium black concretions; slightly acid; clear smooth boundary.

C2—58 to 63 inches; brown (10YR 4/3) loam; massive; very friable; few fine roots, about 5 percent, by volume, pebbles up to 1 inch across; many fine and medium black concretions; slightly acid.

Thickness of the solum is 40 inches or more, and depth to bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 5 percent throughout. The soil ranges from medium acid to moderately alkaline throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. It is silt loam or silty clay loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. In some pedons, the lower part of the Bw horizon is mottled in shades of brown or gray.

Most pedons have a C horizon that has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon is silt loam, silty clay loam, or loam. Mottles are in shades of brown or gray.

Otwell Series

The Otwell series consists of deep, moderately well drained, very slowly permeable soils that formed in old mixed alluvium derived from limestone, siltstone, shale, sandstone, or loess. These nearly level to gently sloping soils are on stream terraces throughout the county. Slopes range from 0 to 6 percent.

Otwell soils are associated with Lawrence, Elk, Lowell, Dunning, Newark, and Nolin soils. Lawrence and Elk soils are on stream terraces adjacent to Otwell soils. Lawrence soils are somewhat poorly drained, and Elk soils are well drained. Lowell soils are on slightly higher foot slopes adjacent to Otwell soils. They are in a fine family and are well drained. Dunning soils are in lower depressions and on flood plains, are in a fine family, are very poorly drained, and have a mollic epipedon. Newark and Nolin soils are on lower flood plains. Newark soils are somewhat poorly drained and do not have a fragipan. Nolin soils are well drained.

Typical pedon of Otwell silt loam, 0 to 2 percent slopes; about 10 miles northwest of Springfield, 2,800 feet north of the intersection of Booker-Croakes-Fredericktown Road and the Louisville and Nashville Railroad, and 200 feet east of the Louisville and Nashville Railroad in a soybean field; Kentucky Coordinate System 2,120,475/528,275; Maud quadrangle:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—10 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; few clay films on faces of peds; strongly acid; clear smooth boundary.

Btx—28 to 54 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate fine and medium subangular blocky; very firm, compact and brittle; few fine roots between prisms; common clay films on faces of peds; light brownish gray coatings between prisms; strongly acid; gradual smooth boundary.

Bt2—54 to 74 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; few fine reddish black concretions; medium acid; clear smooth boundary.

C—74 to 89 inches; pale olive (5Y 6/3) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; massive; firm; common fine reddish black concretions; slightly acid.

Thickness of the solum ranges from 40 to 80 inches, and depth to bedrock is more than 60 inches. Content of coarse fragments range from 0 to 5 percent throughout. The soil ranges from very strongly acid to medium acid through the fragipan except where the surface layer has been limed and from medium acid to moderately alkaline below the fragipan.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam. Mottles are in shades of brown. The Btx horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is silt loam or silty clay loam. Mottles are in shades of gray or brown. Clay coatings between the prism faces are in shades of gray.

The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 2 to 8. It is silt loam or silty clay loam. Mottles are in shades of brown, olive, or gray.

Shelbyville Series

The Shelbyville series consists of deep, well drained, moderately permeable soils that formed in loess or old alluvium and the underlying limestone residuum. These gently sloping to sloping soils are on ridgetops and side slopes in the central and southern part of the county. Slopes range from 2 to 12 percent.

Shelbyville soils are associated with Lowell, Nicholson, and Faywood soils. Lowell and Nicholson soils are on ridgetops and side slopes adjacent to Shelbyville soils. Lowell soils are in a fine family. Nicholson soils have a fragipan. Faywood soils are on lower, narrow ridgetops and on side slopes adjacent to Shelbyville soils, are in a fine family, and have bedrock at a depth of 20 to 40 inches.

Typical pedon of Shelbyville silt loam, 2 to 6 percent slopes; about 4 miles east of Springfield, 0.5 mile south of U.S. Highway 150 on Kentucky Highway 1195, and 800 feet east of Kentucky Highway 1195; Kentucky Coordinate System 2,176,200/482,300; Springfield quadrangle:

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 20 inches; brown (7.5YR 4/4) silty clay loam; moderate medium and coarse subangular blocky structure; friable; common fine roots; common clay films on faces of peds; slightly acid; abrupt smooth boundary.

Bt2—20 to 40 inches; brown (7.5YR 4/4) silty clay loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; common fine roots; common clay films on faces of peds; medium acid; abrupt smooth boundary.

2Bt3—40 to 47 inches; dark yellowish brown (10YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; medium acid; abrupt smooth boundary.

2BC—47 to 56 inches; yellowish brown (10YR 5/6) clay; weak medium subangular structure; firm; few fine roots; common clay films on faces of peds; many medium black concretions; medium acid; abrupt smooth boundary.

2C—56 to 61 inches; yellowish brown (10YR 5/6) clay; common medium distinct brownish yellow (10YR 6/8) mottles; massive; firm; many medium black concretions; strongly acid.

Thickness of the solum is more than 50 inches, and depth to limestone or interbedded limestone and shale bedrock is more than 60 inches. Content of coarse fragments ranges from 0 to 2 percent in the loess cap and from 0 to 10 percent below the lithologic discontinuity. The soil is strongly acid to neutral throughout except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 3, and chroma of 2 to 4. It is silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or silt loam.

The 2Bt and 2BC horizon has hue of 10YR, 2.5Y, or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Most pedons have mottles in shades of brown. The 2Bt and 2BC horizons are clay or silty clay.

Most pedons have a 2C horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. Mottles are in shades of brown or gray. The 2C horizon is silty clay or clay.

Shrouts Series

The Shrouts series consists of moderately deep, well drained soils that have slow permeability. They formed in residuum of weathered, calcareous siltstone, shale, and soft limestone, commonly called marl. These gently sloping to steep soils are on ridgetops and side slopes in the western part of the county. Slopes range from 2 to 30 percent.

Shrouts soils are associated with Beasley, Crider, Nicholson, and Faywood soils. Beasley soils are on ridgetops and side slopes adjacent to Shrouts soils and have marl bedrock at a depth of more than 40 inches. Crider and Nicholson soils are on slightly higher, broad ridgetops and side slopes than Shrouts soils. Crider soils are fine-silty and have bedrock at a depth of more than 60 inches. Nicholson soils have a fragipan. Faywood soils are on lower side slopes adjacent to Shrouts soils and have hard bedrock at a depth of 20 to 40 inches.

Typical pedon of Shrouts silt loam, rocky, 6 to 12 percent slopes, eroded; about 7.6 miles northwest of Springfield and 2,000 feet north of Kentucky Highway 1183 in a pasture; Kentucky Coordinate System 2,118,100/505,000; St. Catharine quadrangle:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 13 inches; yellowish brown (10YR 5/6) silty clay; common fine faint light olive brown mottles; moderate fine and medium angular blocky structure; firm; common fine roots; common clay films on faces of peds; moderately alkaline; clear smooth boundary.

Bt2—13 to 24 inches; light olive brown (2.5Y 5/6) clay; moderate fine angular blocky structure; firm; few fine roots; common clay films on faces of peds; moderately alkaline; abrupt smooth boundary.

BC—24 to 32 inches; mottled yellowish brown (10YR 5/6), light olive brown (2.5Y 5/4), and light brownish gray (2.5Y 6/2) silty clay loam; weak fine and medium subangular blocky structure; firm; few fine roots; few clay films on faces of peds; about 10 percent, by volume, fragments of soft shale up to 1 inch across; common medium brown concretions; moderately alkaline; abrupt smooth boundary.

Cr—32 to 40 inches; soft marl bedrock.

Thickness of the solum and depth to marl bedrock ranges from 20 to 40 inches. Content of coarse fragments ranges from 0 to 20 percent throughout. The soil ranges from medium acid to moderately alkaline in the A and B horizons and from neutral to moderately alkaline in the C horizon. Free carbonates occur in the lower part of the profile and increase with depth.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam or their gravelly analogs.

