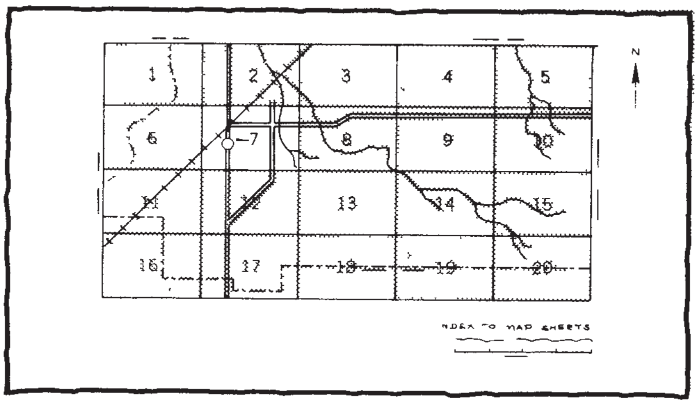
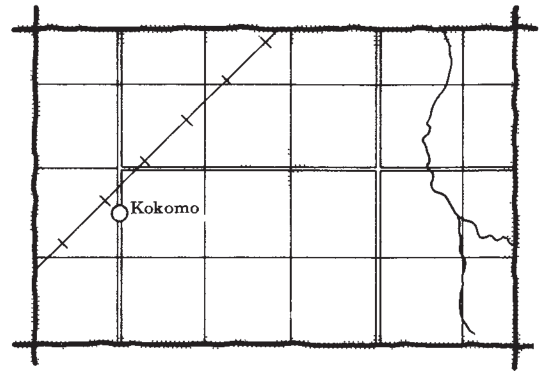
SOIL SURVEY
of
CHRISTIAN COUNTY KENTUCKY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
KENTUCKY DEPARTMENT FOR NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION
and
KENTUCKY AGRICULTURAL EXPERIMENT STATION

HOW TO USE

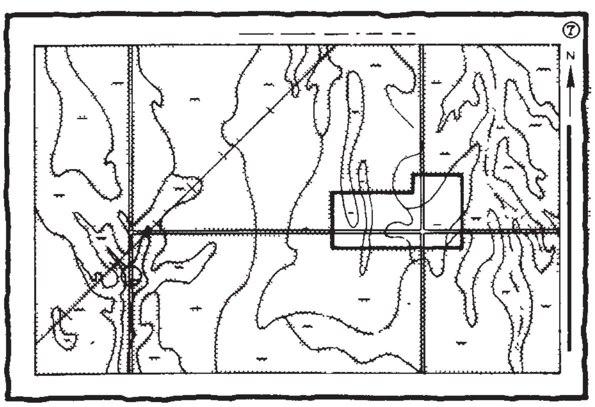
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

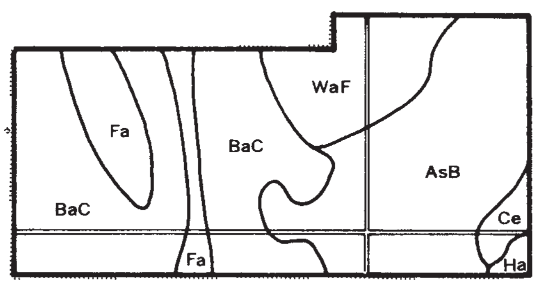




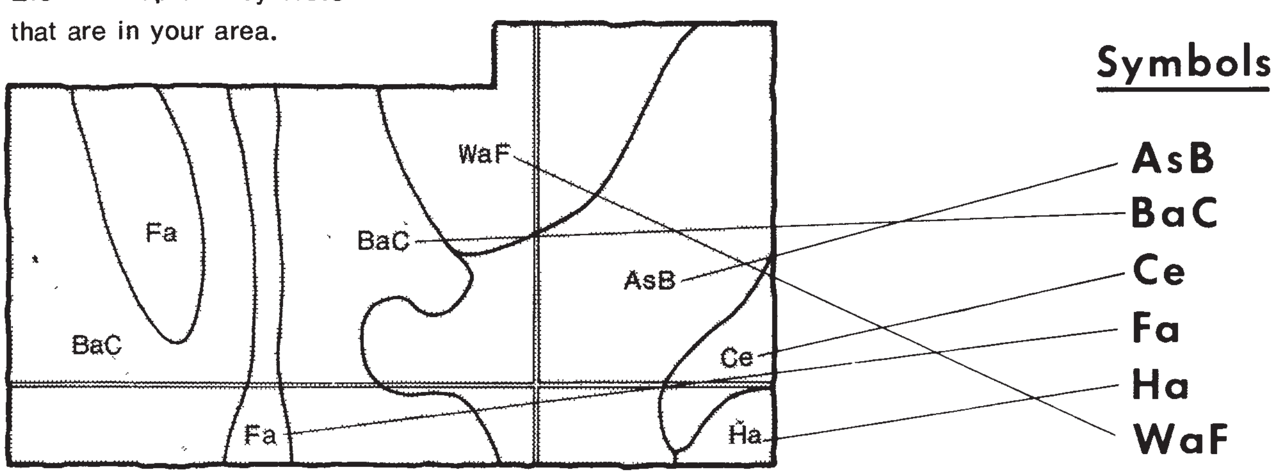
2. Note the number of the map sheet and turn to that sheet.

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



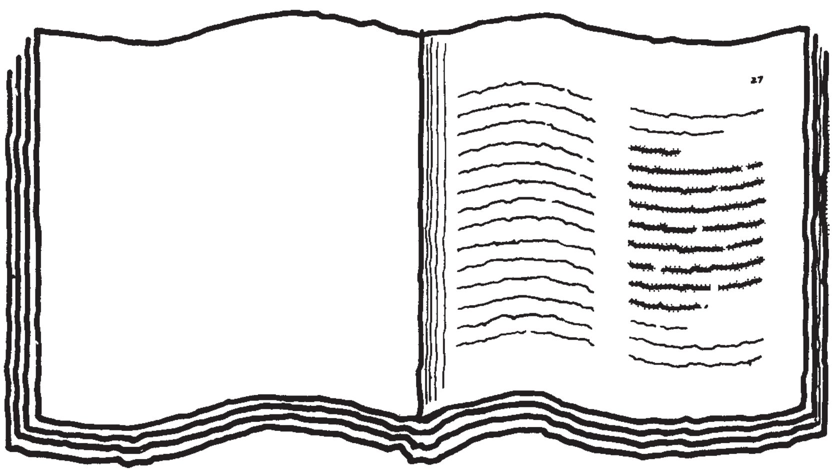


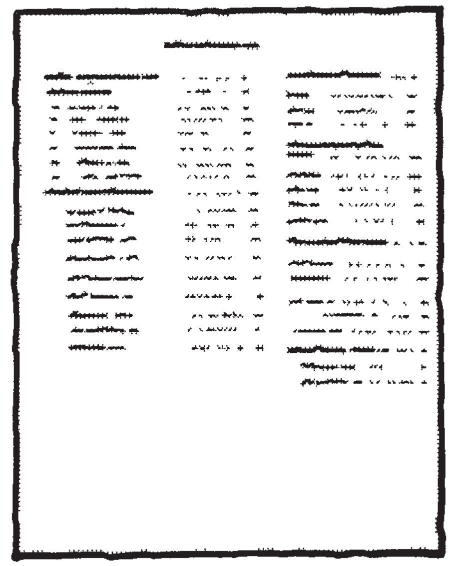
4. List the map unit symbols that are in your area.



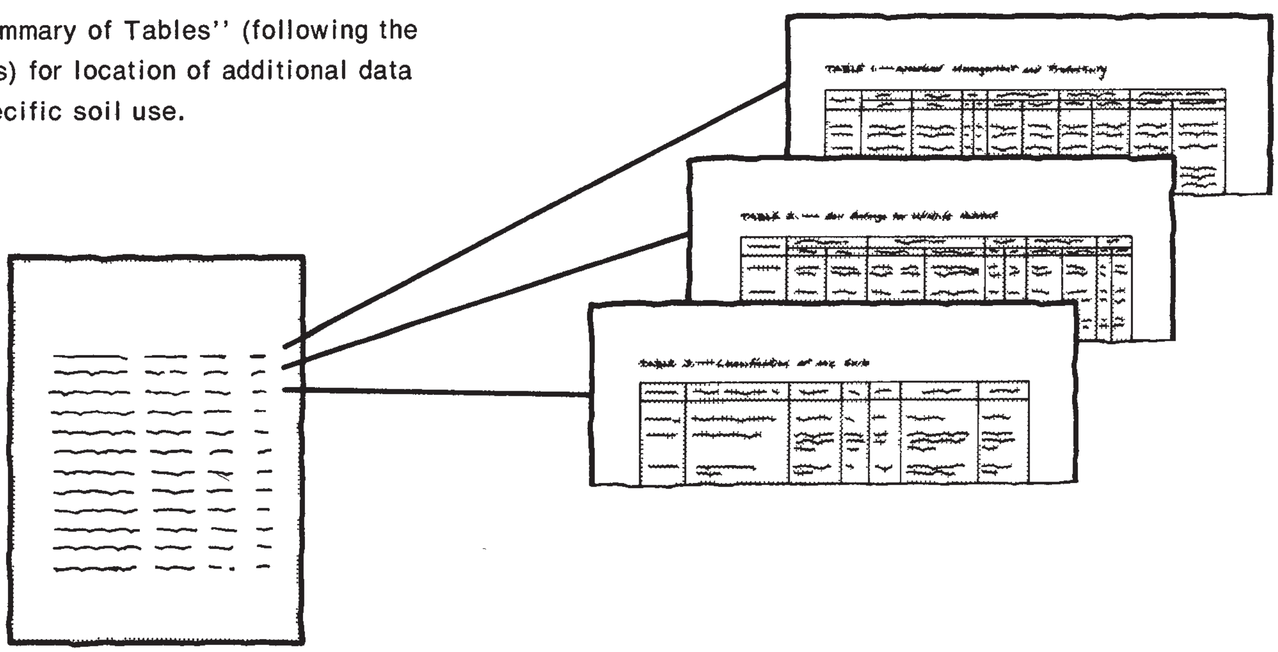
THIS SOIL SURVEY

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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 the period 1966 to 1974. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service, Kentucky Department for Natural Resources and Environmental Protection, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Christian County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Contour and field stripcropping on a farm in Christian County.

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Issued July 1980

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foreword

The Soil Survey of Christian County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

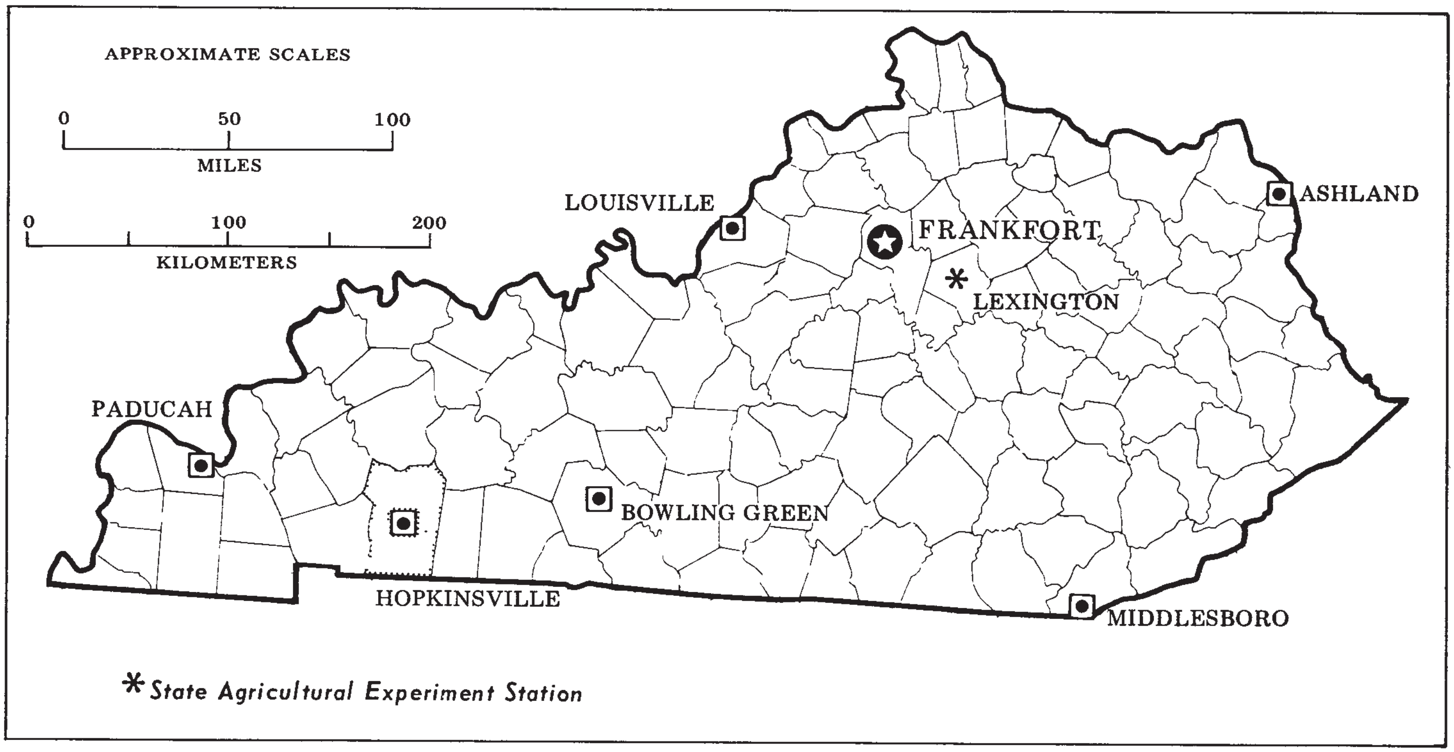
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to 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 kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Glen E. Murray
State Conservationist
Soil Conservation Service



Location of Christian County in Kentucky

SOIL SURVEY OF CHRISTIAN COUNTY, KENTUCKY

By Ronald D. Froedge, Soil Conservation Service

Fieldwork by Ronald D. Froedge, Leslie R. Franklin, William H. Craddock,
Darwin L. Newton, and Arlin J. Barton, Soil Conservation Service

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

CHRISTIAN COUNTY is in the southwestern part of Kentucky. According to the 1970 census, the population of the county was 56,224. Hopkinsville, the county seat, is near the center of the county and had a population of 21,250 in 1970. Christian County is the second largest county in Kentucky. It occupies 464,130 acres or 725 square miles. Fort Campbell Military Reservation is at the southern edge of the county.

The county is in two main physiographic regions. The northern half is in the Western Coal Fields Physiographic Region, and the southern half is in the Western Pennyrile Physiographic Region. The Western Coal Fields Physiographic Region consists of soils formed chiefly in residuum from sandstone and shale of the Pennsylvanian System and from sandstone, shale, and limestone of the Upper Mississippian System. Loess makes up part of the parent material of some soils. Areas are rolling to hilly and have some undulating ridgetops and nearly level flood plains. The soils are medium in natural fertility and are used mainly for farming. Approximately 45 percent of the area is used for woodland, and the rest is used about equally for cultivated crops, hay, and pasture. Corn, soybeans, small grain, and burley and dark fine-cured tobaccos are chief crops. The dominant livestock enterprise is beef production.

Most soils in the Western Pennyrile Physiographic Region are gently sloping. Surface drainage generally goes into underground cavernous sinkholes. The soils formed in material weathered from limestone and thin layers of loess. They are generally well drained and high in natural fertility. This region is one of the most productive farming areas in Kentucky. Approximately 75 percent of the region is used for cultivated crops, 15 percent is used for pasture, and 10 percent is used for woodland and other purposes. Most grain crops are sold for cash.

Elevation in the Western Coal Fields ranges from about 400 feet above sea level near Tradewater River to about 800 feet on the ridgetops. Elevation in the Western Pennyrile ranges from about 430 to 600 feet, but is mainly between 500 and 550 feet.

General nature of the county

This section gives general information concerning the county. It discusses settlement and farming; physiography, geology, relief, and drainage; climate; natural resources; transportation; and recreational resources.

Settlement and farming

The first settlers in the county were James Davis and John Montgomery, natives of Augusta County, Virginia. Around 1782, they built a blockhouse about 1 mile southwest of the present site of Pembroke near the West Fork of Red River. During the next 20 years, settlement proceeded slowly, and settlers concentrated in the northern part of the county because of the abundance of fresh water, game, and timber. The level to gently rolling fertile land in the southern part of the county was settled during the first quarter of the 1800's. Many settlers in the southern part established large farms.

The population of Christian County was 2,318 in 1800. By 1960 the population had increased to 56,904. Agricultural employment accounted for 1,940 of the 20,450 jobs in the county in 1973 (*9*).

In 1970, according to the Kentucky Soil and Water Conservation Needs Inventory (*8*), Christian County had 221,357 acres of cropland, 131,400 acres of forest, 72,218 acres of pasture, and 1,173 acres of other farmland. The county has 37,982 acres of nonfarmland, including about 5,800 acres in the Pennyrile State Forest and 12,000 acres in the Fort Campbell Military Reservation.

Christian County is one of the best counties in Kentucky for farming. In the northern part of the county about the same number of acres of cleared land is used for cultivated crops as is used for pasture. The major cash crops are corn, soybeans, small grain, and tobacco. These crops complement livestock enterprises. Dairying, poultry production, and timber marketing each vary widely in relative importance among individual farming enterprises.

The fertile, gently sloping soils in the southern part of the county are used mostly for cash grain crops. Approximately 75 percent of the land is used for cultivated crops. Farmers in this part of the county have been leaders in the development of no-till cropping systems, and approximately 60,000 acres are farmed annually under these systems. The long growing season and the favorable soil conditions permit three crops in two years in a cropping system of corn, small grain, and soybeans.

The Christian County Conservation District was organized in 1941. Since then, it has had tremendous impact on the total environment of the county through the use of soil and water conservation programs. It has been especially effective in establishing watershed projects, in applying stripcropping, and in draining thousands of acres of land to increase production.

The number of farms in the county decreased from 1,868 in 1969 to 1,450 in 1974. In the same period, the average size of farms increased from 184 acres to 210 acres. The total value of farm products sold increased considerably from 1969 to 1974 (*18*).

Physiography, geology, relief, and drainage

The physiographic regions of Christian County are the Western Coal Fields and the Western Pennyrile (*10*). Each occupies about one-half of the county. The Western Coal Fields occupies the northern half of the county and consists of geologic formations of the Pennsylvanian and Mississippian ages. The Western Pennyrile occupies the southern part of Christian County and consists of formations entirely of the Mississippian System. The formations of the Western Coal Fields are sandstone, siltstone, and shale of the Pennsylvanian System and interbedded limestone, sandstone, siltstone, and shale of mainly the Upper Mississippian System. The formations of the Western Pennyrile are limestones, predominantly the Ste. Genevieve limestone, of the Lower Mississippian System.

The Western Coal Fields Physiographic Region is characterized by numerous faults and escarpments that have caused irregular hilly land with excessive relief. The side slopes and valley walls are dissected by numerous drainageways. Slopes are less than 100 feet to several hundred feet long. Gradient is sloping to steep, and runoff is rapid to very rapid. Elevation ranges from about 800 feet on some ridges to less than 450 feet in the valleys. Some ridgetops, however, are relatively broad and gently sloping, have generally low relief, and have medium to slow runoff.

The soils of the Western Pennyrile Physiographic Region are mostly gently sloping and in karst landscape. The range in elevation over broad areas is less than 100 feet. Slopes range to several hundred feet long. Runoff in most areas is medium.

Drainage of the county is dominantly north and northwest. The northeastern part of the county drains into Pond River, which flows north into Green River. Green River, in turn, flows into the Ohio River. The northwestern part of the county drains into the Tradewater River, which flows into the Ohio River. The surface drainage of the Western Pennyrile is mainly to underground cavernous sinkholes. Some streams flow into and from underground channels several times throughout their course. Little River, the largest surface stream in this region, drains south from Hopkinsville and eventually west to Lake Barkley on the Cumberland River. Sinking Fork Creek joins Little River just west of the Christian-Trigg County line. West Fork of Red River, in the southeast corner of the county, flows south into Red River in Montgomery County, Tennessee.

Climate

In Christian County, summers are warm and humid, and winters are moderately cold. Rainfall is fairly heavy throughout the year but peaks slightly late in winter and early in spring. Snowfall occurs nearly every winter, but the snow cover generally lasts only a few days.

Average precipitation in April through September is adequate for most crops, but periods of below or above average precipitation occur. As shown in table 1, precipitation from May through September is inadequate in 2 years in 10. On many farms, irrigation is needed and used on high-value cash crops, such as tobacco and truck crops. Wet periods affect planting dates, tillage, and harvesting of crops. The effect is greater in the northern part of the county on soils that have a fragipan than in the southern part of the county where many of the soils are well drained.

A killing frost occurring earlier than mid-October can reduce yields of late-planted soybeans, especially if the soybeans are in a two-crop system of small grain followed by soybeans.

The county has a favorable, moderate climate. Many days of the year have nearly ideal temperature. The fall season has many mild, sunny days and is considered one of the best seasons for outdoor activities.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Hopkinsville for the period 1951 to 1975. 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 37 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Hopkinsville on February 2, 1951, is 22 degrees below zero. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on August 17, 1954, is 108 degrees.

Growing degree days, shown in table 1, 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.

Of the total annual precipitation, 23 inches, or 47 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.47 inches at Hopkinsville on January 15, 1951. Thunderstorms number about 60 each year, and about 26 occur in summer.

Average seasonal snowfall is 11 inches. The greatest snow depth at any one time during the period of record was 15 inches. On the average, 4 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon in spring is less than 55 percent; during the rest of the year it is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The percentage of possible sunshine is 65 in summer and 40 in winter. The prevailing wind is from the south and southwest. Average windspeed is highest, 10 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

Natural resources

Other than the soil, the most important natural resources in the county are limestone, coal, oil, and forest products.

Limestone in the Mississippian Plateau is an important economic resource. It is used for agricultural lime, for highways, and for many other commercial and industrial purposes. The limestone quarries in Christian County provide several counties to the north with limestone products. Coal is mined in the northern edge of the county. Approximately 1,500 acres have been strip mined. Although coal mining is of limited extent in Christian County, large coal mining operations in counties to the north serve as an important labor source for part-time farmers and others in the county. Small scattered pools of oil and gas are in the northern part of the county. Production is small, but it is an important source of income to landholders. Approximately 131,000 acres of forest is in the county, and forest products are significant to the economy of the county.

Transportation

Christian County is served by a network of Federal and State highways. U.S. Highways 41-A and 41 are major arteries into the south and midwest. The Pennyrile Parkway and the Western Kentucky Parkway provide east and west links in the county. Interstate Highway 24 is important to the transportation capability in Christian County. Air service is available at the Hopkinsville-Christian County Airport and at Outlaw Field at Fort Campbell. The Illinois Central Gulf Railroad and the Louisville and Nashville Railroad both serve the county.

Recreational resources

Hunting and fishing are popular recreational activities in Christian County. The county is suited to a large variety of game. The hilly, wooded sections in the northern part of the county provide food, water, and cover for squirrel, rabbit, quail, and other game. Deer are plentiful. The grain areas in the southern part of the county provide good hunting for mourning dove, quail, and rabbit.

Fishing is provided in the many floodwater retarding structures, streams, and natural ponds. Although most floodwater retarding structures are on private land, some are multipurpose and provide public fishing.

Other outdoor activities provided are swimming, boating, golfing, horseback riding, hiking, and picnicking. Pennyrile State Forest has a lodge, cottages, and camping accommodations in addition to the above activities.

The City of Hopkinsville has recreational facilities that are supervised by a full time director and staff. They include a golf course, tennis courts, parks, swimming pools, ball diamonds, and a recreation building. In addition, along Little River in Hopkinsville there is 1.5 miles of recreation land along the river. It includes fountains, picnic tables, rest rooms, a dam to raise the water level in the river, a shelter house, benches, fishing piers, and landscaping.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit 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 provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Areas dominated by moderately well drained and well drained, deep to shallow, gently sloping to steep soils

The three map units in this group are made up of gently sloping to steep soils on ridges and side slopes. These units make up about 40 percent of the county and are in the northern part. The moderately well drained soils in these units have a fragipan, and the well drained soils do not.

1. Dekalb-Zanesville

Moderately deep, steep, well drained loamy soils and deep, gently sloping and sloping, moderately well drained loamy soils

This map unit is in the northwest corner of the county. The landscape is rough and broken. The soils are underlain by bedrock of the Middle and Lower Pennsylvanian System.

This map unit occupies about 2 percent of the county. About 37 percent is Dekalb soils, 23 percent is Zanesville soils, and 40 percent is soils of minor extent.

Dekalb soils are on steep side slopes and are moderately deep. Zanesville soils are on ridgetops and are deep (fig. 1). Dekalb soils are well drained, and Zanesville soils are moderately well drained. The surface layer of Dekalb soils is channery sandy loam, and that of Zanesville soils is silt loam. Dekalb soils are channery or very channery throughout and have low available water capacity. They are droughty. Zanesville soils have a fragipan at a depth of about 2 feet and have moderate available water capacity.

Soils of minor extent are the well drained, deep, Wellston soils on sloping ridges; the well drained, moderately deep Frondorf soils, shallow Weikert soils, and deep, well drained Riney soils on moderately steep and steep side slopes; and small narrow areas of alluvial soils on flood plains that consist mainly of Skidmore and Cuba soils.

The soils in this unit are used mainly for woodland. The Pennyrile State Forest is within most of this unit. Most areas of the Zanesville soils that were used for cropland in the past have now been planted to trees. The steeper soils mostly support old stands of trees.

The potential of these soils is fair for woodland and good for extensive recreation areas. Steep slopes limit the use of logging equipment in woodland management. The potential is poor for cultivated crops, specialty crops, urban uses, and intensive recreation areas. Steep slopes, depth to bedrock, and small stones are limitations and are difficult to overcome. However, small areas on ridges, where limitations are not so severe, can be selected as sites for buildings.

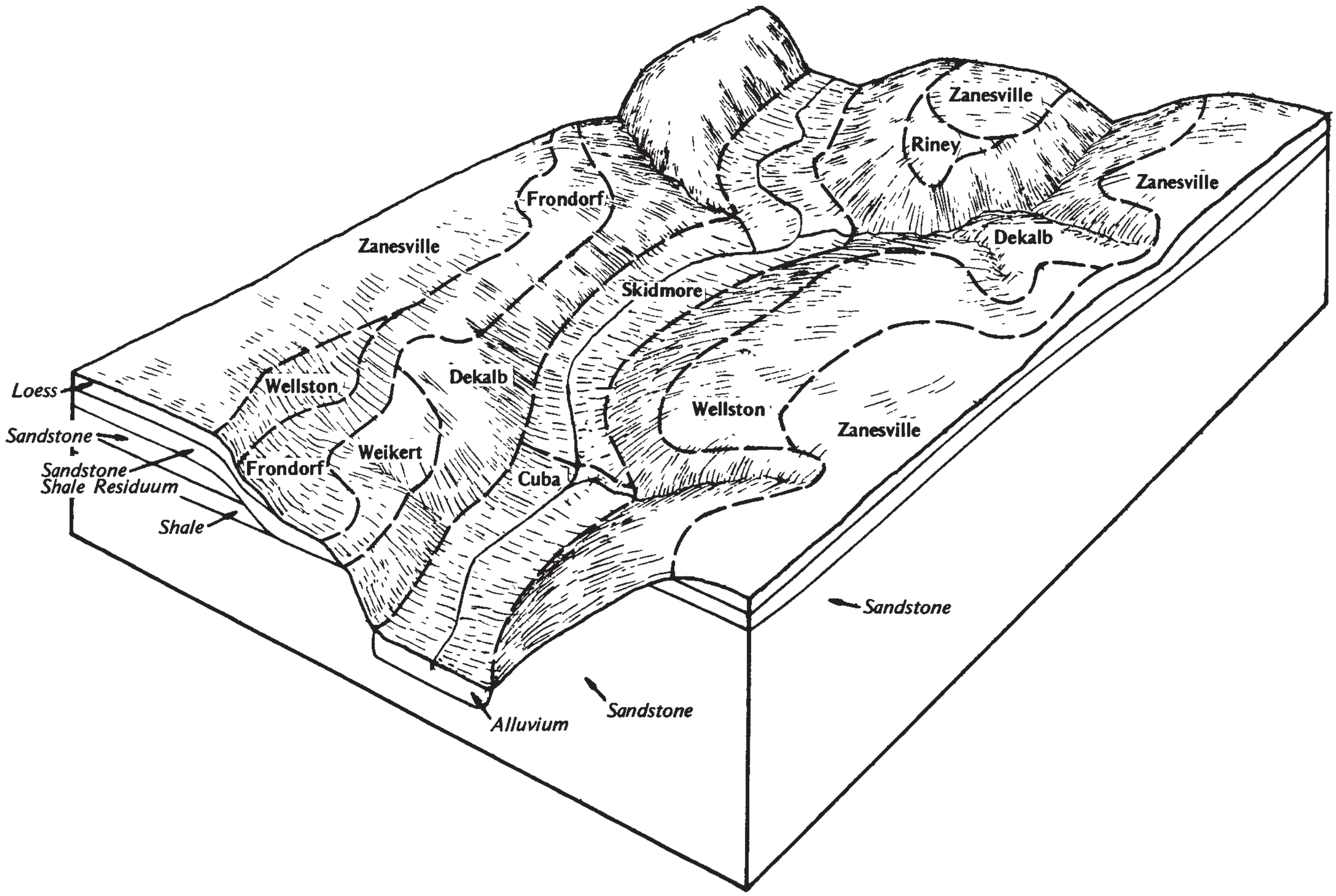


Figure 1.—Typical pattern of soils and underlying material in the Dekalb-Zanesville unit

2. Zanesville-Frondorf-Weikert

Deep, gently sloping and sloping, moderately well drained loamy soils and moderately deep and shallow, sloping to steep, well drained loamy soils

This map unit is mainly in the northern part of the county. The soils are underlain by bedrock of the Pennsylvanian System.