The Bt horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay or their gravelly analogs. Mottles are in shades of brown. Most pedons have a BC horizon that has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 4 to 6. The BC horizon is silty clay loam, silty clay, or clay or their gravelly analogs. Mottles are in shades of brown, olive, or gray.

Some pedons have a C horizon that has hue of 2.5Y or 5Y, value of 4 to 6, chroma of 4 to 8. The C horizon is silty clay loam or its gravelly analogs. Mottles are in shades of brown, olive, or gray.

Skidmore Series

The Skidmore series consists of deep, well drained soils that have moderately rapid permeability. They formed in mixed alluvium derived from limestone, siltstone, and shale. These nearly level to gently sloping soils are on narrow flood plains and alluvial fans in the northwestern part of the county near the Fredericktown vicinity. Slopes range from 0 to 4 percent.

Skidmore soils are associated with Nolin and Boonesboro soils. Nolin soils are fine-silty. Boonesboro soils have bedrock at a depth of 20 to 40 inches.

Typical pedon of Skidmore gravelly loam, occasionally flooded; about 1.6 miles north of Fredericktown on

Booker-Croakes-Fredericktown Road to bridge over Hog Run, 1,400 feet northeast of bridge, and 120 feet west of Louisville and Nashville Railroad in a lot; Kentucky Coordinate System 2,119,900/526,100; Maud quadrangle:

Ap—0 to 7 inches; dark brown (10YR 4/3) gravelly loam; moderate very fine and fine granular structure; very friable; many fine and medium roots; about 30 percent, by volume, pebbles and subrounded flat fragments up to 9 inches across; neutral; clear wavy boundary.

Bw1—7 to 20 inches; dark brown (10YR 4/3) very gravelly loam; weak fine subangular blocky structure; very friable; common fine roots; about 45 percent, by volume, pebbles and subrounded flat fragments up to 9 inches across; neutral; clear wavy boundary.

Bw2—20 to 33 inches; dark yellowish brown (10YR 4/4) extremely gravelly loam; weak fine granular structure; very friable; few fine roots; about 80 percent, by volume, pebbles and subrounded flat fragments up to 9 inches across; neutral; clear smooth boundary.

2C—33 to 50 inches; dark brown (10YR 4/3) extremely gravelly clay loam; massive; friable; few fine roots; about 70 percent, by volume, pebbles and subrounded flat fragments up to 9 inches across; neutral; abrupt smooth boundary.

2R—50 inches; hard gray limestone bedrock.

Thickness of the solum ranges from 20 to 40 inches, and depth to hard bedrock is more than 40 inches. Content of pebbles and subrounded limestone channers and flagstones ranges from 10 to 50 percent in the A horizon and upper B horizon and from 35 to 80 percent in the lower B horizon and C horizon; fragments in the 2C horizon range from 25 to 70 percent. The soil ranges from medium acid to mildly alkaline throughout.

The A horizon has hue of 10YR, value of 4, and chroma of 3. It is loam or their gravelly or very gravelly analogs.

The Bw horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is loam or clay loam or their gravelly, very gravelly, or extremely gravelly analogs.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is the very gravelly or extremely gravelly analogs of loam or clay loam. The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is the gravelly, very gravelly, extremely gravelly, channery, very channery, or extremely channery analogs of loam or clay loam.

Formation of the Soils

This section gives information about the geology and topography of Washington County. It also discusses the five major factors of soil formation and explains their effects on the soils.

Geology and Topography

Washington County is in the Outer Bluegrass and the hills of the Bluegrass physiographic regions *(5)*. It is underlain by plane-bedded sedimentary rock of the Ordovician, Silurian, and Devonian ages. According to the U.S. Geologic Survey, the rock is predominantly of Ordovician age *(19)*. A discontinuous band of Silurian and Devonian rock is in the southwestern part of the county, starting near the community of Fredericktown and extending south to the Washington County-Marion County line. Table 19 shows the geologic system of Washington County and lists the predominant soils that formed in each system.

The Lexington Limestone of Middle and Upper Ordovician age is exposed only along the Chaplin River in the northeastern part of the county. It is about 37 feet thick and is light olive gray to light brownish gray limestone. It is the oldest formation in Washington County. Faywood soils are dominant on this formation. Because the exposure is very small, this formation has little significance in the survey area.

The Clays Ferry Formation rests on the Lexington Limestone and underlies the eastern half of the county, primarily extending east of the Beech Fork River. The Clays Ferry Formation of the Middle and Upper Ordovician age is interbedded shale, limestone, and siltstone and has a maximum thickness of about 280 feet. The gray to olive gray limestone is dominant and averages about 35 percent of the formation. The greenish gray, clayey, calcareous shale and some siltstone make up about 65 percent of the formation. The topography of the area underlain by the Clays Ferry Formation is hilly with rolling ridgetops. Eden and Lowell soils are dominant on this formation.

Resting on the Clays Ferry Formation is the Calloway Creek Limestone. The Grant Lake Limestone and the Ashlock Formation are on the Calloway Creek Limestone. They are of Upper Ordovician age. Generally, the Calloway Creek Limestone underlies the area along the Beech Fork River through the center of the county and an area extending from the community of Brush Grove westward to the Chaplin River. The Grant Lake Limestone and Ashlock Formation underlie the western half of the county, primarily extending westward from the Beech Fork River. The Calloway Creek Limestone is medium gray limestone and has small amounts of greenish gray shale. It is 70 to 80 feet thick. The Ashlock Formation is made up of the Tate and Gilbert Members. The Tate Member is greenish gray limestone that is 40 to 55 feet thick, and the Gilbert Member is medium gray limestone that has small amounts of medium gray to dark gray shale and is 12 to 18 feet thick. The Upper Member of the Grant Lake Limestone is medium gray to olive gray and is 35 to 40 feet thick. The Lower Member of the Grant Lake Limestone is medium gray to olive gray and is 40 to 50 feet thick. The topography of the area is rolling to very steep. Lowell, Faywood, Shelbyville, and Fairmount soils are dominant on the Ashlock Formation, and Lowell, Faywood, and Fairmount soils are dominant on these formations.

Resting on the Grant Lake Limestone and the Ashlock Formation is the Drakes Formation, which consists of the Rowland, Bardstown, and Saluda Dolomite Members. The Drakes Formation is of Upper Ordovician age. It is dominantly westward from Cartwright Creek. The Rowland Member is greenish gray limestone 45 to 66 feet thick. The Bardstown Member is greenish gray limestone 18 to 35 feet thick and has minor interbedding of greenish gray calcareous shale. Colonial coral heads occur mostly in several discontinuous layers in the Bardstown Member. The Saluda Dolomite Member is greenish gray dolomite 17 to 25 feet thick. This member has a thin upper layer of greenish gray, calcareous, clayey shale 3 to 18 inches thick. The gray dolomite consists of a resistant upper layer that crops out in gullies as a smooth rounded ledge. The lower layer of dolomite is less resistant and silty. A greenish gray shale bed that ranges from less than 1 foot to several feet thick is beneath the dolomite layer. The topography in this area is rolling to very steep. Fairmount, Shrouts, Faywood, and Beasley soils occur in this formation.

Resting on the Drakes Formation is the Brassfield Dolomite of Lower Silurian age, and the Osgood Formation of Middle Silurian age. The Brassfield Dolomite and the Osgood Formation primarily extend from the community of Fredericktown southward into Marion County. They form a discontinuous band generally occurring near the ridgetops. The Brassfield Dolomite is light gray, yellowish green, and light brown dolomite 2 to 30 feet thick. The Osgood Formation is shale and dolomite 2 to 40 feet thick. The shale is greenish gray, dominantly dolomitic shale or mudstone, and clay shale that weathers to plastic clay. Dolomite occurs in thin beds especially near the base. The Osgood Formation is exposed near the community of Bearwallow and in a few areas south of Bearwallow. The dominant soils on the Brassfield Dolomite and Osgood Formation are Beasley, Shrouts, Faywood, Nicholson, and Fairmount soils.