This map unit occupies about 26 percent of the county. About 30 percent is Zanesville soils, 20 percent is Frondorf soils, 10 percent is Weikert soils, and 40 percent is soils of minor extent.

Zanesville soils are on ridgetops (fig. 2). They are moderately well drained. Frondorf soils are on rims of ridges. They are also intermingled with Weikert soils on moderately steep to steep side slopes. In these places, the Frondorf and Weikert soils are mapped in a complex. Frondorf and Weikert soils are well drained. Zanesville and Frondorf soils have a surface layer of silt loam. The surface layer of Weikert soils is channery or shaly silt loam. Zanesville soils are deep, but they have a fragipan at a depth of about 2 feet. Frondorf soils are moderately deep, and Weikert soils are shallow to bedrock. Approximately 15 percent of the areas of Frondorf-Weikert complexes are stony.

Soils of minor extent are the moderately well drained Sadler soils on ridges, the well drained Wellston soils on side slopes, and narrow areas of acid alluvial soils that are in valleys and consist mainly of Stendal soils. Udorthents, or mine spoil, also are in this unit.

The soils in this unit have various uses. The soils on ridgetops are used for cultivated crops (fig. 3). The sloping soils are used for pasture and hay, and the steep soils are used for woodland.

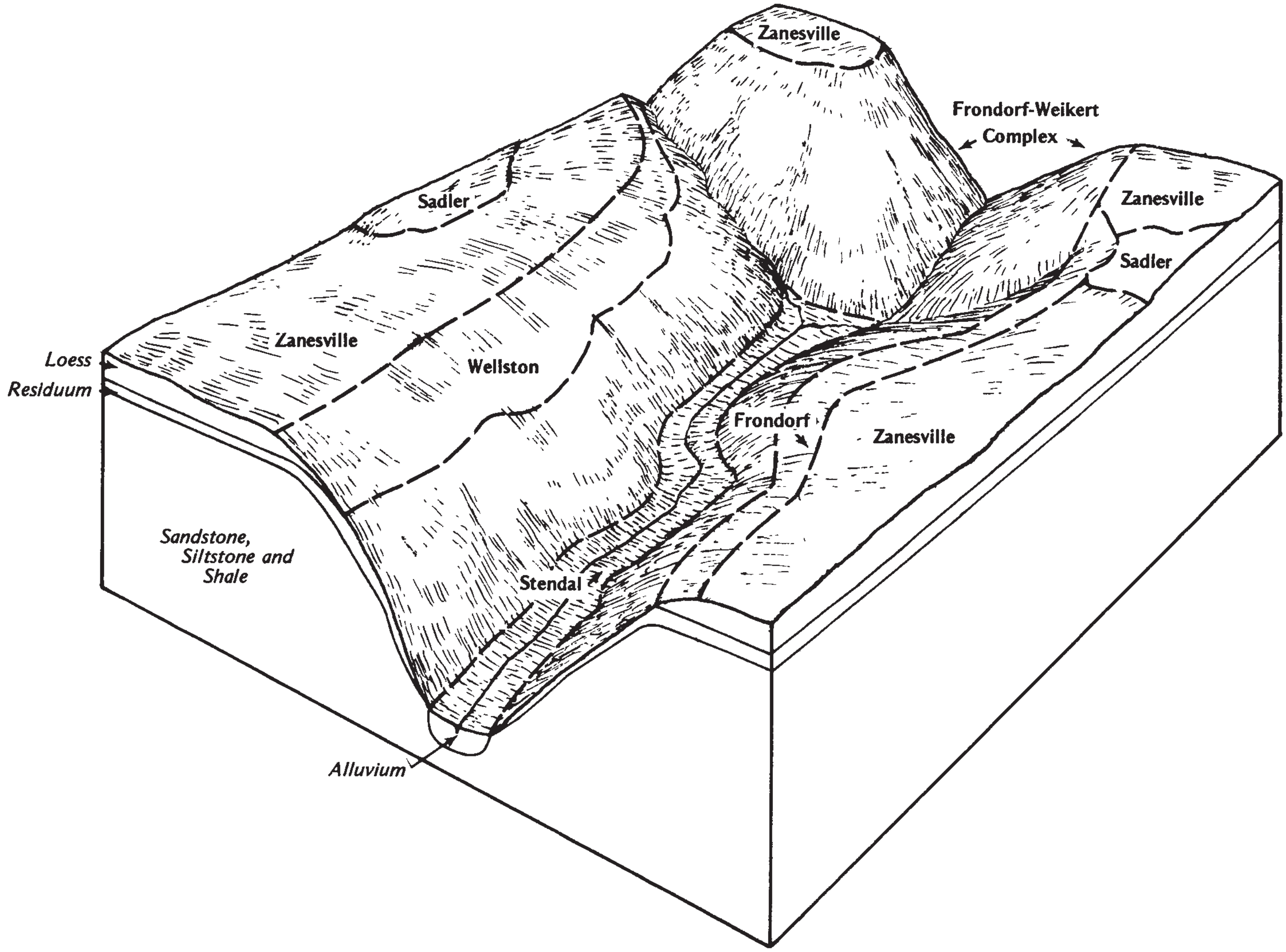


Figure 2.—Typical pattern of soils and underlying material in the Zanesville-Frondorf-Weikert unit

The potential is good for extensive recreation areas and fair for most other uses. In hilly parts of this unit, the hazard of erosion, steepness of slopes, and moderate to shallow depth to bedrock are limitations for most uses. On the ridgetops, the hazard of erosion and wetness can be overcome for most uses.

3. Caneyville-Frondorf-Zanesville

Moderately deep, sloping to steep, well drained, loamy or clayey soils that are intermingled with limestone rock outcrop in most places and moderately deep and deep, gently sloping to steep, well drained and moderately well drained loamy soils

This map unit is mainly in the northeastern part of the county (fig. 4). The landscape is hilly. It is characterized by faults and escarpments of the Mississippian and Lower Pennsylvanian System. As a result, slopes are irregular and there are many different soils.

This map unit occupies about 12 percent of the county. About 50 percent is Caneyville soils and Rock outcrop, 15 percent is Frandorf soils, 15 percent is Zanesville soils, and 20 percent is soils of minor extent.

Caneyville soils are mainly on lower side slopes and are intermingled with limestone outcrop, but some areas have no outcrop. These soils are also on ridgetops and benches. They are well drained, are moderately deep to bedrock, and have a clayey subsoil. They have a surface layer of silt loam or silty clay. In areas of outcrop, the rock exposures range from 2 to more than 10 feet across and occur as bedrock escarpments of limestone. Frondorf soils are on rims of ridges and on the upper

Figure 3—Floodwater retarding structure in East Fork Pond River watershed in Zanesville-Frondorf-Weikert unit Stripcropping on Zanesville soils in left center of picture

part of side slopes. They are generally above Caneyville soils. They have a surface layer of silt loam, are well drained, and are moderately deep to sandstone bedrock. Zanesville soils are mainly on ridgetops. They are deep and moderately well drained and have a fragipan at a depth of about 2 feet. They have a surface layer of silt loam.

The soils of minor extent are the Weikert, Wellston, Sadler, and Nicholson soils on uplands and the Newark, Melvin, and Lindside soils along streams. The shallow, well drained Weikert soils are intermingled with Frondorf soils on steep and moderately steep side slopes. The deep, well drained Wellston soils are on gently sloping to moderately steep ridges and side slopes. The deep, moderately well drained Sadler soils are on nearly level and gently sloping ridges. The deep, moderately well drained Nicholson soils are on nearly level to sloping benches and toe slopes. The deep, poorly drained to moderately well drained Newark, Melvin, and Lindside soils are along East Fork of Pond River and Dulin Creek and at the head of West Fork of Pond River.

The soils in this unit are used mainly for woodland and wildlife habitat. Only a small percentage of the acreage is cleared. Cleared areas are mostly narrow ridges, toe slopes, and narrow alluvial land.

The potential of these soils is poor for farming, urban uses, and intensive recreation areas. Large outcrops of rock, steep broken landscape, depth to bedrock, and a clayey subsoil are limitations that are very difficult to overcome. The potential of these soils is fair for woodland and is good for extensive recreation areas. If the soils of minor extent along streams are drained, the potential is good for cultivated crops.

Areas dominated by poorly drained and somewhat poorly drained, nearly level soils subject to flooding

The map unit in this group of soils is on flood plains. This unit makes up about 2 percent of the county and is in the northern part. The soils in this unit have a seasonal high water table. They do not have a fragipan.

4. Stendal-Bonnie

Deep, nearly level, somewhat poorly drained and poorly drained, loamy soils

This map unit is in the northern part of the county on the West Fork of Pond River and McFarland Creek and on the Upper Tradewater River and Castleberry Creek.

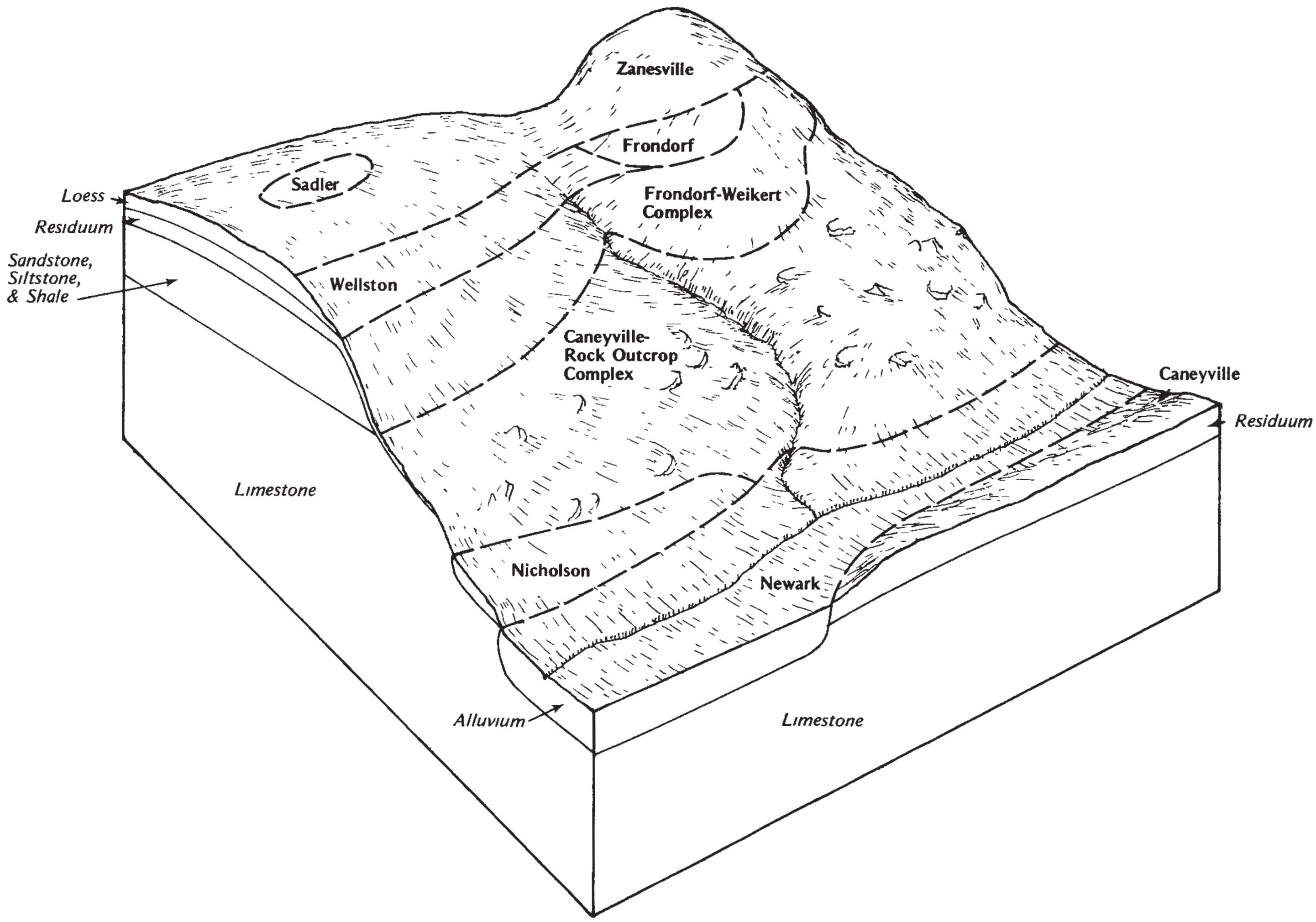


Figure 4.—Typical pattern of soils and underlying material in the Caneyville-Frondorf-Zanesville unit.

The soils are on flood plains of low gradient streams and are frequently flooded.

This map unit occupies about 2 percent of the county. About 40 percent is Stendal soils, 31 percent is Bonnie soils, and 29 percent is soils of minor extent.

In most areas, Stendal soils are nearer the stream channels than Bonnie soils. Bonnie soils are in broad areas, are nearer the uplands, and have less gradient than Stendal soils. Stendal soils are somewhat poorly drained, and Bonnie soils are poorly drained. Both soils have a surface layer of silt loam and a seasonal high water table. They are soft and compressible when wet.

The soils of minor extent are the well drained Cuba and the moderately well drained Steff soils along drainageways.

The soils in this unit are used mainly for cultivated crops, but some are used for pasture. A few tracts are wooded, and a few are swampy. Less than 25 percent of the acreage has been drained. Some areas collect a large amount of runoff from strip mines. Flooding and ponding are common in winter and spring (fig. 5).

The potential of these soils is good for cultivated crops and specialty crops if the soils are adequately drained and runoff from surrounding areas is diverted. Wetness and flooding are such severe limitations and so difficult to overcome that the potential is poor for residential development, intensive recreation areas, and other urban uses. The potential of these soils is good for the development of wetland wildlife habitat, for woodland, and for woodland wildlife habitat.

Areas dominated by moderately well drained and somewhat poorly drained, nearly level to sloping soils

The four map units in this group are made up of soils that are mainly on broad ridges and ridgetops throughout

Figure 5.—Common flooding delays planting and destroys crops in some years in the Stendal-Bonnie unit.

the county. Various size basins are on the ridges. These map units make up about 15.5 percent of the county. All major soils in these units, with exception of Henshaw soils in map unit 5, have a fragipan.