Resting on the Brassfield Dolomite or the Osgood Formation is the Laurel Dolomite, Waldron Shale, and the Louisville Limestone of the Middle Silurian age. These formations are exposed only in a small area southwest of Fredericktown. The Laurel Dolomite is a light gray dolomite 50 to 60 feet thick. The Waldron Shale is a medium gray shale that has light gray, muddy dolomite occurring in the shale in irregular masses and is up to 11 feet thick. The Louisville Limestone is light gray dolomite and dolomitic limestone up to 10 feet thick. Because the exposure is very small, it has little significance in the survey area.

Also, resting on the Osgood Formation or the Brassfield Dolomite is the Beechwood Limestone Member of Sellersburg Limestone. The Sellersburg Limestone is of Middle and Upper Devonian age. It consists of yellowish gray to pinkish gray limestone up to 8 feet thick. The Sellersburg Limestone forms a discontinuous band underlying ridgetops from Bearwallow southward into Marion County. This formation is gently sloping to sloping. Crider soil is dominant on this formation.

New Albany Shale, which is generally included in the Beechwood Limestone Member, was not found in the survey area.

Factors of Soil Formation

Soils formed through the interaction of the five major factors: parent material, climate, plant and animal life, relief, and time *(7)*. These factors are interrelated. Each factor affects the other factors and the effects on 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 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 Devonian, Silurian, and Ordovician ages. The Eden, Lowell, and Faywood 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 Nolin, Boonesboro, Elk, and Dunning soils. Except for Dunning soils, these soils have a loamy subsoil. Dunning soils have a clayey subsoil.

Wind-transported material, which is referred to as loess, has been deposited on some of the broader ridges in the survey area. Soils, such as Shelbyville, Crider, and Nicholson soils, were formed partly in loess and partly from residual material. The surface layer and upper part of the subsoil is loess material, and these layers are loamy or silty. The lower part of the subsoil and the substratum formed in residual parent material and are usually clayey.

Some soils were formed by gravity-transported soil material, referred to as colluvium, deposited above residual material. Lowell soils in toe slope areas at the base of steep hillsides is an example. These soils have a clayey subsoil. Soils formed from gravity-transported material are of minor extent in the survey area.

Climate

Climate affects the physical, chemical, and biological properties of the 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. 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 an area and the degree of development of the soil *(12)*.

Changes or shifts in climate over long periods affect formation of the soils. Soil formation is affected by climate averages; however, weather extremes probably have had more influence on particular soil properties than on soil formation. The soils in Washington County 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 temperatures are fairly brief in summer.

The average annual temperature in the survey area is about 55 degrees. The average annual precipitation is about 50 inches, and it is fairly evenly distributed throughout the year.

Temperature and rainfall in Washington County have favored almost continuous weathering of rocks and minerals, leaching of soluble material and fine particles, and removal and deposition of material 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 a loamy surface layer and an accumulation of clay in the subsoil. An example is the Lowell soils.

Plant and Animal Life

The native vegetation in Washington County was mostly mixed hardwood trees. Most of the soils formed under hardwood forests. Soils that remained in woodland have a thin, dark surface layer. Soils that have been plowed, such as the Lowell and Beasley soils, have had the dark surface layer mixed with the light colored layer below it. The Dunning soils have a thick, dark surface layer resulting from an accumulation of organic matter. These soils formed under marsh vegetation. Some of the Shelbyville soils in the survey area have a thicker, somewhat darker surface layer than is typical for soils formed under trees. They probably formed under grass.

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 also mixed by root channeling and by trees uprooted by wind. 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, 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 Washington County. 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 can form under certain conditions. The Nicholson 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 relatively stable surface permits an argillic horizon to form. The Lowell and Beasley 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 soils are 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 toe slope areas located below steep slopes. Other steep soils are moderately deep because weathering of the underlying rock proceeds at a faster rate than geologic erosion. The Faywood and Eden soils are examples.

In some karst areas, the surface layer of soils from 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 recently deposited. In Washington County, local alluvial areas large enough to separate were mapped. Other local alluvial areas too small to map separately were mapped as inclusions. Such areas are included with Shelbyville, Lowell, and Crider soils.

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 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 that have poorly developed horizons have characteristics almost identical to the parent material. In Washington County such soils occur on flood plains where fresh deposition prevents the development of distinct soil horizons. Nolin and Skidmore soils are examples.

Soils developed over long periods have well developed profiles. The Lowell and Beasley 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 to 38 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). The volume of soft soil decreases excessively 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 noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. These included no-tillage, strip tillage, stubble mulching, and other types of noninversion 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 resting grazingland 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, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

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.

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.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or 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 Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) 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.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

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. This contrasts 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 that are 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 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 affects 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 0.2 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). Subsurface tunnels or pipelike cavities are formed 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. Unless the soils are artificially drained, 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 filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). In these areas, 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 the 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. 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). There is a 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 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 surface runoff.

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.

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). The soil mass is 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 ensure 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 millimeters 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, E, 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 that 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. Breaking up a compact subsoil by pulling a special chisel through the soil.

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 organic matter content 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 on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

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 is 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 by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course 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. This 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

[Data were recorded in the period 1951-80 at Bardstown, Kentucky]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	43.4	23.7	33.6	70	-9	24	3.65	1.97	5.12	7	6.9
February---	47.8	26.1	37.0	73	-4	26	3.34	1.59	4.84	7	3.7
March------	57.7	34.8	46.3	82	12	107	4.93	2.55	7.01	8	2.7
April------	69.9	44.7	57.3	88	25	236	4.48	2.19	6.45	8	.1
May--------	78.3	52.8	65.6	92	30	484	4.65	2.70	6.37	8	.0
June-------	85.6	60.7	73.2	96	44	696	4.33	2.64	5.84	7	.0
July-------	88.6	64.5	76.6	99	49	825	5.22	2.86	7.30	8	.0
August-----	87.9	63.1	75.5	98	48	791	3.41	1.62	4.95	6	.0
September--	82.5	56.6	69.6	96	36	588	3.56	1.42	5.35	6	.0
October----	71.3	43.9	57.6	89	23	257	2.65	1.31	3.80	5	.0
November---	57.3	34.9	46.1	81	11	44	3.55	1.88	5.01	7	.9
December---	47.7	28.4	38.1	71	2	20	4.18	2.06	6.00	7	2.1
Yearly:											
Average--	68.2	44.5	56.4	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	-12	---	---	---	---	---	---
Total----	---	---	---	---	---	4,098	47.95	40.08	55.46	84	16.4

* 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

[Data were recorded in the period 1951-80 at Bardstown, 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 5	April 21	May 13
2 years in 10 later than--	April 2	April 16	May 7
5 years in 10 later than--	March 25	April 6	April 25
First freezing temperature in fall:			
1 year in 10 earlier than--	October 24	October 10	October 4
2 years in 10 earlier than--	October 29	October 14	October 8
5 years in 10 earlier than--	November 6	October 24	October 15

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-80 at Bardstown, Kentucky]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	206	181	150
8 years in 10	213	188	157
5 years in 10	225	200	172
2 years in 10	237	212	187
1 year in 10	244	218	195

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BeB	Beasley silt loam, 2 to 6 percent slopes	635	0.3
BeC	Beasley silt loam, 6 to 12 percent slopes	445	0.2
Bo	Boonesboro silt loam, occasionally flooded	770	0.4
CrB	Crider silt loam, 2 to 6 percent slopes	1,060	0.6
CrC	Crider silt loam, 6 to 12 percent slopes	270	0.1
Du	Dunning silty clay loam, frequently flooded	230	0.1
EdD2	Eden silty clay loam, 6 to 20 percent slopes, eroded	22,015	11.5
EeE3	Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded	60,800	31.7
EkA	Elk silt loam, 0 to 2 percent slopes	540	0.3
EkB	Elk silt loam, 2 to 6 percent slopes	2,600	1.4
EkC	Elk silt loam, 6 to 12 percent slopes	810	0.4
FaD	Fairmount-Rock outcrop complex, 6 to 20 percent slopes	7,605	3.9
FaF	Fairmount-Rock outcrop complex, 20 to 50 percent slopes	8,570	4.5
FdB	Faywood silt loam, 2 to 6 percent slopes	1,040	0.5
FoC2	Faywood silty clay loam, 6 to 12 percent slopes, eroded	4,835	2.5
FoD2	Faywood silty clay loam, 12 to 20 percent slopes, eroded	4,100	2.1
FwC3	Faywood silty clay, 6 to 20 percent slopes, severely eroded	3,080	1.6
FyE3	Faywood-Shrouts silty clay loams, very rocky, 12 to 30 percent slopes, severely eroded	5,545	2.9
La	Lawrence silt loam	750	0.4
LoB	Lowell silt loam, 2 to 6 percent slopes	10,170	5.3
LoC2	Lowell silt loam, 6 to 12 percent slopes, eroded	20,470	10.6
LoD2	Lowell silt loam, 12 to 20 percent slopes, eroded	3,890	2.0
LwC3	Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	1,425	0.7
Ne	Newark silt loam, frequently flooded	1,405	0.7
NhB	Nicholson silt loam, 2 to 6 percent slopes	2,965	1.5
NhC	Nicholson silt loam, 6 to 12 percent slopes	845	0.4
No	Nolin silt loam, occasionally flooded	6,605	3.4
OtA	Otwell silt loam, 0 to 2 percent slopes	135	0.1
OtB	Otwell silt loam, 2 to 6 percent slopes	1,020	0.5
Pt	Pits, quarries	195	0.1
SeB	Shelbyville silt loam, 2 to 6 percent slopes	9,265	4.8
SeC	Shelbyville silt loam, 6 to 12 percent slopes	2,620	1.4
ShB	Shrouts silt loam, 2 to 6 percent slopes	730	0.4
ShC2	Shrouts silt loam, rocky, 6 to 12 percent slopes, eroded	3,830	2.0
Sk	Skidmore gravelly loam, occasionally flooded	560	0.3
	Water areas less than 40 acres	752	0.4
	Total land area	192,582	100.0
	Water areas more than 40 acres	148	0.0
	Total land and water area	192,730	100.0

TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
BeB	Beasley silt loam, 2 to 6 percent slopes
Bo	Boonesboro silt loam, occasionally flooded
CrB	Crider silt loam, 2 to 6 percent slopes
Du	Dunning silty clay loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
EkA	Elk silt loam, 0 to 2 percent slopes
EkB	Elk silt loam, 2 to 6 percent slopes
FdB	Faywood silt loam, 2 to 6 percent slopes
La	Lawrence silt loam (where drained)
LoB	Lowell silt loam, 2 to 6 percent slopes
Ne	Newark silt loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
NhB	Nicholson silt loam, 2 to 6 percent slopes
No	Nolin silt loam, occasionally flooded
OtA	Otwell silt loam, 0 to 2 percent slopes
OtB	Otwell silt loam, 2 to 6 percent slopes
SeB	Shelbyville silt loam, 2 to 6 percent slopes
ShB	Shrouts silt loam, 2 to 6 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND 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	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Pasture	Alfalfa hay
		Bu	Lbs	Bu	Bu	Tons	AUM*	Tons
BeB------------- Beasley	IIe	105	2,800	35	40	4.0	8.0	4.5
BeC------------- Beasley	IIIe	90	2,400	30	35	3.5	7.0	4.0
Bo-------------- Boonesboro	IIw	100	2,800	40	40	3.5	7.0	---
CrB------------- Crider	IIe	135	3,200	45	50	4.5	9.0	5.0
CrC------------- Crider	IIIe	120	2,900	40	45	4.5	9.0	5.0
Du-------------- Dunning	IIIw	120	---	40	---	4.0	8.0	---
EdD2------------ Eden	IVe	70	1,950	20	20	2.5	5.0	3.5
EeE3------------ Eden	VIe	---	---	---	---	---	3.5	---
EkA------------- Elk	I	130	3,200	45	50	4.5	9.0	5.0
EkB------------- Elk	IIe	130	3,200	45	50	4.5	9.0	5.0
EkC------------- Elk	IIIe	110	2,900	35	40	4.0	8.0	4.5
FaD------------- Fairmount	VIe	---	---	---	---	---	3.0	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
FaF------------- Fairmount	VIIe	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
FdB------------- Faywood	IIe	90	2,400	30	25	3.5	7.0	3.5
FoC2------------ Faywood	IIIe	80	2,250	25	20	3.0	6.0	3.5
FoD2------------ Faywood	IVe	---	2,100	---	---	2.5	5.0	3.0
FwC3------------ Faywood	IVe	---	---	---	---	2.5	5.0	---
FyE3------------ Faywood-Shrouts	VIe	---	---	---	---	---	4.0	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Tobacco	Soybeans	Wheat	Grass-legume hay	Pasture	Alfalfa hay
		Bu	Lbs	Bu	Bu	Tons	AUM*	Tons
La---------------- Lawrence	IIIw	80	1,900	35	30	3.0	6.0	---
LoB--------------- Lowell	IIe	110	2,900	35	40	4.0	8.0	5.0
LoC2-------------- Lowell	IIIe	100	2,600	30	35	4.0	8.0	5.0
LoD2-------------- Lowell	IVe	85	2,300	---	30	3.5	7.0	4.0
LwC3-------------- Lowell	IVe	85	2,150	25	30	3.0	6.0	3.5
Ne---------------- Newark	IIIw	115	2,500	40	45	4.5	9.0	---
NhB--------------- Nicholson	IIe	115	3,000	40	40	4.0	8.0	4.0
NhC--------------- Nicholson	IIIe	95	2,700	35	35	3.5	7.0	3.5
No---------------- Nolin	IIw	135	3,200	45	50	4.5	9.0	5.0
OtA--------------- Otwell	IIw	115	3,000	40	40	4.0	8.0	4.0
OtB--------------- Otwell	IIe	115	3,000	40	40	4.0	8.0	4.0
Pt**-------------- Pits	VIIIs	---	---	---	---	---	---	---
SeB--------------- Shelbyville	IIe	135	3,200	45	50	4.5	9.0	5.0
SeC--------------- Shelbyville	IIIe	120	2,900	40	45	4.0	8.0	5.0
ShB--------------- Shrouts	IIe	90	2,300	30	35	3.5	7.0	4.0
ShC2-------------- Shrouts	IVe	80	2,000	25	30	3.0	6.0	3.5
Sk---------------- Skidmore	IIw	70	---	30	30	3.0	6.0	---

* 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 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	540	---	---	---
II	37,555	29,485	8,070	---
III	32,680	30,295	2,385	---
IV	38,340	38,340	---	---
V	---	---	---	---
VI	72,809	72,809	---	---
VII	6,856	6,856	---	---
VIII	3,050	---	---	3,050