5. Sadler-Henshaw

Deep, gently sloping and nearly level, moderately well drained and somewhat poorly drained loamy soils

This map unit is in the north-central part of the county surrounding Crofton. The soils formed in a mantle of loess and the underlying material weathered from loess sandstone, siltstone, and shale or from old alkaline alluvium.

This map unit occupies about 2.5 percent of the county. About 35 percent is Sadler soils, 17 percent is Henshaw soils, and 48 percent is soils of minor extent.

Sadler soils are on the gently sloping ridgetops and rims of areas, and Henshaw soils dominantly are in the center and less sloping parts. Sadler soils have a fragipan and are moderately well drained. Henshaw soils are somewhat poorly drained and do not have a fragipan. Both soils have a surface layer of silt loam and a seasonal high water table. Sadler soils are strongly acid or very strongly acid. Henshaw soils are strongly acid to neutral in the upper part and are neutral to moderately alkaline in the lower part. Both soils are soft and compressible when wet.

Soils of minor extent are the well drained, gently sloping and sloping Crider, Wellston, Frondorf, and Caneyville soils; the moderately well drained, gently sloping Zanesville and Nicholson soils; and the well drained, nearly level Skidmore soils along narrow drainageways.

The soils in this unit are used for soybeans, corn, small grain, tobacco, hay, and pasture. Most of the acreage has been cleared, but a few areas are wooded.

The potential of these soils is good for most cultivated crops and for specialty crops if the soils are drained. Wetness delays planting and occasionally causes a harvesting problem. The potential is poor for urban uses and intensive recreation areas. Wetness is a severe limitation for some uses that is difficult to overcome. The potential is fair for woodland. Wetness limits the use of equipment except in dry periods. The potential is good for extensive recreation areas.

6. Sadler-Zanesville-Nicholson

Deep, nearly level to sloping, moderately well drained loamy soils

This map unit is in an east-west area north of Hopkinsville and in a small area at the northern edge of the county. The soils are underlain by sandstone, shale, siltstone, and limestone of the Mississippian System. They formed in a loess mantle and the underlying material weathered from bedrock.

This map unit occupies about 9 percent of the county. About 30 percent is Sadler soils, 18 percent is Zanesville soils, 10 percent is Nicholson soils, and 42 percent is soils of minor extent.

The major soils generally are in similar positions and elevation on the landscape (fig. 6); Sadler soils, however, are on broader ridges than Zanesville and Nicholson soils. Nicholson soils are underlain by limestone; and Sadler and Zanesville soils are underlain by sandstone, siltstone, and shale. All three soils are moderately well drained and have a fragipan. They have a surface layer of silt loam and good tilth.

The soils of minor extent are mainly the well drained, gently sloping to sloping Crider, Pembroke, and Elk soils; the well drained Wellston, Frondorf, Fredonia, and Caneyville soils on adjoining side slopes; and soils that formed in loamy alluvium along drainageways, consisting mainly of the somewhat poorly drained Stendal and Newark soils.

The soils in this unit are very good for farming. They are used for most commonly grown cultivated and specialty crops, including tobacco.

The potential of these soils is good for cultivated crops and specialty crops. A moderate to severe hazard of erosion and the wetness caused by a seasonal perched water table are moderate limitations. The potential is good for woodland and for openland and woodland wildlife habitats. The potential for residential uses and other urban uses is only fair because of wetness and the moderately slow to slow permeability. The potential is fair for intensive recreation areas and is good for extensive recreation areas.

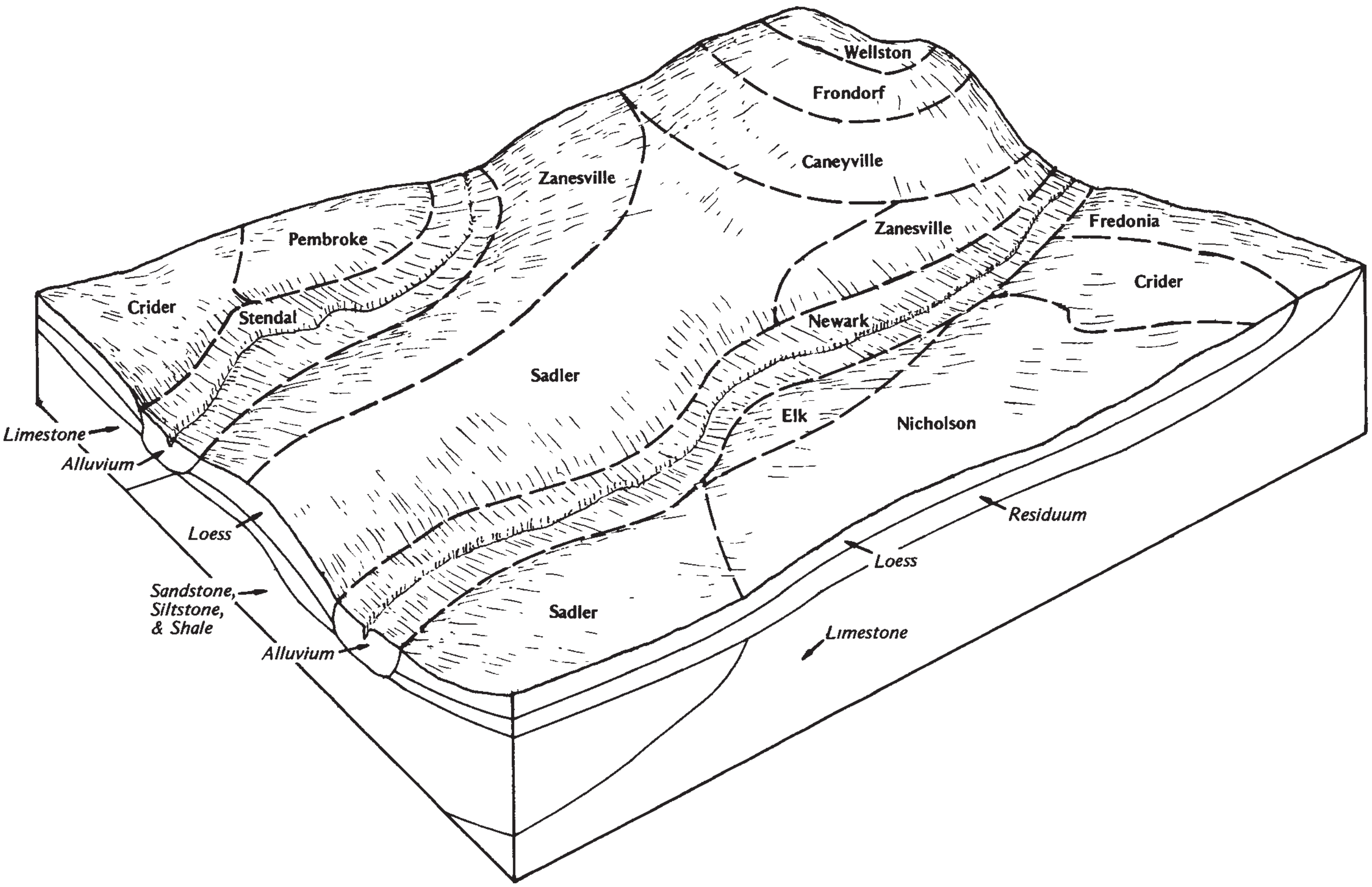


Figure 6.—Typical pattern of soils and underlying material in the Sadler-Zanesville-Nicholson unit.

7. Nicholson

Deep, nearly level and gently sloping, moderately well drained loamy soils

This map unit is north of Pembroke in the southeastern part of the county and near LaFayette in the southwest corner. The soils are on a part of the Mississippian Plateau and are underlain by limestone.

This map unit occupies about 3 percent of the county. About 54 percent is Nicholson soils and 46 percent is soils of minor extent.

Nicholson soils have a fragipan at a depth of about 2 feet. They are moderately well drained, have a loamy subsoil, and have a seasonal perched water table. The surface layer is silt loam, and tilth is good.

The soils of minor extent are the somewhat poorly drained Lawrence soils and the poorly drained Robertsville soils on upland flats and in depressions, the well drained Pembroke and Crider soils on knolls and adjoining ridges, and the somewhat poorly drained Newark soils and the poorly drained Melvin soils along drainageways and in depressions.

The soils in this unit are used mostly for cultivated crops, hay, and pasture. Most of the acreage has been cleared. Some areas contain small shallow basins and upland flats that are poorly drained. Most undrained areas are in woodland.

The potential of most of these soils is fair for cultivated crops. Wetness and erosion are limitations for farming, but these can be overcome. The potential is good for woodland and for openland and woodland wildlife habitat. Some wet flats have good potential for shallow water areas and for wetland wildlife. The potential for residential uses and other urban uses is only fair because of wetness and slow permeability, which are difficult to overcome. The potential is fair for intensive recreation areas and is good for extensive recreation areas.

8. Robertsville-Lawrence

Deep, nearly level, poorly drained and somewhat poorly drained loamy soils

This map unit is in the southwestern part of the county. The soils are mainly in large basins of several hundred acres that are separated by nearly level plains. A few basins are small, long and narrow, and have sluggish outlets. The large basins have no outlets or have very slow outlets. The soils are very wet in winter and spring, and they commonly dry out in summer and fall.

This map unit occupies about 1 percent of the county. About 57 percent is Robertsville soils, 32 percent is Lawrence soils, and 11 percent is soils of minor extent.

In most places Robertsville soils are in basins and are slightly lower in elevation than Lawrence soils. The Lawrence soils in most places are on the plains between Robertsville soils. Robertsville soils are poorly drained, and Lawrence soils are somewhat poorly drained. Robertsville soils have a fragipan at a depth of about 1.5 feet, and Lawrence soils have a fragipan at a depth of about 2 feet. Both soils have a surface layer of silt loam, a seasonal high water table, and remain saturated for long periods.

The soils of minor extent consist almost entirely of the moderately well drained Nicholson soils on elevated knolls between flat areas.

The soils in this unit are used mainly for woodland. Some areas between the large flats are cleared and are used mainly for soybeans. A few areas are in pasture.

The potential of these soils is poor for farming and most other uses. Wetness is the main limitation. Flooding and ponding are common in winter and spring. Adequate outlets prevent use of drainage measures. If major drainage is accomplished, potential for crops is fair. The potential for woodland is good. Equipment use is limited to dry weather. The potential is good for development of wetland wildlife habitat.

Areas dominated by well drained, deep to moderately deep, gently sloping to moderately steep soils

The three map units in this group are made up of soils that are on broad ridges, ridgetops, and plateaus and in karst rolling areas along streams and cavernous sinkholes. These units make up about 42.5 percent of the county and are in the southern part, mainly south of Hopkinsville. The major soils in these units do not have a fragipan.

9. Pembroke-Fredonia-Caneyville

Deep and moderately deep, gently sloping and sloping, well drained loamy or clayey soils

This map unit is in small areas scattered from east to west across the central part of the county (fig. 7). The soils are in geological mixed areas of the Lower mid-Mississippian System.

This map unit occupies about 3.5 percent of the county. About 31 percent is Pembroke soils, 21 percent is Fredonia soils, 18 percent is Caneyville soils, and 30 percent is soils of minor extent.

Pembroke soils are between areas of Fredonia soils or between Fredonia and Caneyville soils. In places, they are intermingled with Fredonia soils. Pembroke, Fredonia, and Caneyville soils are well drained. Pembroke soils are 60 inches or more deep to limestone bedrock, and Fredonia and Caneyville soils are 20 to 40 inches deep to limestone bedrock. Fredonia and Caneyville soils have an occasional outcrop of rock. All these soils formed in material weathered from limestone and have a clayey subsoil, except Pembroke soils which formed in part from loess and are loamy in the upper part of the subsoil. All these soils have a surface layer of silt loam, except in severely eroded areas where the surface layer of Caneyville soils is silty clay.

The soils of minor extent are the well drained, gently sloping Crider soils; the well drained, sloping Vertrees soils in karst areas; the moderately well drained Nicholson and Sadler soils on connecting ridges; and the Nolin and Lindside soils in depressions.

The soils in this unit are used mainly for pasture, but some are used for cultivated crops. Most of the acreage has been cleared, but some areas are in woodland.

The potential of these soils is good for pasture and is fair for cultivated crops, including specialty crops. The moderate depth to bedrock, hazard of erosion, and high content of clay in the subsoil are limitations for cultivated crops and specialty crops. The potential for urban development is fair. Low strength and depth to bedrock are limitations but can be overcome by careful design and planning. The potential is good for woodland and extensive recreation areas and is fair for intensive recreation areas. The potential is good for development of openland and woodland wildlife habitat.

10. Pembroke-Crider

Deep, gently sloping, well drained loamy soils

This map unit is in a large area that is dominant in the southern part of the county. The soils are in broad areas on the Mississippian Plateau. These are areas of high grade, cavernous limestone capped with medium to thin layers of loess (fig. 8).

This map unit occupies about 32 percent of the county. About 45 percent is Pembroke soils, 22 percent is Crider soils, and 33 percent is soils of minor extent.