TABLE 8.--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
BeB, BeC----------- Beasley	3c	Slight	Moderate	Slight	Moderate	White oak-----------	67	White oak, black oak, white ash, chestnut oak.
						Scarlet oak---------	---	
						Eastern redcedar----	41	
						Hickory-------------	---	
						White ash-----------	63	
Bo----------------- Boonesboro	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Eastern cottonwood, sweetgum, yellow-poplar, white ash, American sycamore.
						Yellow-poplar-------	---	
						White oak-----------	---	
						Sweetgum------------	---	
						White ash-----------	---	
						Black walnut--------	---	
						American sycamore---	---	
CrB, CrC----------- Crider	1o	Slight	Slight	Slight	Severe	Northern red oak----	88	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, shortleaf pine.
						Yellow-poplar-------	97	
						Virginia pine-------	78	
Du----------------- Dunning	1w	Slight	Severe	Severe	Severe	Pin oak-------------	95	Pin oak, American sycamore, swamp white oak.
						Sweetgum------------	95	
						Eastern cottonwood--	100	
						Red maple-----------	---	
						American sycamore---	---	
						Boxelder------------	---	
						Black willow--------	---	
						Swamp white oak-----	---	
EdD2--------------- Eden	3c	Moderate	Moderate	Moderate	Moderate	Black oak-----------	75	White oak, black oak, white ash, scotch pine.
						White oak-----------	62	
						White ash-----------	70	
						Scarlet oak---------	73	
						Black walnut--------	---	
						Eastern redcedar----	40	
						Chickapin oak-------	---	
EeE3--------------- Eden	4c	Moderate	Moderate	Moderate	Moderate	Eastern redcedar----	35	Virginia pine, white oak, black oak, white ash, scotch pine.
						Black oak-----------	65	
						White oak-----------	---	
						Scarlet oak---------	---	
						Chickapin oak-------	---	

TABLE 8.--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	
EkA, EkB, EkC------ Elk	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine, yellow-poplar, black walnut, black oak, eastern cottonwood, white oak, northern red oak, pin oak, shortleaf pine, sweetgum, white ash.
						Yellow-poplar-------	90	
						Hackberry-----------	---	
						Red maple-----------	---	
FaD:								
Fairmount---------	4x	Moderate	Moderate	Moderate	Slight	Black oak-----------	---	Black oak, white oak, eastern redcedar.
						Eastern redcedar----	41	
						Scarlet oak---------	60	
						Northern red oak----	66	
						White ash-----------	---	
						Black locust--------	---	
						Black walnut--------	---	
						Chinkapin oak-------	55	
Rock outcrop.								
FaF:								
Fairmount---------	4x	Severe	Severe	Moderate	Slight	Black oak-----------	---	Black oak, white oak, eastern redcedar.
						Eastern redcedar----	41	
						Scarlet oak---------	60	
						Northern red oak----	66	
						White ash-----------	---	
						Black locust--------	---	
						Black walnut--------	---	
						Chinkapin oak-------	55	
Rock outcrop.								
FdB, FoC2---------- Faywood	3c	Slight	Moderate	Slight	Moderate	Northern red oak----	70	White oak, black oak, white ash.
						Scarlet oak---------	72	
						White oak-----------	60	
						Hickory-------------	---	
						White ash-----------	---	
						Chinkapin oak-------	---	
						Sugar maple---------	---	
FoD2-------------- Faywood	3c	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	White oak, black oak, white ash.
						Scarlet oak---------	72	
						White oak-----------	60	
						Hickory-------------	---	
						White ash-----------	---	
						Chinkapin oak-------	---	
						Sugar maple---------	---	

TABLE 8.--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	
FwC3: Faywood	4c	Slight	Moderate	Moderate	Slight	Northern red oak	---	Virginia pine, eastern redcedar, black oak, white oak.
						Eastern redcedar	---	
						White oak	58	
						White ash	---	
						Hickory	---	
						Black cherry	---	
						Chinkapin oak	---	
						Sugar maple	---	
						Scarlet oak	72	
						Eastern white pine	76	
FyE3:								
Faywood	3c	Moderate	Moderate	Slight	Moderate	Northern red oak	70	White oak, black oak, white ash, Virginia pine.
						Scarlet oak	72	
						White oak	60	
						Hickory	---	
						White ash	---	
						Chinkapin oak	---	
						Sugar maple	---	
Shrouts	5c	Severe	Severe	Severe	Slight	Scarlet oak	50	Virginia pine, black oak, white oak, chestnut oak.
						Eastern redcedar	40	
						Virginia pine	50	
						White oak	---	
						Black oak	---	
La: Lawrence	2w	Slight	Moderate	Slight	Moderate	Yellow-poplar	85	Yellow-poplar, white ash, American sycamore, black oak, white oak, sweetgum, willow oak.
						Sweetgum	89	
						White oak	72	
						Black oak	73	
						Willow oak	---	
						Red maple	---	
						Pin oak	---	
						Hackberry	---	
						American beech	---	
						Blackgum	---	
LoB, LoC2: Lowell	2c	Slight	Moderate	Slight	Moderate	Black oak	89	Northern red oak, black oak, white ash.
						White ash	75	
						Virginia pine	80	
						Black locust	78	
LoD2: Lowell	2c	Moderate	Moderate	Slight	Moderate	Black oak	89	Northern red oak, black oak, white ash.
						White ash	75	
						Virginia pine	80	
						Black locust	78	

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competi-tion	Common trees	Site index	
LwC3---------------- Lowell	3c	Slight	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine--------	60 65	Virginia pine, northern red oak, white ash, black oak.
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, red maple, American sycamore, eastern white pine, yellow-poplar.
NhB, Nhc----------- Nicholson	2o	Slight	Slight	Slight	Moderate	Black oak----------- White oak----------- Hickory------------- Sweetgum------------ Yellow-poplar-------	76 71 --- --- ---	Black oak, yellow-poplar, white oak, sweetgum, white ash, northern red oak, eastern white pine.
No------------------ Nolin	1o	Slight	Slight	Slight	Severe	Sweetgum------------ Yellow-poplar------- American sycamore--- Red maple-----------	92 107 --- ---	Sweetgum, yellow-poplar, eastern cottonwood, white ash, black walnut, northern red oak.
OtA, OtB----------- Otwell	3o	Slight	Slight	Slight	Moderate	White oak----------- Yellow-poplar------- Sugar maple--------- Black oak-----------	69 --- --- ---	Eastern white pine, black oak, yellow-poplar, white ash, white oak, shortleaf pine.
SeB, SeC----------- Shelbyville	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Black walnut-------- Hackberry----------- American elm--------	80 --- --- ---	Eastern white pine, black oak, shortleaf pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
ShB, ShC2---------- Shrouts	4c	Slight	Moderate	Slight	Slight	Black oak----------- Scarlet oak--------- Virginia pine------- Eastern redcedar---- White oak-----------	--- 60 60 45 ---	Black oak, white oak, chestnut oak.
Sk------------------ Skidmore	1o	Slight	Slight	Slight	Severe	Northern red oak---- Yellow-poplar-------	85 95	Yellow-poplar, black walnut, white ash, eastern white pine, American sycamore.

TABLE 9.--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
BeB: Beasley	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight.
BeC: Beasley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Bo: Boonesboro	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding, thin layer.
CrB: Crider	Slight	Slight	Moderate: slope.	Slight	Slight.
CrC: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Du: Dunning	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
EdD2: Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
EeE3: Eden	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: large stones, slope, too clayey.	Severe: too clayey, slope.	Severe: large stones, slope, too clayey.
EkA: Elk	Severe: flooding.	Slight	Slight	Slight	Slight.
EkB: Elk	Slight	Slight	Moderate: slope.	Slight	Slight.
EkC: Elk	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
FaD:*					
Fairmount	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: large stones, thin layer, slope.
Rock outcrop.					
FaF:*					
Fairmount	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: erodes easily, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FdB------------------- Faywood	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: depth to rock, slope, percs slowly.	Slight----------	Moderate: thin layer.
FoC2------------------ Faywood	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
FoD2------------------ Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FwC3------------------ Faywood	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
FyE3:*					
Faywood--------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Shrouts--------------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
La-------------------- Lawrence	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
LoB------------------- Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
LoC2------------------ Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
LoD2------------------ 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.
Ne-------------------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
NhB------------------- Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
NhC------------------- Nicholson	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
No-------------------- Nolin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OtA------------------- Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
OtB------------------- Otwell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
Pt.* Pits					
SeB------------------- Shelbyville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
SeC------------------- Shelbyville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
ShB------------------- Shrouts	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight----------	Moderate: thin layer.
ShC2------------------ Shrouts	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope, thin layer.
Sk-------------------- Skidmore	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
BeB---------------- Beasley	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeC---------------- Beasley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bo----------------- Boonesboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrB---------------- Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC---------------- Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Du----------------- Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
EdD2--------------- 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.
EkC---------------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FaD:*										
Fairmount---------	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.										
FdB---------------- Faywood	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FoC2--------------- Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FoD2--------------- Faywood	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FwC3--------------- Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--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
FyE3:*										
Faywood	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Shrouts	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
La Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LoB Lowell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC2 Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LoD2 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.
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.
NhC Nicholson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
No Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OtA, OtB Otwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pt.* Pits										
SeB Shelbyville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SeC Shelbyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ShB, ShC2 Shrouts	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Sk Skidmore	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
BeB: Beasley	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
BeC: Beasley	Moderate: slope, too clayey.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Bo: Boonesboro	Severe: depth to rock.	Severe: flooding.	Severe: flooding, depth to rock.	Severe: flooding.	Severe: flooding.	Moderate: flooding, thin layer.
CrB: Crider	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
CrC: Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Du: Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
EdD2: Eden	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
EeE3: Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: large stones, slope, too clayey.
EkA: Elk	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength.	Slight.
EkB: Elk	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
EkC: Elk	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
FaD:*						
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.						