Pembroke soils are mainly in the more undulating karst areas. Crider soils in most places are on the broad, smooth, higher ridges. In some places both soils are on the same kind of positions on the landscape and at the same elevation. The proportion of Crider soils tends to increase from east to west relative to the proportion of Pembroke soils. Both soils are well drained and have a surface layer of silt loam. Pembroke soils have a darker surface layer than Crider soils. Both soils formed in a mantle of loess and the underlying material weathered from limestone. Both are loamy in the upper part of the

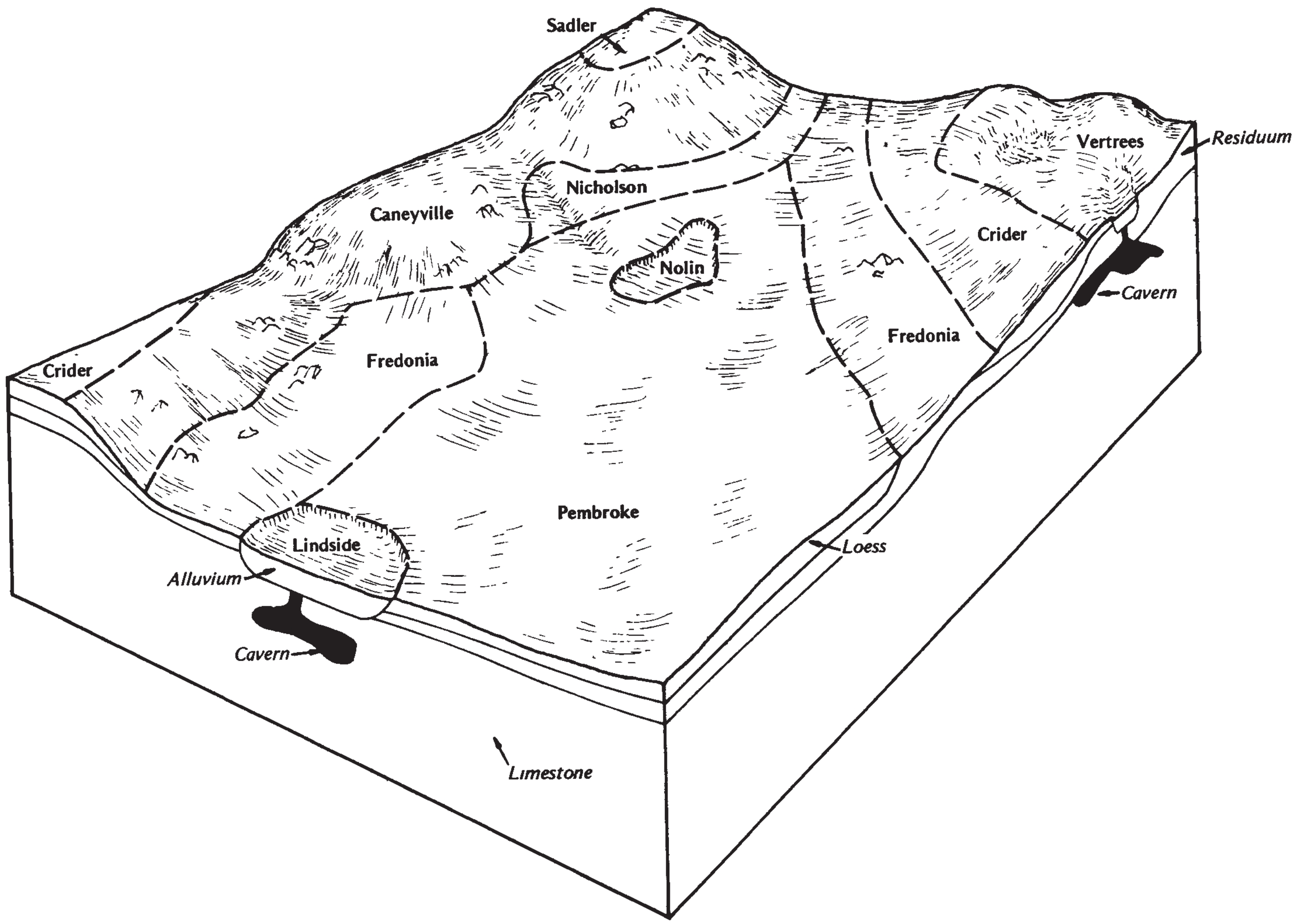


Figure 7.—Typical pattern of soils and underlying material in the Pembroke-Fredonia-Caneyville unit.

subsoil and clayey in the lower part, and both have good tilth.

The soils of minor extent are the moderately well drained Nicholson soils and somewhat poorly drained Lawrence soils on ridges and in slight depressions; the well drained Hammack, Vertrees, and Baxter soils in karst areas; and the well drained Nolin soils and moderately well drained Lindside soils in depressions and along drainageways.

The soils in this unit are used intensively for cultivated crops and beef cattle production. Most of the acreage has been cleared.

The potential of these soils is good for most uses. The most popular cropping system is three crops in two years in a rotation of corn, small grain, and soybeans. No-till methods are used on most farms for one or more crops in the rotation. Most farms are used for cash grain crops and tobacco, but some are used for grain crops and beef production. Dark-fired and burley tobacco are grown on most farms, and dark air-cured tobacco is grown on some farms. The hazard of erosion is the main limitation for farming. No-till farming on the contour and returning crop residue to the soil permit intensive farming of row crops and specialty crops.

The potential of these soils is good for residential and urban uses. Low strength is a limitation but is easily overcome by using proper design and installation procedures. The potential is good for woodland and for intensive and extensive recreation areas.

11. Hammack-Baxter-Crider

Deep, gently sloping to steep, well-drained loamy soils

This map unit is in the southwest side of the county and in the southeast corner. The soils are in karst rolling areas along streams and cavernous sinkholes in the Mississippian System.

This map unit occupies about 7 percent of the county. About 22 percent is Hammack soils, 20 percent is Baxter soils, 20 percent is Crider soils, and 38 percent is soils of minor extent.

Hammack and Baxter soils are intermingled in areas dominated by cavernous sinkholes (fig. 9). Baxter soils are mainly on the steeper side slopes along streams. Crider soils are on broader ridges between the cavernous karst areas. All of these soils are deep and well drained. Baxter soils have a surface layer of cherty silt loam. Crider and Hammack soils have a surface layer of silt loam.

The soils of minor extent are the well drained Pembroke, Elk, Vertrees, and Nolin soils and the moderately well drained Nicholson soils. The Pembroke soils are on connecting ridges and side slopes, the Vertrees soils are on karst irregular side slopes, the Nicholson soils are on adjoining ridges, the Elk soils are on stream terraces, and the Nolin soils are in upland depressions and along stream drainageways.

The soils in this unit are used mainly for pasture, hay, and cultivated crops. Some of the steeper areas are in woodland.

The potential is fair for cultivated crops, if proper conservation practices are applied. The hazard of erosion is the main limitation for farming. In places, tilth is only fair because of the content of chert fragments and is a handicap for cultivated crops. Irregular slopes in some areas prevent the use of good conservation practices. These areas are better adapted to pasture and hay crops. The potential is good for woodland and fair

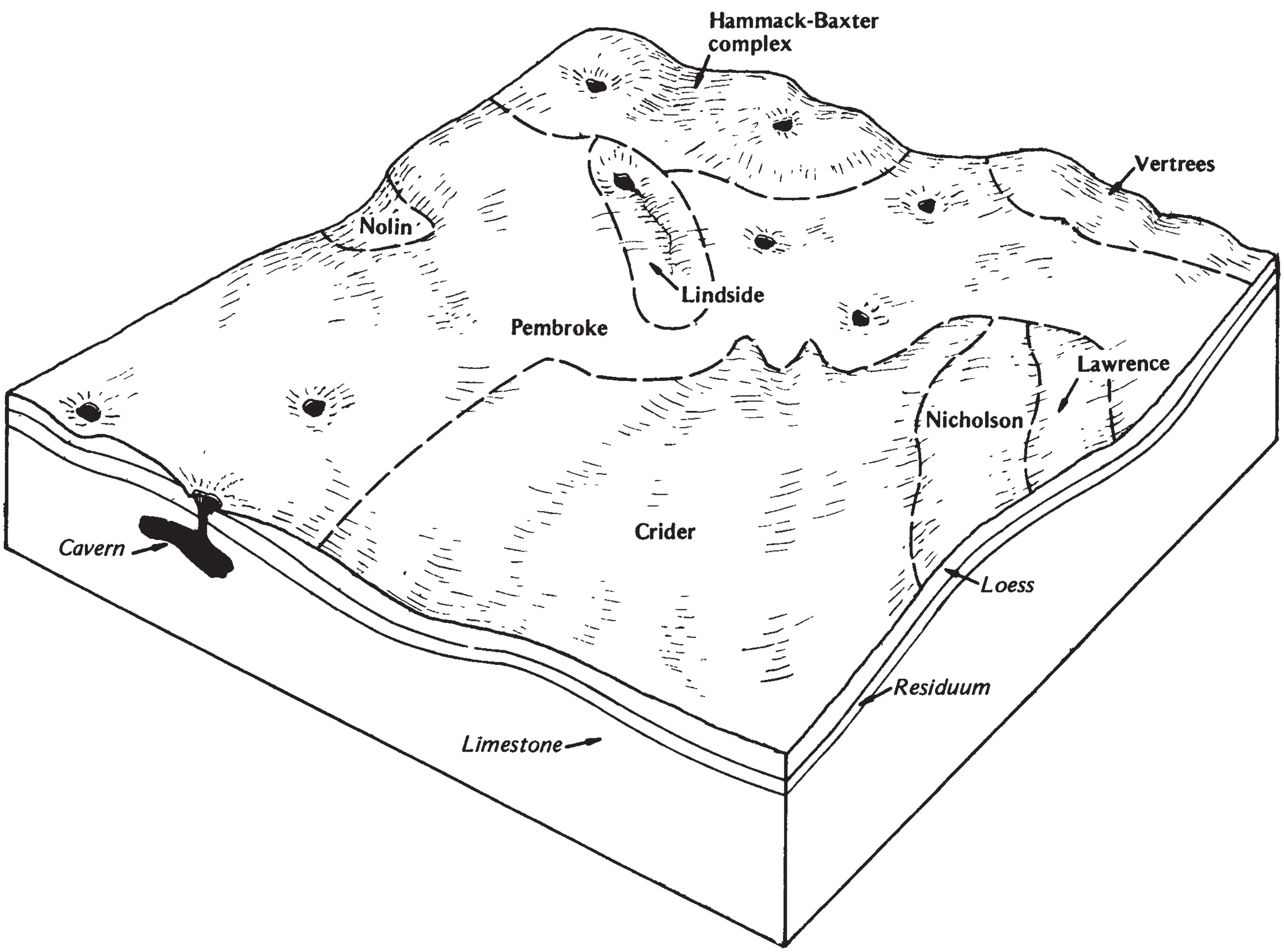


Figure 8.—Typical pattern of soils and underlying material in the Pembroke-Crider unit.

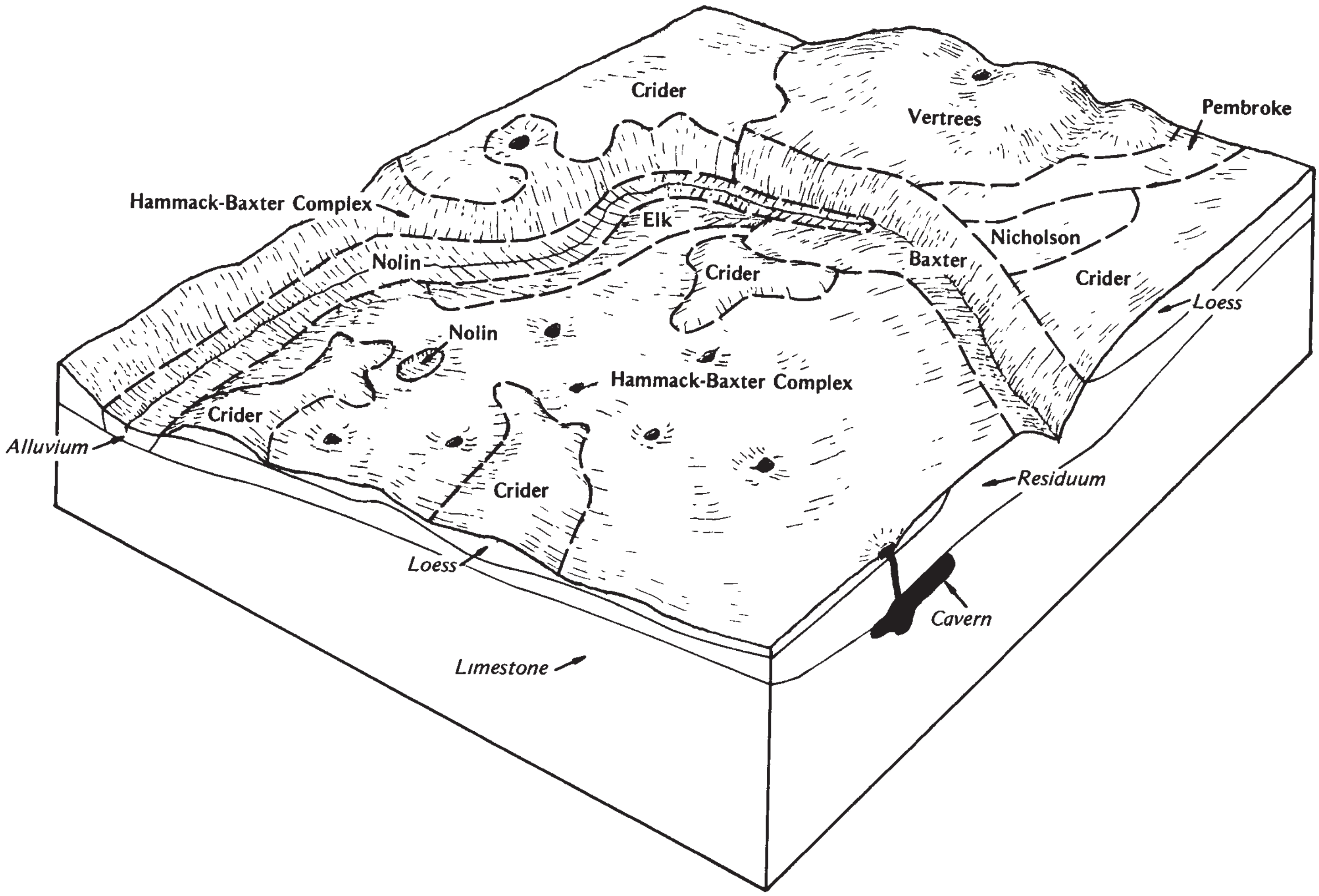


Figure 9.—Typical pattern of soils and underlying material in the Hammack-Baxter-Crider unit.

for most urban uses. For urban uses, low strength is the main limitation; however, steepness of slope, moderate shrink-swell potential, and high content of clay are other limitations. The potential is good for openland and woodland wildlife habitat. The potential is good for extensive recreation areas and is fair for intensive recreation areas. Steepness of slope and high content of chert are the main limitations for intensive recreation areas.

Broad land use considerations

Deciding which land should be used for urban development is an important issue for the city of Hopkinsville and other areas. Christian County is mainly agriculturally oriented, but in recent years urban development of industry and housing has been significant around Hopkinsville and Fort Campbell. Employment in the manufacturing industry has more than doubled since 1964. The sharpest employment gains have been in the metal products, machinery, and apparel industries.

The general soil map is most helpful for planning the general outline of urban areas; however, it cannot be used for the selection of sites for specific urban structures. In general, in the survey area the soils that have good potential for cultivated crops also have good potential for urban development. The data about specific soils in this survey can be helpful in planning future land use patterns.

Soils that have properties so unfavorable that they prohibit urban development are not extensive in the urbanized areas. Hopkinsville is in areas of the Pembroke-Crider unit and the Sadler-Zanesville-Nicholson unit, to the northeast. The Pembroke-Crider unit has few limitations for urban development, and the Sadler-Zanesville-Nicholson unit has moderate to severe limitations because of wetness caused by a perched water table. Both units have reasonably good potential for farming, but the Crider-Pembroke unit has better potential. Urban development further north in the Zanesville-Frondorf-Weikert unit is more expensive because of steep soils and, in part, because bedrock is a few feet below the surface. However, evaluation for development should consider that this unit is not as well suited to farming as other units.

The Sadler-Henshaw, Sadler-Zanesville-Nicholson, and Nicholson map units have good potential for farming but only fair or poor potential for nonfarm use. In these units wetness is a limitation to nonfarm uses. With proper drainage and shaping of the surface, this limitation can be overcome. It should be noted, however, that the soils have good potential for farming and, in places, drainage is sufficient or has been provided for most farm crops.

The Sadler-Henshaw, Sadler-Zanesville-Nicholson, and Nicholson map units have good potential for vegetables and other specialty crops, if proper drainage has been installed. Nursery crops can be grown on the less sloping soils of the Zanesville-Frondorf-Weikert unit. The Frondorf and Weikert soils are well drained and warm up earlier in spring than the heavier, wetter soils. The Pembroke-Fredonia-Caneyville and the Hammack-Baxter-Crider units have fair potential for specialty crops because of the high content of clay in the Fredonia and Caneyville soils and the high content of chert in the Baxter soils. Minor soils in these units have good potential for specialty crops.

Most soils in the county have good or fair potential for woodland. Commercially valuable trees are less common and generally do not grow as rapidly on the wetter soils of the Robertsville-Lawrence and Stendal-Bonnie units as they do on some other units. Slow growth can be expected on some soils in the Dekalb-Zanesville and Caneyville-Frondorf-Zanesville units because of the moderate depth to bedrock, lack of sufficient moisture in the Frondorf, Dekalb, and Caneyville soils, and high content of clay in the Caneyville soil.

The hilly Dekalb-Zanesville and Caneyville-Frondorf-Zanesville units have excellent potential for parks and extensive recreation areas. The Pennyrile State Forest is in the Dekalb-Zanesville unit. Hardwood forests enhance the beauty of most of this area. The undrained flats of the Robertsville-Lawrence unit and the swamp areas of the Stendal-Bonnie unit are good for nature study. All units provide habitat for many important species of wildlife.

The Pembroke-Crider unit has no significant limitations for most uses.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series.* Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Fredonia series, for example, was named for the town of Fredonia in Caldwell County, Kentucky.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Wellston silt loam, 2 to 6 percent slopes is one of several phases within the Wellston series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Frondorf-Weikert complex, 12 to 20 percent slopes is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Gullied land is an example, and in Christian County, is mapped in a complex with Zanesville soils. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

BaD—Baxter cherty silt loam, 12 to 20 percent slopes. This deep, well drained, moderately steep soil is on hills and side slopes. The hilly areas are karst and have irregular slopes. Areas on side slopes are generally dissected by drainageways. Areas are 10 to 40 acres.

Typically, the surface layer is dark grayish brown cherty silt loam about 5 inches thick. The subsoil is more than 91 inches thick. It is yellowish brown cherty silt loam in the upper 12 inches. The subsoil is red silty clay loam between depths of 17 and 22 inches, red cherty silty clay between 22 and 75 inches, and red and yellowish brown silty clay and clay between 75 and 96 inches.

This soil is medium in natural fertility. It is strongly acid and very strongly acid, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content is moderate in the surface layer. This soil has only fair tilth because of chert fragments; however, it can be worked throughout a wide range of soil moisture. This soil has low strength. Shrink-swell potential is moderate below a depth of about 20 inches.

Included with this soil in mapping are a few severely eroded areas of a soil that has a surface layer of yellowish brown or red silty clay loam and a few severely eroded areas of Baxter soils. Also included are a few small areas of Vertrees soils and a few areas of a soil that has a silt mantle 10 to 20 inches deep over chert residuum. The included soils make up about 20 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for pasture, hay, and trees. Some areas are occasionally used for cultivated crops.

This soil has poor potential for cultivated crops. The hazard of erosion is very severe when this soil is cultivated. The application of needed erosion control practices is difficult because of the irregular, moderately steep slopes.

This soil has good potential for pasture and hay crops. The very severe hazard of erosion and fair tilth are limitations in seeding. Seeding late in summer or early in fall, which generally are dry periods, prevents excessive erosion while establishing crops. Rotation grazing and renovation of old stands without plowing help to produce good yields and to control erosion. Crops respond well to a high level of fertility. Deep-rooted plants, such as alfalfa, are well suited.

This soil has good potential for northern red oak, yellow-poplar, shortleaf pine, eastern white pine, and loblolly pine. Good yields can be obtained. The moderately steep slope is a moderate limitation in using equipment.

This soil has poor potential for urban development. The moderately steep slope is a severe limitation that is relatively difficult to overcome. Low strength is a severe limitation.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IVe. The woodland suitability group is 2r.

BaE—Baxter cherty silt loam, 20 to 30 percent slopes. This deep, well drained, steep soil is dominantly on side slopes along Little River and West Fork of Red River. In a few places this soil is around deep cavernous sinkholes. Most slopes are irregular and are crossed by drainageways. Areas are from 7 to 40 acres.

Typically, the surface layer is dark grayish brown cherty silt loam about 5 inches thick. The subsoil is more than 91 inches thick. It is yellowish brown cherty silt loam in the upper 12 inches. Between depths of 17 and 22 inches the subsoil is red silty clay loam. It is red cherty silty clay between 22 and 75 inches, and red and yellowish brown silty clay and clay between 75 and 96 inches.

This soil is medium in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content is moderate in the surface layer. This soil has only fair tilth because of chert content. It has low strength. Shrink-swell potential is moderate below a depth of about 20 inches.

Included with this soil in mapping are a few severely eroded areas of soils that have small gullies and rills and a few severely eroded areas in which the surface layer is yellowish brown or red silty clay loam. Also included are a few small areas of Vertrees soils. The included soils make up approximately 20 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for woodland and pasture.

This soil has poor potential for cultivated crops. Steepness of slope is a severe limitation and is difficult to overcome.

This soil has fair potential for pasture. The very severe hazard of erosion and rapid runoff are severe limitations in establishing stands. Seeding late in summer and early in fall, which are commonly dry periods, generally prevents excessive erosion. Renovation of old stands without plowing is desirable. Rotation grazing and maintaining a high level of fertility help to maintain good stands and good production and to control erosion. This soil is suited to deep-rooted plants.

This soil has good potential for woodland. It is suited to northern red oak, yellow-poplar, shortleaf pine, eastern white pine, and loblolly pine. The steepness of slope causes moderate erosion and is a moderate limitation in using equipment.

This soil has poor potential for urban development and for most urban uses. The steepness of slope is a severe limitation and is very difficult to overcome.

This soil has good potential for woodland wildlife habitat.

This soil is in capability subclass VIe. The woodland suitability group is 2r.

Bo—Bonnie silt loam. This deep, poorly drained, nearly level soil is on flood plains and in upland depressions. The flood plains are subject to frequent flooding of long duration from December to May. The depressions are subject to ponding of short duration anytime during the year, if rains are heavy. Areas are 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. Below that, the substratum to a depth of 66 inches or more is gray silt loam mottled in shades of brown.

This soil is medium in natural fertility. It is strongly acid and very strongly acid throughout, except where limed. The root zone is deep, permeability is slow, and available water capacity is high. Runoff is very slow, and in places it is ponded. Organic matter content is low in the surface layer. This soil has fair tilth. In winter and spring, the water table is at or near the surface.

Included with this soil in mapping are small areas of Stendal and Lawrence soils and some small areas of soils that are similar to this Bonnie soil, except they have a surface layer of loam or fine sandy loam. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for woodland or pasture. A few areas are used for cultivated crops.

This soil has poor potential for cultivated crops, unless drained. The potential is poor because of wetness and flooding. Plowing, planting, tillage, and harvesting are commonly delayed in most years from one week to several weeks because of excessive wetness. The potential is increased by the installation of a drainage system and control of runoff from adjacent areas. If drained, this soil has fair potential for cultivated crops and good potential for such short season crops as soybeans. The mid-season crops are seldom destroyed by flooding; however, they should be harvested before the rains in fall. Winter grain crops are not suited to this soil because of wetness and flooding. Maintaining the level of fertility, liming according to crop needs, and returning crop residue to the soil help to produce good yields and to maintain organic matter content and tilth.

This soil has fair potential for pasture and hay. Wetness and flooding are limitations. Pasture grasses and legumes that tolerate flooding for short periods are best suited. Grazing should be restricted in wet periods. Overgrazing and grazing when the water table is near the surface can damage the plant cover, increase possible weed competition, and make early renovation necessary.

This soil has good potential for woodland. Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, and pin oak are suited. The limitation for equipment is severe because of wetness, but this can be overcome by using equipment in dry periods. If seedlings are planted, undesirable plant competition needs to be controlled.

This soil has poor potential for urban development and urban uses. The limitations are flooding and wetness. Even if this soil is protected from flooding, and drainage is improved, wetness is a limitation for many uses.

This soil has good potential for development of wetland wildlife habitat. It is suited to wetland plants and shallow water developments.

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

CaB—Caneyville silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on relatively narrow, smooth, convex ridges and benches on broken uplands. A few areas are karst, and some areas have an occasional Rock outcrop. Areas are 4 to 12 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil is about 29 inches thick. It is yellowish red silty clay to a depth of 16 inches. Below that to a depth of 34 inches, the subsoil is yellowish brown clay that has mottles in shades of red and gray. Hard gray limestone bedrock is at a depth of 34 inches.

This soil is medium in natural fertility. It is very strongly acid to medium acid in the upper part and medium acid to mildly alkaline in the lower part. The root zone is moderately deep, permeability is moderately slow, and available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer. Tilth is moderately good, and shrink-swell potential is moderate. This soil has low strength. Bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of a soil that is clayey and less than 20 inches deep to bedrock and small areas of a soil that is very similar to this Caneyville soil but is more than 40 inches deep to bedrock. Also included are a few small areas of Fredonia soils. The included soils make up less than 15 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil are used for hay, pasture, and woodland. A few areas are used for cultivated crops.

This soil has fair potential for cultivated crops, pasture, and hay. The potential of this soil for cultivated crops, hay, and pasture is limited by the moderate depth to rock and clayey subsoil. The clayey subsoil limits the available water capacity. In years when rainfall is sufficient, however, good production can be obtained. Erosion is a moderate limitation for cultivated crops. Contour tillage, no-till farming, return of crop residue to the soil, and rotation to pasture or hay help reduce runoff, control erosion, and maintain organic matter content and tilth. The rooting depth limits deep-rooted pasture or hay plants on this moderately deep soil.

This soil has good potential for northern red oak, yellow-poplar, eastern redcedar, Virginia pine, eastern white pine, shortleaf pine, and loblolly pine. The use of equipment is restricted in wet seasons because of the high clay content. Control of weeds can reduce mortality of young seedlings.

This soil has fair potential for urban development and most other nonfarm uses. Moderate depth to rock and low strength are the main limitations. For septic tank absorption fields the limitations are severe; the moderate depth to rock and moderately slow permeability are difficult to overcome.

This soil has high potential for openland and woodland wildlife habitat.

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

CaC—Caneyville silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping to rolling soil is on ridges, benches, and lower side slopes. Most areas are dissected by drainageways, and some have an occasional Rock outcrop. Areas are 10 to 25 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil is about 29 inches thick. It is yellowish red silty clay to a depth of 16 inches, and below that it is yellowish brown clay that has mottles in shades of red and gray. Hard gray limestone bedrock is at a depth of 34 inches.

This soil is medium in natural fertility. It is very strongly acid to medium acid in the upper part and medium acid to mildly alkaline in the lower part. The root zone is moderately deep, permeability is moderately slow, and available water capacity is moderate. Runoff is moderately rapid. Organic matter content is moderate in the surface layer. Tilth and shrink-swell potential are moderate. This soil has low strength. Bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping is a yellowish brown clayey soil that has bedrock at a depth of less than 20 inches and a soil that is similar to this Caneyville soil, except it has bedrock at a depth of more than 40 inches. Also included are a few small areas of Wellston soils and some areas of soils that have slopes of more than 12 percent. The included soils make up less than 20 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for hay, pasture, and woodland. A few areas are used for cultivated crops.

This soil has fair to poor potential for most cultivated crops. The severe hazard of erosion, irregular slopes, and size and location of areas are limitations for farming. The moderate depth to rock and clayey subsoil limit available water capacity. Contour tillage is difficult because of irregular slopes. Minimum tillage, contour cultivation, return of crop residue to the soil, cover crops, and including a rotation of grasses and legumes in the cropping system help to control erosion.

This soil has fair potential for pasture and hay crops. Low available water capacity limits production. Also, rooting depth limits deep-rooted pasture and hay crops.

This soil has good potential for woodland. Suitable species are northern red oak, yellow-poplar, eastern redcedar, Virginia pine, eastern white pine, shortleaf pine, and loblolly pine. The use of equipment is restricted in most seasons because of the high clay content. Control of weeds can reduce mortality of young seedlings.

For most urban uses, this soil has fair potential. Moderate depth to rock, slope, low strength, and moderate shrink-swell potential are limitations. Except for depth to rock, most of these can be overcome by good design and proper installation methods. This soil has severe limitations for septic tank absorption fields. The moderate depth to rock and moderately slow permeability are difficult to overcome.

This soil has good potential for openland and woodland wildlife habitat.

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

CnD3—Caneyville silty clay, 6 to 20 percent slopes, severely eroded. This moderately deep, well drained, sloping to moderately steep, severely eroded soil is on broken ridges, on side slopes, and in karst areas. Some areas have occasional Rock outcrop, and some have deep gullies. Areas are 5 to 25 acres.

Typically, the original surface layer has been removed by water erosion. The present surface layer consists mainly of subsoil material and is brown or yellowish brown silty clay about 5 inches thick. Below this, to a depth of 29 inches, the subsoil is yellowish red to yellowish brown clay that has mottles in shades of red and gray in the lower part. Hard gray limestone bedrock is at a depth of 29 inches.

This soil is low in natural fertility. It ranges from very strongly acid in the upper part to mildly alkaline in the lower part. The root zone is moderately deep, permeability is moderately slow, and available water capacity is moderate. Runoff is rapid. Organic matter content is low in the surface layer. Tilth is poor. This soil is very difficult to work, and it tends to form clods and crust because of the low organic matter content and clayey texture. Shrink-swell potential is moderate. This soil has low strength. Bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of clayey soils that are less than 20 inches deep to bedrock, a few areas of Rock outcrop, and some small areas of Gullied land. Some areas on the upper rim of side slopes include severely eroded Frondorf soils.

Most areas of this soil are idle or covered with second-growth woodland or scrub pasture. A few areas of pasture have been renovated.