See footnote at end of table.

TABLE 11.--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
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.						
FdB Faywood	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: low strength.	Moderate: thin layer.
FoC2 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.
FoD2 Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
FwC3 Faywood	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: too clayey.
FyE3:*						
Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Shrouts	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
La Lawrence	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength.	Moderate: wetness.
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.
LoC2 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.
LoD2 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.

See footnote at end of table.

TABLE 11.--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
Ne----------------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
NhB---------------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
NhC---------------- Nicholson	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
No----------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
OtA---------------- Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Slight.
OtB---------------- Otwell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
Pt.* Pits						
SeB---------------- Shelbyville	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
SeC---------------- Shelbyville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
ShB---------------- Shrouts	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: thin layer.
ShC2--------------- Shrouts	Moderate: too clayey, slope, depth to rock.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell, depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
Sk----------------- Skidmore	Moderate: depth to rock, wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: small stones, flooding, large stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," 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
BeB------------------ Beasley	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
BeC------------------ Beasley	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack.
Bo------------------- Boonesboro	Severe: flooding, depth to rock.	Severe: seepage, depth to rock, flooding.	Severe: flooding, depth to rock, seepage.	Severe: flooding, depth to rock, seepage.	Poor: area reclaim, thin layer, small stones.
CrB------------------ Crider	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight------------	Fair: too clayey.
CrC------------------ Crider	Moderate: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Du------------------- Dunning	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
EdD2----------------- Eden	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.
EeE3----------------- Eden	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope.
EkA------------------ Elk	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
EkB------------------ Elk	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight------------	Fair: too clayey.
EkC------------------ Elk	Moderate: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.

See footnote at end of table.

TABLE 12.--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:*					
Fairmount	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, thin layer.
Rock outcrop.					
FaF:*					
Fairmount	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, slope.
Rock outcrop.					
FdB Faywood	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.
FoC2 Faywood	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
FoD2 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, slope.
FwC3 Faywood	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.
FyE3:*					
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, slope.
Shrouts	Severe: percs slowly, slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: slope, depth to rock.	Poor: too clayey, hard to pack, slope.
La Lawrence	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
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.

See footnote at end of table.

TABLE 12.--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
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.
LoC2: Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
LoD2: 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.
Ne: Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
NhB: Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
NhC: Nicholson	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Fair: too clayey, wetness, slope.
No: Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Fair: too clayey.
OtA: Otwell	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: flooding, wetness, too clayey.	Moderate: flooding, wetness.	Fair: too clayey, wetness.
OtB: Otwell	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
Pt.*: Pits					
SeB: Shelbyville	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
SeC: Shelbyville	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, slope.
ShB. Shrouts	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, thin layer.

See footnote at end of table.

TABLE 12.--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
ShC2----------------- Shrouts	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: too clayey, thin layer, area reclaim.
Sk------------------- Skidmore	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "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	Roadfill	Sand	Gravel	Topsoil
BeB, BeC------------- Beasley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bo------------------- Boonesboro	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer.
CrB------------------ Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CrC------------------ Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Du------------------- Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
EdD2----------------- Eden	Poor: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
EeE3----------------- Eden	Poor: depth to rock, slope, thin layer, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, large stones.
EkA, EkB------------- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
EkC------------------ Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
FaD:*				
Fairmount------------	Poor: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
Rock outcrop.				
FaF:*				
Fairmount------------	Poor: depth to rock, low strength, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope, large stones.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FdB, FoC2------------- Faywood	Poor: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FoD2------------------ Faywood	Poor: depth to rock, slope, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FwC3------------------ Faywood	Poor: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FyE3:*				
Faywood--------------	Poor: depth to rock, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Shrouts--------------	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
La-------------------- Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LoB, LoC2------------- Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LoD2------------------ 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.
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.
NhC------------------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
No-------------------- Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OtA------------------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
OtB------------------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Pt.* Pits				
SeB------------------ Shelbyville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
SeC------------------ Shelbyville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
ShB------------------ Shrouts	Poor: low strength, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ShC2----------------- Shrouts	Poor: low strength, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Sk------------------- Skidmore	Fair: depth to rock, thin layer.	Improbable: small stones.	Probable-------------	Poor: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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
BeB: Beasley	Moderate: seepage, depth to rock.	Moderate: thin layer.	Deep to water	Erodes easily	Favorable.
BeC: Beasley	Moderate: seepage, depth to rock.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Bo: Boonesboro	Severe: seepage.	Severe: thin layer, piping.	Deep to water	Depth to rock	Depth to rock.
CrB: Crider	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CrC: Crider	Moderate: seepage.	Severe: piping.	Deep to water	Slope	Slope.
Du: Dunning	Slight	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
EdD2: Eden	Moderate: depth to rock.	Severe: hard to pack, thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
EeE3: Eden	Severe: slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
EkA, EkB: Elk	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
EkC: Elk	Moderate: seepage.	Severe: piping.	Deep to water	Slope	Slope.
FaD:*					
Fairmount	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
Rock outcrop.					
FaF:*					
Fairmount	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
Rock outcrop.					
FdB: Faywood	Moderate: depth to rock.	Severe: thin layer. hard to pack.	Deep to water	Depth to rock erodes easily.	Erodes easily. depth to rock.

See footnote at end of table.

TABLE 14.--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
FoC2, FoD2-------- 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.
FwC3-------------- Faywood	Moderate: depth to rock.	Severe: hard to pack, thin layer.	Deep to water----	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
FyE3:*					
Faywood----------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Shrouts----------	Severe: slope.	Moderate: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
La---------------- Lawrence	Slight------------	Severe: piping.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
LoB--------------- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
LoC2, LoD2, LwC3-- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Ne---------------- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
NhB--------------- Nicholson	Slight------------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
NhC--------------- Nicholson	Slight------------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
No---------------- Nolin	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
OtA--------------- Otwell	Slight------------	Slight------------	Deep to water----	Erodes easily, rooting depth.	Erodes easily, rooting depth.
OtB--------------- Otwell	Slight------------	Moderate: thin layer.	Deep to water----	Erodes easily, rooting depth.	Erodes easily, rooting depth.
Pt.* Pits					
SeB--------------- Shelbyville	Moderate: seepage.	Slight------------	Deep to water----	Favorable--------	Favorable.
SeC--------------- Shelbyville	Moderate: seepage.	Slight------------	Deep to water----	Slope------------	Slope.
ShB--------------- Shrouts	Moderate: depth to rock.	Moderate: hard to pack, thin layer.	Deep to water----	Depth to rock, erodes easily.	Depth to rock, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ShC2---------------- Shrouts	Moderate: depth to rock.	Moderate: hard to pack, thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Sk----------------- Skidmore	Severe: seepage.	Severe: seepage.	Deep to water----	Large stones-----	Large stones, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