This soil has fair potential for pasture and hay. The severe hazard of erosion, poor tilth, low organic matter content, and irregular slopes are limitations in establishing crops, maintaining good production, and using equipment. Land smoothing before seeding is needed in some areas. A short summer fallow assists in preparing a seedbed. Because of the hazard of erosion and poor tilth, seeding pasture or hay late in summer or early in fall is desirable. Generally there is less rainfall in the summer and fall, and the hazard of erosion is slight. This soil responds well to optimum fertilizer and lime. To increase the pH of the surface layer of this soil, more lime is needed than on other Caneyville soils, because this soil has a higher content of clay. Good cover should be established quickly, and overgrazing should be avoided.

This soil has poor potential for cultivated crops because of the hazard of erosion, poor tilth, low organic matter content, irregular slopes, and other undesirable features.

This soil has fair potential for trees. Natural revegetation generally is eastern redcedar. Trees to plant are Virginia pine, shortleaf pine, and loblolly pine. Seedling mortality is a moderate limitation. Steepness of slope is a severe limitation for using equipment. The severe hazard of erosion, clayey surface layer, and low organic matter content create droughty conditions for seedlings. Slope and the clayey soil make machine planting difficult.

This soil has poor potential for all urban uses. The moderate depth to rock, moderately slow permeability, low strength, high clay content, and slope are severe limitations for most uses.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass VIe. The woodland suitability group is 3c, north aspect, and 4c, south aspect.

CoD—Caneyville-Rock outcrop complex, 6 to 30 percent slopes. This map unit consists of moderately deep, well drained, sloping to steep Caneyville soils and Rock outcrop. The soil and Rock outcrop are so intermingled that to separate them in mapping was not feasible. This unit is on broken ridges and side slopes and in karst areas. Areas are 100 to more than 2,000 feet wide and 15 to 40 acres.

Caneyville soils make up about 35 percent of the unit, Rock outcrop makes up 35 percent, and included soils make up the rest.

Typically, the surface layer of the Caneyville soil is brown silt loam about 5 inches thick. The subsoil is about 29 inches thick. It is yellowish red silty clay to a depth of 16 inches, and below that, to a depth of 34 inches, it is yellowish brown clay that has mottles in shades of red and gray. Hard gray limestone bedrock is at a depth of 34 inches.

The Caneyville soil is medium in natural fertility. It is very strongly acid to medium acid in the upper part and medium acid to mildly alkaline in the lower part. The root zone is moderately deep, permeability is moderately slow, and available water capacity is moderate. Surface runoff is rapid. Organic matter content in the surface layer is moderate. This soil has low strength. Shrink-swell potential is moderate. Bedrock is at a depth of 20 to 40 inches.

Exposures of Rock outcrop range from 3 feet to more that 10 feet across, are from 10 to 40 feet apart, and cover about 25 to 50 percent of the surface.

Included with this unit in mapping are areas of brownish clayey soils that are near Rock outcrop and are less than 10 inches to bedrock. Also included are brownish or yellowish brown clayey soils 10 to 20 inches deep over bedrock. Small narrow areas of Nolin soils are included along drainageways.

Most areas of this unit are wooded. This soil has poor potential of farming and urban uses. Rock outcrop, shallow soil near outcrops, and steep slope are severe limitations that are very difficult to overcome.

This unit has fair potential for such native trees as yellow-poplar, oaks, eastern redcedar, and hickory. It has moderate potential for Virginia pine. Erosion is a hazard because of slope. The use of equipment is restricted because of Rock outcrop and the steep slope.

This unit has good potential for woodland wildlife habitat and extensive recreation areas.

This Caneyville soil is in capability subclass VIIe. The woodland suitability group is 2c, north aspect, and 3c, south aspect.

CrA—Crider silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on broad smooth ridges. Areas are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of about 99 inches. The upper part of the subsoil, to a depth of 18 inches, is brown silt loam, and below this, to a depth of 33 inches, it grades to reddish brown silty clay loam. The lower part of the subsoil, to a depth of 61 inches, is red silty clay loam, and below this it is dark red clay.

This soil is high in natural fertility. It is strongly acid to neutral in the surface layer and upper part of the subsoil and is strongly acid to medium acid in the lower part of the subsoil. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good, and this soil can be worked throughout a moderately wide range of soil moisture. This soil has low strength. It has low shrink-swell potential in the upper part of the subsoil and moderate shrink-swell potential in the lower part.

Included with this soil in mapping are small areas of Pembroke, Nicholson, and Nolin soils. Also included in a few depressions is a soil that has 10 to 20 inches of brown silt loam overwash. The included soils make up about 10 to 25 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are used for residential and urban developments.

This soil has good potential for intensive cultivated crops, including specialty crops. This soil has no significant limitations. Its potential for high yields is limited by unseasonable weather. Returning crop residue to the soil helps maintain good tilth and organic matter content.

This soil has good potential for woodland. Control of weeds is needed to establish seedlings in open fields.

This soil has good potential for urban uses. Low strength is a moderate limitation for buildings and a severe limitation for local roads and streets. This limitation can be easily overcome by proper design and careful installation procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1o.

CrB—Crider silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad, smooth ridges. Areas are 20 to 80 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of about 99 inches. The upper part of the subsoil, to a depth of 18 inches, is brown silt loam, and below this, to a depth of 33 inches, it grades to reddish brown silty clay loam. The lower part of the subsoil, to a depth of 61 inches, is red silty clay loam, and below this it is dark red clay.

This soil is high in natural fertility. It is strongly acid to neutral in the surface layer and upper part of the subsoil and is strongly acid or medium acid in the lower part of the subsoil. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good, and this soil can be worked throughout a moderately wide range of soil moisture. This soil has low strength. It has low shrink-swell potential in the upper part of the subsoil and moderate shrink-swell potential in the lower part.

Included with this soil in mapping are small areas of Pembroke, Nicholson, and Nolin soils. In some parts of the county, Crider and Pembroke soils are mapped in a complex, and Pembroke soils make up as much as 20 percent of the complex. The included soils make up about 15 to 25 percent of mapped areas. Individual areas of included soils are less than 4 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are used for residential and urban developments.

This soil has good potential for cultivated crops. It is one of the more productive soils in the county. It is used intensively in most places by growing three crops, such as corn, small grain, and soybeans, in a 2-year rotation. The hazard of erosion is moderate when this soil is cultivated. Methods that help to control erosion and maintain organic matter content and good tilth are stripcropping (fig. 10), contour tillage, terraces, cover crops, and returning crop residue to the soil.

This soil has good potential for hay and pasture. Deep-rooted crops adapt well, and production of pasture and hay is high if management is good. Hay or pasture fits well into a cropping system that includes grain. Crop rotation along with other practices helps to control erosion and maintain organic matter content and good tilth.

This soil has good potential for northern red oak, yellow-poplar, black walnut, and eastern white pine. Control of weeds is needed to establish seedlings in an open field.

This soil has good potential for urban uses. Low strength is a moderate limitation for buildings and a severe limitation for local roads and streets. This limitation can be overcome by good design and careful installation procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

CrC—Crider silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on side slopes that break from gently sloping soils on broad ridges. This soil is also on toe slopes and benches. Areas are 3 to 15 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of about 99 inches. The upper part of the subsoil, to a depth of 18 inches, is brown silt loam, and below this, to a depth of 33 inches, it grades to reddish brown silty clay loam. The lower part of the subsoil, to a depth of 61 inches, is red silty clay loam, and below this it is dark red clay.

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

Figure 10.—Stripcropping of alternate grasses and legumes and row crops The soil is Crider silt loam, 2 to 6 percent slopes.

surface layer. Tilth is good. This soil can be worked throughout a moderately wide range of soil moisture. This soil has low strength. It has low shrink-swell potential in the upper part of the subsoil and moderate shrink-swell potential in the lower part.

Included with this soil in mapping are small areas of Pembroke and Nolin soils. Also included are small eroded spots that have a redder surface layer than this Crider soil and a few areas of soils that have slopes of more than 12 percent.

Most areas of this soil are used for pasture, hay, and cultivated crops. A few areas are used for woodland.

This soil has fair potential for cultivated crops. All crops commonly grown in the county are suited. The hazard of erosion is severe and is the main limitation. Methods that help to control erosion are minimum tillage, contour tillage, stripcropping, terraces, and cover crops. Return of crop residue to the soil also helps to control erosion and maintain organic matter content and good tilth.

This soil has good potential for pasture and hay crops, including deep-rooted crops. Pasture or hay fits well into a cropping system with grain and, along with other practices, helps to control erosion and maintain organic matter content and good tilth.

This soil has good potential for northern red oak, yellow-poplar, black walnut, and eastern white pine. Control of weeds is needed to establish seedlings in open fields.

This soil has fair potential for urban uses. Slope and low strength are severe limitations for some uses. These limitations can be overcome by proper design and careful installation and construction practices.

This soil has good potential for openland and woodland wildlife habitat.

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

Cu—Cuba silt loam. This deep, well drained, nearly level soil is on flood plains. Flooding of brief duration is frequent in most areas from December to May. Areas are 3 to 50 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 20 inches thick. It is dark yellowish brown silt loam. The substratum, between depths of 30 and 50 inches, is yellowish brown silt loam that has faint brownish mottles, and between depths of 50 and 66 inches, it is silt loam mottled in shades of brown and gray.

This soil is high in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength.

Included with this soil in mapping are small areas of Steff, Stendal, and Skidmore soils. Also included are some areas of soils that are similar to this Cuba soil, except they have a surface layer of loam or fine sandy loam.

Most areas of this soil are used for cultivated crops, hay, and pasture.

This soil has good potential for cultivated crops, except winter grain crops. Winter grain crops have poor potential because of flooding in winter and spring. This soil can be used intensively for cultivated crops in most years. Crops respond well to a high level of fertilization. Generally, in most years, crops are not destroyed by seasonal flooding. Return of crop residue to the soil helps maintain organic matter content and good tilth. Some areas need diversion ditches at the base of joining slopes to prevent overwash.

This soil has good potential for pasture and hay. Grasses and legumes that withstand flooding for short periods are better suited than most other crops to this soil. Productive stands of pasture grasses and legumes are easy to establish and maintain. Grazing should be controlled to prevent overgrazing and should be restricted when the soil is saturated.

This soil has good potential for eastern white pine, black walnut, and yellow-poplar. In places, seedlings planted on this soil require mechanical and chemical controls to reduce competition from grasses, weeds, and hardwood sprouts.

This soil has poor potential for most urban uses. Flooding is a severe limitation and is not feasible to overcome. This soil has good potential as topsoil; however, it has low strength for fill material under foundations.

This soil has good potential for woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1o.

DkF—Dekalb channery sandy loam, 20 to 40 percent slopes. This moderately deep, well drained, steep soil is on rough broken upland. It is on long convex side slopes made irregular by drainageways. Areas range from 10 to 200 acres but average about 53 acres.

Typically, the surface layer is dark brown channery sandy loam about 5 inches thick. The subsoil is about 23 inches thick. It is yellowish brown channery sandy loam to a depth of about 17 inches, and below that it is yellowish brown very channery sandy loam to a depth of 28 inches. The substratum is about 2 inches thick. It is yellowish brown very channery loamy sand. Grayish brown sandstone bedrock is at a depth of 30 inches.

This soil is low in natural fertility. It is very strongly acid or strongly acid throughout. The root zone is moderately deep, permeability is rapid, and available water capacity is low. Runoff is rapid. The organic matter content is low. The tilth is poor because of the content of coarse fragments, but this soil can be worked at almost any moisture content without clodding or crusting. The content of small stones and other coarse fragments makes the use of tillage implements difficult. Bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few small areas of Riney, Weikert, and Wellston soils, a few narrow sandstone rock escarpments, and small areas of a soil that is similar to this Dekalb soil in texture but has bedrock at a depth of 20 inches or less. A few areas of clayey soils that formed in material weathered from shale are included. The included soils make up 15 to 30 percent of the areas. Included areas are less than 5 acres.

Most areas of this soil are used for woodland. A few small areas are used for pasture.

This soil has poor potential for farming. The steep slope, content of small stones, moderate depth to bedrock, and low available water capacity are limitations to farming. These limitations are very difficult to overcome.

This soil has fair potential for woodland, and most areas are in natural stands of mixed oaks, maple, white pine, and hemlock. Trees suitable for planting on south slopes are eastern white pine and Virginia pine. Those suitable for north-facing slopes are eastern white pine, Virginia pine, and loblolly pine. In use and management, the hazard of erosion is moderate. Logging roads and skidtrails need to be on the contour to help control erosion. Use of equipment has severe limitations. Steep slopes and small stones restrict equipment. Mortality of seedlings and young planted trees is moderate on south-facing slopes where the soil dries quickly.

This soil has poor potential for most urban uses because of the steepness of slope, moderate depth to rock, and the content of small stones. These are severe limitations and are difficult to overcome.

This soil has fair potential for openland and woodland wildlife habitat and good potential for extensive recreation areas.

This soil is in capability subclass VIIe. The woodland suitability group is 2f, north aspect, and 3f, south aspect.

Du—Dunning soils. These are deep, nearly level, very poorly drained to poorly drained soils on flats and in depressions on flood plains, streamheads, and ponded areas. These soils are commonly flooded from December through May. Areas are 5 to 20 acres.

Dunning silt loam that has about 8 inches of overwash makes up about 50 percent of this unit, and Dunning silty clay loam makes up about 45 percent. Some mapped areas are mostly overwashed, some are mostly Dunning silty clay loam, and some areas contain both soils.

Typically, the surface layer is very dark grayish brown silty clay loam about 7 inches thick. The subsurface layer is about 9 inches thick. It is very dark gray silty clay loam that has a few light olive brown mottles. The subsoil is about 29 inches thick. It is dark gray silty clay and has mottles in shades of brown. The substratum is at a depth of about 45 inches. To a depth of 68 inches, it is dark gray clay and has many medium, prominent mottles in shades of brown.

These soils are high in natural fertility. They are medium acid to mildly alkaline throughout. The root zone is deep, permeability is slow, and available water capacity is high. Runoff is slow to very slow and is ponded in some areas. In winter and spring the water table is on or near the surface. Tilth is poor in areas where the surface layer is silty clay loam. In these areas, the range of soil moisture is narrow in which the soil can be worked and in which a good seedbed can be prepared without clods forming. Tilth is good in areas that have a silt loam overwash, and the soil can be worked at the wider range of moisture. These soils have moderate shrink-swell potential and low strength.

Included with these soils in mapping are a few areas of Robertsville, Lawrence, Newark, and Melvin soils. The included soils make up about 5 percent of mapped areas. Individual areas of included soils are less than 2 acres.

Most areas of these soils have been cleared and are used for pasture or hay and for cultivated crops, if drained. Some areas are wooded.

These soils have poor potential for cultivated crops. Wetness and flooding are severe limitations. Plowing, planting, tillage, and harvesting are commonly delayed from 2 to 6 weeks because of excessive wetness. The potential is fair if these soils are drained. Tile drains, open ditches, and improvement of channels reduce wetness. Some areas do not have suitable outlets for a tile system. In some areas ditches can be used to control runoff and overwash from adjacent soils. Where drained, production is good for soybeans, corn, and other crops. Short-season crops need to be planted so they mature and can be harvested in fall before the rainy period. Winter grain crops are not suited because of wetness and flooding. Return of crop residue to the soil helps tillage and reduces clodding.