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	
BeB, BeC--------- Beasley	0-7	Silt loam--------	ML, CL-ML	A-4	0-5	90-100	85-100	80-100	75-100	25-35	4-10
	7-20	Silty clay loam, silt loam.	CL	A-6	0-5	90-100	85-100	85-100	75-100	34-40	15-22
	20-40	Silty clay, clay.	CL, CH	A-7	0-5	90-100	85-100	85-100	75-100	45-70	20-40
	40-48	Silt loam, silty clay loam, loam.	CL	A-6	0-10	70-100	70-100	60-100	60-95	34-40	15-25
	48-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bo--------------- Boonesboro	0-17	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	80-100	70-95	25-35	4-11
	17-24	Gravelly silt loam, gravelly silty clay loam.	CL, CL-ML	A-4 A-6, A-7	0-20	70-90	65-75	55-65	50-60	25-42	5-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CrB, CrC--------- Crider	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	9-39	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	39-79	Silty clay, clay.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
Du--------------- Dunning	0-23	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	34-42	15-22
	23-64	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
EdD2------------- Eden	0-9	Silty clay loam	CL, CH	A-7, A-6	0-15	75-100	70-100	70-100	65-100	35-65	12-35
	9-23	Flaggy silty clay flaggy clay, silty clay.	CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	23-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
EeE3------------- Eden	0-4	Flaggy silty clay	CL, CH	A-7, A-6	25-40	75-95	70-95	70-95	65-95	35-65	12-35
	4-24	Flaggy silty clay flaggy clay, silty clay.	CH, CL	A-7	10-45	75-100	70-100	65-100	65-95	45-75	20-45
	24-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
EkA, EkB, EkC---- Elk	0-11	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	11-54	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
	54-66	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML	A-4, A-6	0	80-100	80-100	70-100	60-95	25-40	5-15
FaD*, FaF:*											
Fairmount-------	0-10	Silty clay loam	CL	A-6, A-7	8-50	80-100	70-100	65-100	60-95	35-45	15-22
	10-16	Flaggy silty clay loam, flaggy clay, silty clay.	CH, CL	A-7, A-6	8-50	80-100	70-100	65-100	60-100	40-70	20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--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	
FdB: Faywood	0-7	Silt loam	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	7-22	Silty clay, clay	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FoC2, FoD2: Faywood	0-7	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	7-22	Silty clay, clay.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FwC3: Faywood	0-5	Silty clay	CL, CH, MH	A-7	0-15	90-100	90-100	85-100	80-100	45-60	20-30
	5-23	Silty clay, clay	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FyE3:* Faywood	0-4	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	4-31	Silty clay, clay,	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Shrouts	0-4	Silty clay loam	ML, CL-ML, CL	A-4, A-6	0-5	85-100	70-100	65-100	60-100	24-40	4-15
	4-10	Clay, silty clay	CH, CL	A-7	0-5	90-100	70-100	65-100	60-100	45-65	20-40
	10-20	Clay, silty clay, silty clay loam.	CH, CL	A-7,A-6	0-10	80-100	70-100	65-100	60-100	35-65	15-40
	20-25	Weathered bedrock	---	---	---	---	---	---	---	---	---
La: Lawrence	0-7	Silt loam	ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	7-21	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	21-39	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	39-64	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-45	5-20
LoB: Lowell	0-8	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	8-15	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
	15-60	Clay, silty clay	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
LoC2, LoD2: Lowell	0-5	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	5-11	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
	11-55	Clay, silty clay	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
	55	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
	5-41	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
	41-53	Clay, silty clay	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--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	
Ne---------------- Newark	0-13	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	13-38	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
	38-89	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	75-100	65-100	55-95	22-42	3-20
NhB, NhC--------- Nicholson	0-6	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	6-23	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	23-51	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
	51-62	Silty clay, clay	CH, CL	A-6, A-7	0-10	85-100	85-100	75-100	65-95	34-70	16-40
No---------------- Nolin	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	90-100	90-100	80-100	25-40	5-18
	11-58	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	90-100	85-100	75-100	25-46	5-23
	58-63	Loam, silt loam	ML, CL, CL-ML	A-4, A-6	0-10	90-100	90-100	80-95	50-95	<30	NP-15
OtA--------------- Otwell	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	90-100	90-100	70-95	25-35	5-15
	10-28	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	90-100	90-100	70-95	25-40	5-20
	28-54	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	90-100	85-100	65-90	35-50	15-30
	54-89	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	80-95	35-50	15-30
OtB--------------- Otwell	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	90-100	90-100	70-95	25-35	5-15
	10-28	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	90-100	90-100	70-95	25-40	5-20
	28-54	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	90-100	85-100	65-90	35-50	15-30
	54-89	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	80-95	35-50	15-30
Pt.* Pits											
SeB, SeC--------- Shelbyville	0-9	Silt loam--------	ML, CL	A-4, A-6	0	100	95-100	90-100	85-100	25-40	3-15
	9-40	Silty clay loam, silt loam.	CL	A-6, A-4, A-7	0	100	95-100	90-100	85-100	30-45	10-25
	40-61	Silty clay, clay	CH, CL, MH	A-7	0-10	85-100	85-100	70-100	65-100	45-75	20-45
ShB, ShC2-------- Shrouts	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-5	85-100	70-100	65-100	60-100	24-35	4-12
	6-24	Clay, silty clay	CH, CL	A-7	0-5	90-100	70-100	65-100	60-100	45-65	20-40
	24-32	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-10	80-100	75-100	65-100	60-100	35-65	15-40
	32-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sk---------------- Skidmore	0-7	Gravelly loam----	GM, SM, ML	A-4, A-2	0-10	60-90	40-85	40-75	25-60	<35	NP-10
	7-50	Gravelly loam, very gravelly loam.	GM, GP-GM	A-2	5-30	35-60	20-50	15-40	10-35	<35	NP-5
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more 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		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
BeB, BeC---------	0-7	10-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-7.3	Low----------	0.43	3	.5-4
Beasley	7-20	40-60	1.30-1.55	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	20-40	40-60	1.40-1.70	0.2-0.6	0.10-0.16	6.6-8.4	Moderate-----	0.28		
	40-48	25-40	1.40-1.60	0.2-2.0	0.12-0.18	6.6-8.4	Low----------	0.28		
	48-54	---	---	---	---	---	-------------	----		
Bo---------------	0-17	15-27	1.20-1.40	0.6-2.0	0.18-0.23	6.1-8.4	Low----------	0.37	3	3-5
Boonesboro	17-24	15-35	1.20-1.40	6.0-20	0.06-0.12	6.1-8.4	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
CrB, CrC---------	0-9	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low----------	0.32	5	2-4
Crider	9-39	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low----------	0.28		
	39-79	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate-----	0.28		
Du---------------	0-23	27-40	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Moderate-----	0.32	5	2-10
Dunning	23-64	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate-----	0.28		
EdD2-------------	0-9	27-40	1.30-1.50	0.06-0.6	0.12-0.18	5.1-8.4	Moderate-----	0.43	3	.5-2
Eden	9-23	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	23-30	---	---	---	---	---	-------------	----		
EeE3-------------	0-4	40-60	1.45-1.65	0.06-0.6	0.11-0.17	5.1-8.4	Moderate-----	0.17	3	.5-2
Eden	4-24	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	24-30	---	---	---	---	---	-------------	----		
EkA, EkB, EkC----	0-11	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.37	5	.5-3
Elk	11-54	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.28		
	54-66	15-40	1.20-1.50	0.6-2.0	0.14-0.20	5.1-6.5	Low----------	0.28		
FaD*, FaF:*										
Fairmount--------	0-10	27-40	1.20-1.40	0.06-0.6	0.12-0.20	6.6-8.4	Moderate-----	0.37	2	3-7
	10-16	35-60	1.40-1.60	0.06-0.6	0.10-0.18	6.6-8.4	Moderate-----	0.37		
	16	---	---	---	---	---	-------------	----		
Rock outcrop.										
FdB--------------	0-7	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
Faywood	7-22	40-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	22	---	---	---	---	---	-------------	----		
FoC2, FoD2-------	0-7	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-3
Faywood	7-22	40-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	22	---	---	---	---	---	-------------	----		
FwC3-------------	0-5	40-60	1.30-1.60	0.2-0.6	0.14-0.18	5.1-7.8	Moderate-----	0.32	2	<2
Faywood	5-23	40-60	1.35-1.60	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	23	---	---	---	---	---	-------------	----		
FyE3:*										
Faywood----------	0-4	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	2	1-2
	4-31	40-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	31	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 16.--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/cc	In/hr	In/in	pH				Pct
FyE3:*										
Shrouts	0-4	27-40	1.30-1.55	0.06-0.2	0.15-0.20	5.6-8.4	Low	0.43	2	.5-2
	4-10	40-60	1.40-1.65	0.06-0.2	0.13-0.17	5.6-8.4	Moderate	0.37		
	10-20	35-60	1.40-1.70	<0.06	0.08-0.14	6.6-8.4	Moderate	0.37		
	20-25	---	---	---	---	---	-------------	----		
La: Lawrence	0-7	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.43	3	1-4
	7-21	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.37		
	21-39	18-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low	0.43		
	39-64	18-40	1.50-1.60	0.06-0.6	0.08-0.12	5.6-7.3	Low	0.37		
LoB: 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
	8-15	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	15-60	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
LoC2, LoD2: Lowell	0-5	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	1-3
	5-11	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	11-55	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	55	---	---	---	---	---	-------------	----		
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	2	.5-2
	5-41	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	41-53	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	53	---	---	---	---	---	-------------	----		
Ne: Newark	0-13	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low	0.43	5	1-4
	13-38	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
	38-89	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low	0.43		
NhB, NhC: Nicholson	0-6	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.0	Low	0.43	3	1-4
	6-23	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.43		
	23-51	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.0	Low	0.43		
	51-62	40-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-7.8	Moderate	0.37		
No: Nolin	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43	5	2-4
	11-58	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43		
	58-63	10-35	1.30-1.55	0.6-6.0	0.10-0.23	5.6-8.4	Low	0.43		
OtA: Otwell	0-10	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	2-4
	10-28	18-35	1.30-1.50	0.06-0.2	0.18-0.22	4.5-6.0	Low	0.43		
	28-54	18-35	1.60-1.80	<0.06	0.06-0.08	4.5-6.0	Low	0.43		
	54-89	18-35	1.50-1.65	0.06-0.2	0.06-0.08	5.6-8.4	Low	0.43		
OtB: Otwell	0-10	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	.5-3
	10-28	18-35	1.30-1.45	0.06-0.2	0.18-0.22	4.5-6.0	Low	0.43		
	28-54	18-35	1.60-1.80	<0.06	0.06-0.08	4.5-6.0	Low	0.43		
	54-89	18-35	1.55-1.65	0.06-0.2	0.19-0.21	5.6-8.4	Low	0.43		
Pt.* Pits										
SeB, SeC: Shelbyville	0-9	10-27	1.30-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	4	2-5
	9-40	18-35	1.30-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low	0.28		
	40-61	40-60	1.35-1.50	0.2-0.6	0.12-0.18	5.1-7.3	Moderate	0.28		
ShB, ShC2: Shrouts	0-6	12-27	1.40-1.55	0.06-0.2	0.15-0.20	5.6-8.4	Low	0.43	2	.5-3
	6-24	40-60	1.40-1.65	0.06-0.2	0.13-0.17	5.6-8.4	Moderate	0.37		
	24-32	35-60	1.40-1.80	<0.06	0.08-0.14	6.6-8.4	Moderate	0.37		
	32-40	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 16.--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/cc	In/hr	In/in	pH				Pct
Sk---------------- Skidmore	0-7	7-18	1.20-1.40	2.0-6.0	0.07-0.13	5.6-7.8	Low-----------	0.17	5	2
	7-50	7-18	1.30-1.60	2.0-6.0	0.04-0.10	5.6-7.8	Low-----------	0.17		
	50	---	---	---	---	---	--------------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
BeB, BeC---------- Beasley	C	None---------	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
Bo---------------- Boonesboro	B	Occasional	Brief------	Jan-Apr	>6.0	---	---	20-40	Hard	Low-------	Low.
CrB, CrC---------- Crider	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Du---------------- Dunning	D	Frequent----	Brief------	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	High------	Moderate.
EdD2, EeE3-------- Eden	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low.
EkA--------------- Elk	B	Rare---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
EkB, EkC---------- Elk	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
FaD*, FaF:* Fairmount---------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
Rock outcrop.											
FdB, FoC2, FoD2, FwC3-------------- Faywood	C	None---------	---	---	>6.0	---	---	20-40	Hard	High------	Moderate.
FyE3:* Faywood-----------	C	None---------	---	---	>6.0	---	---	20-40	Hard	High------	Moderate.
Shrouts-----------	C	None---------	---	---	>6.0	---	---	20-40	Soft	High------	Low.
La---------------- Lawrence	C	Rare---------	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High------	High.
LoB, LoC2, LoD2, LwC3-------------- Lowell	C	None---------	---	---	>6.0	---	---	>40	Hard	High------	Moderate.
Ne---------------- Newark	C	Frequent----	Brief------	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High------	Low.
NhB, NhC---------- Nicholson	C	None---------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High------	Moderate.
No---------------- Nolin	B	Occasional	Brief------	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low-------	Moderate.
OtA--------------- Otwell	C	Rare---------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.
OtB--------------- Otwell	C	None---------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.

See footnote at end of table.

TABLE 17.--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			
Pt.* Pits											
SeB, SeC---------- Shelbyville	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ShB, ShC2--------- Shrouts	C	None---------	---	---	>6.0	---	---	20-40	Soft	High-----	Low.
Sk---------------- Skidmore	B	Occasional	Very brief	Dec-May	3.0-6.0	Apparent	Dec-Mar	>40	Hard	Low------	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that 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]

Soil name	Family or higher taxonomic class
*Beasley	Fine, mixed, mesic Typic Hapludalfs
Boonesboro	Fine-loamy, mixed, mesic Fluventic Hapludolls
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
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
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lowell	Fine, mixed, mesic Typic Hapludalfs
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs
Shelbyville	Fine-silty, mixed, mesic Mollic Hapludalfs
Shrouts	Fine, mixed, mesic Typic Hapludalfs
Skidmore	Loamy-skeletal, mixed, mesic Dystric Fluventic Eutrochrepts

TABLE 19.--GEOLOGIC SYSTEMS, FORMATIONS, AND MEMBERS

System	Formation	Member	Thickness ft.	Predominant Soils
Devonian---------	Sellersburg Limestone	Beechwood Limestone	0-8	Crider
Silurian---------	Louisville Limestone	---	0-10	---
	Waldron Shale	---	0-11	---
	Laurel Dolomite	---	0-60	---
	Osgood	---	2-40	Beasley Faywood Fairmount Nicholson Shrouts
	Brassfield Dolomite	---	2-30	Beasley Faywood Fairmount Nicholson Shrouts
Ordovician-------	Drakes	Saluda Dolomite	17-25	Shrouts Faywood
		Bardstown	18-35	Faywood Fairmount
		Rowland	45-66	Lowell Faywood Fairmount
	Grant Lake Limestone	Upper	35-40	Lowell Faywood Fairmount
	Ashlock	Gilbert	12-18	Lowell Faywood Fairmount
		Tate	40-55	Shelbyville Lowell Faywood Fairmount
	Grant Lake Limestone	Lower	40-50	Lowell Faywood Fairmount
	Calloway Creek	---	70-80	Shelbyville Nicholson Lowell Faywood Fairmount
	Clays Ferry	---	120-286	Eden Lowell
	Lexington Limestone	Sulphur Well	19-22	Faywood
		Perryville Limestone	15	Faywood

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