These soils have fair potential for pasture and hay crops. Pasture is better suited than cultivated crops, unless the soils are drained. Pasture grasses and legumes that tolerate wetness and flooding are better suited than most other crops. Grazing should be restricted in wet periods. Grazing animals can compact the soil and cause excessive damage to the plants when the soil is saturated. Overgrazing results in thin cover of pasture plants and permits increased competition from weeds.

These soils have good potential for pin oak, sweetgum, loblolly pine, and eastern cottonwood. Wetness is a severe limitation for using equipment. Dry periods can be selected for most equipment needs, including logging.

These soils have poor potential for most urban uses. Even if they are protected from flooding, they are poorly suited for most uses because of the extreme wetness and seasonal high water table. The moderate shrink-swell potential, low strength, and slow permeability also affect most urban uses.

These soils have good potential for wetland plants and shallow water areas for wildlife habitat.

This unit is in capability subclass IIIw. The woodland suitability group is 1w.

ElA—Elk silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on stream terraces between the more nearly level drainageways or depressions and the gently sloping soils on uplands. From January to April, areas are subject to rare flooding of brief duration. Areas are 5 to 20 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is between depths of 9 and 50 inches. It is yellowish brown silty clay loam and is mottled in shades of gray below a depth of 34 inches. The substratum, to a depth of 68 inches or more, is yellowish brown heavy silty clay loam and is mottled in shades of brown and gray.

This soil is high in natural fertility. It is medium acid to very strongly acid in the surface layer and subsoil, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good, and this soil can be worked throughout a moderately wide range of soil moisture. This soil has low strength.

Included with this soil in mapping are a few small areas of Nolin, Nicholson, and Crider soils. Also included are areas of soils that have a surface layer of brown overwash 10 to 20 inches thick. The included soils make up about 10 to 25 percent of mapped areas. Individual areas of included soils are less than 2 acres.

Most areas of this soil have been cleared and are used intensively for cultivated crops. A few areas are used for pasture or hay, and some areas are used for such specialty crops as tobacco.

This soil has good potential for most cultivated crops, hay, and pasture. The only limitation is flooding. Flooding is brief and in most years does not occur after April. Winter crops, such as small grain, have only fair potential because of flooding, but in most years these crops survive the flooding. Return of crop residue to the soil helps maintain the organic matter content and good tilth.

This soil has good potential for black walnut, yellow-poplar, white oak, red oak, and eastern white pine. If seedlings are planted, control of plant competition is needed.

For urban development, this soil has poor potential. Flooding is a limitation and is difficult to overcome. Low strength and flooding are limitations in building roads and streets. These can be overcome by proper design and construction procedures.

This soil has good potential for development of openland and woodland wildlife habitat.

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

ElB—Elk silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on stream terraces, mainly between the less sloping alluvial soils and soils on uplands. From January to April most areas are subject to some flooding of brief duration. Areas are in long bands that are narrow in proportion to length and are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is between depths of 9 and 50 inches. It is yellowish brown silty clay loam and, below a depth of 34 inches, is mottled in shades of gray. The substratum, to a depth of 68 inches or more, is yellowish brown heavy silty clay loam and is mottled in shades of brown and gray.

This soil is high in natural fertility. It is medium acid to very strongly acid in the surface layer and subsoil, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good, and this soil can be worked throughout a moderately wide range of soil moisture. This soil has low strength.

Included with this soil in mapping are a few small areas of Crider and Nicholson soils. Also included are a few eroded spots near drainageways that have a surface layer of yellowish brown light silty clay loam. The included soils make up less than 15 percent of mapped areas. Individual areas of included soils generally are less than 1 acre.

Most areas of this soil are used for cultivated crops, hay, and pasture.

This soil has good potential for cultivated crops, hay, and pasture. The hazard of erosion is moderate for cultivated crops. Contour tillage, stripcropping, no-till farming, and return of crop residue to the soil help control erosion and maintain good tilth and organic matter content. Hay and pasture fit well into a cropping system with grain crops and help supplement other practices in controlling erosion and maintaining organic matter content and good tilth. Flooding is a limitation but in most years does not occur after April. Duration of flooding is generally brief, and crops commonly are not destroyed. Winter crops, such as small grain, have only fair potential because of flooding, but in most years these crops survive the flooding.

This soil has good potential for woodland, but most areas are cleared. Production is good. Suited trees are black walnut, yellow-poplar, white oak, red oak, and eastern white pine. If seedlings are planted, control of plant competition is needed.

For urban development, this soil has poor potential. Flooding is a limitation and is difficult to overcome. Low strength and flooding are limitations in building roads or streets. These limitations can be compensated for by good design and proper construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

ElC—Elk silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on stream terraces, benches, and toe slopes near major streams. Most slopes are short. From January through April, areas are subject to rare flooding of brief duration. Areas are long and narrow and are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is between depths of 9 and 50 inches. It is yellowish brown silty clay loam and, below a depth of 34 inches, is mottled in shades of gray. The substratum, to a depth of 68 inches or more, is yellowish brown heavy silty clay loam and is mottled in shades of brown and gray.

This soil is high in natural fertility. It is medium acid to very strongly acid in the surface layer and subsoil, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good, and this soil can be worked throughout a moderate range of soil moisture. This soil has low strength.

Included with this soil in mapping are a few small areas of Crider and Nicholson soils. Also included are a few severely eroded spots that have a surface layer of yellowish brown light silty clay loam. The included soils make up less than 15 percent of the acreage. Individual areas of included soils generally are less than 1 acre.

Most areas of this soil have been cleared and are used for cultivated crops, hay, and pasture. A few areas are wooded.

This soil has fair potential for cultivated crops. Most crops commonly grown in the county do well, but when this soil is cultivated the hazard of erosion is severe. Conservation methods that help to control erosion and maintain organic matter content and good tilth are no-till planting, contour cultivation, stripcropping, cover crops, and return of crop residue to the soil. Flooding is a limitation, especially to winter grain late in winter and early in spring. In most years, spring and summer crops planted after April are not affected by flooding.

This soil has good potential for pasture and hay crops that include deep-rooted crops. These crops fit well into a cropping system with grain crops and help supplement other practices in controlling erosion and maintaining organic matter content and good tilth.

This soil has good potential for woodland. Productive species that are desirable for planting are black walnut, yellow-poplar, white oak, red oak, and white pine. Control of competitive plants is needed to establish young seedlings in open fields.

This soil has poor potential for all urban uses. Flooding is a limitation difficult to overcome. Low strength and flooding are limitations in building roads and streets. These limitations can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

FdC—Fredonia silt loam, very rocky, 2 to 12 percent slopes. This moderately deep, well drained, gently sloping and sloping soil is in karst areas and on knoblike hills, benches, and narrow ridgetops. Most areas have 2 to 10 percent Rock outcrop. The limestone outcrops are about 100 to 300 feet apart. Areas are 5 to 40 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 22 inches thick. It is dark red silty clay. Hard gray limestone bedrock is below a depth of about 30 inches.

This soil is medium in natural fertility. It is medium acid or strongly acid in the surface layer and upper part of the subsoil, except where limed, and is medium acid to neutral in the lower part of the subsoil. The root zone is moderately deep, permeability is moderately slow to slow, and available water capacity is moderate. Runoff is medium. Organic matter content is moderate. Tilth is moderately good, but an occasional Rock outcrop limits use of tillage implements. This soil has moderate shrink-swell potential and low strength. Bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of Pembroke, Vertrees, and Caneyville soils and small areas of a clayey soil that has bedrock at a depth of 10 to 20 inches and is near outcrops of rock. Also included are a few areas of soils that have more than 10 percent Rock outcrop, a few areas that are steeper than 12 percent, and a few severely eroded spots. The included soils make up about 20 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil are used for pasture. Some areas are wooded.

This soil has poor potential for cultivated crops. Cultivated crops are poorly suited because of the severe hazard of erosion, moderate depth to rock, and moderate available water capacity. Also, Rock outcrop limits tillage.

This soil has fair potential for pasture. In periods of sufficient rainfall, production is good. The severe hazard of erosion, moderate depth to rock, and moderate available water capacity are limitations. Seeding pasture late in summer and early in fall reduces the hazard of erosion. The moderate available water capacity limits production in dry periods. Overgrazing should be avoided to prevent excessive erosion and poor stands. The moderate depth to rock limits deep-rooted plants. Rotation grazing and optimum fertility help to control erosion and maintain good stands of pasture plants.

This soil has good potential for northern red oak, Virginia pine, and eastern redcedar. Seedling mortality and use of equipment are moderate limitations in management.

This soil has poor potential for urban uses. The moderate depth to rock and low strength are the main limitations and are difficult to overcome. This soil is poorly suited for septic tank filter fields because of the depth to rock and moderately slow or slow permeability.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass VIe. The woodland suitability group is 3c.

FnC—Frondorf silt loam, 6 to 12 percent slopes. This moderately deep, well drained, sloping soil is on edges of broad ridges and on narrow ridges and benches. Most slopes are irregular, but on some side slopes and benches they are smooth and slightly convex. Areas are 8 to 30 acres.

Typically, the surface layer is grayish brown silt loam about 2 inches thick. The subsurface layer is about 5 inches of brown silt loam. The subsoil is about 17 inches thick. It is strong brown light silty clay loam to a depth of 18 inches. Below that, to a depth of 24 inches, the subsoil is yellowish brown channery silt loam that has common mottles in shades of brown and gray. The substratum is about 6 inches thick. It is brown channery loam that has common mottles in shades of gray. Rippable grayish sandstone in 6- to 8-inch beds is between depths of 30 and 50 inches. Below this, to a depth of 60 inches, is soft clayey shale.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout, unless limed. The root zone is moderately deep, and permeability and available water capacity are moderate. Surface runoff is medium. Organic matter content is moderate. Tilth is good. This soil can be worked in a wide range of soil moisture without clodding. This soil has low strength, and bedrock is at a depth of 20 to 40 inches.

Included with this soil in mapping are a few areas of Wellston, Zanesville, and Weikert soils. Also included is a soil that has a yellowish red clayey subsoil that formed in material weathered from gray acid shale. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Areas of this soil are used mostly for trees, hay, and pasture. A few areas on the rims of broad ridges are farmed along with other soils.

This soil has poor potential for cultivated crops. The main limitation is the severe hazard of erosion. If cultivated crops are grown, effective management is needed to control erosion. Contour tillage, stripcropping, minimum tillage, cover crops, and return of crop residue to the soil help control erosion and maintain organic matter content and good tilth.

This soil has fair potential for pasture and hay. Limitations are the moderate depth to bedrock, moderate available water capacity, and hazard of erosion. Grasses and legumes that withstand short periods of drought are better suited. Rotation grazing and optimum fertility help to maintain pasture plants and control erosion. Renovation without plowing also helps control erosion.

This soil has good potential for trees. Plant competition is a moderate hazard. Trees that do well on this soil are yellow-poplar, northern red oak, shortleaf pine, black walnut, eastern white pine, and loblolly pine.

This soil has fair potential for urban uses. The slope, moderate depth to rock, and low strength are limitations to most uses. These limitations can be overcome by using proper design and installation procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

FwD—Frondorf-Weikert complex, 12 to 20 percent slopes. This map unit consists of well drained, moderately steep, moderately deep to shallow Frondorf and Weikert soils. These soils are side by side and so intermingled that to separate them in mapping was not practical. This unit is on moderately wide side slopes in sandstone areas. Surface runoff is rapid, and about 15 percent of the surface is stony. Areas of this unit are 10 to 80 acres. Some areas are 2 to 5 acres.

Frondorf silt loam makes up about 50 percent of the unit, Weikert channery silt loam makes up 25 percent, and included soils make up the rest.

Typically, the surface layer of the Frondorf soil is grayish brown silt loam about 2 inches thick. The subsurface layer is about 5 inches of brown silt loam. The subsoil is about 17 inches thick. It is strong brown light silty clay loam to a depth of 18 inches and yellowish brown channery silt loam to a depth of 24 inches. The substratum is brown channery loam about 6 inches thick. Rippable grayish sandstone bedrock is at a depth of 30 inches, and soft clayey shale is at a depth of 50 inches.

The Frondorf soil is low in natural fertility. It is strongly acid or very strongly acid throughout, unless limed. The root zone is moderately deep. Permeability, organic matter content, and available water capacity are moderate. This soil has low strength and is 20 to 40 inches deep to bedrock.

Typically, the surface layer of the Weikert soil is brown channery silt loam about 5 inches thick. The subsoil is about 14 inches thick. It is yellowish brown channery silt loam. Sandstone bedrock is at a depth of 19 inches.

The Weikert soil is low in natural fertility. It is strongly acid to very strongly acid throughout. The root zone is shallow, permeability is moderately rapid, organic matter content is low, and available water capacity is very low. This soil has low strength and is 10 to 20 inches deep to bedrock.

Included with this unit in mapping are a few small areas of Wellston soils, narrow areas of Cuba soils along drainageways, and small areas of a soil that is similar to the Frondorf soil but contains more than 5 percent coarse fragments to a depth of 12 to 20 inches. Also included is a moderately deep soil that has a yellowish red clay subsoil and formed in shale.

Most areas of this unit are wooded, but a few areas are used for pasture.

The potential is poor for farming. The severe hazard of erosion, shallow depth, low available water capacity, and scattered stones and small stones are severe limitations to farming. If areas are used for pasture, good management must include limited grazing and maintaining a high level of fertility.

The potential is fair for northern red oak, yellow-poplar, shortleaf pine, black walnut, eastern white pine, and loblolly pine on north-facing slopes and shortleaf pine, loblolly pine, and Virginia pine on south-facing slopes. Steepness of slope causes an erosion hazard and limits use of equipment. Shallowness of the soils in places limits rooting depth.

The potential is poor for urban uses. Moderately steep slopes and shallow depth to bedrock are severe limitations.

This complex has fair potential for woodland wildlife habitat or extensive recreation areas.

These soils are in capability subclass VIe. The woodland suitability group for the Frondorf soil is 2r, north aspect, and 3r, south aspect, and for the Weikert soil is 4d, north aspect, and 5d, south aspect.

FwF—Frondorf-Weikert complex, 20 to 40 percent slopes. This map unit consists of well drained, steep, moderately deep to shallow Frondorf and Weikert soils. These soils are side by side and so intermingled that to separate them in mapping was not practical. The soils are on dissected land and long side slopes. Surface runoff is rapid to very rapid, and some areas are stony. Areas of this unit are 15 to 90 acres. Areas of each soil are 3 to 10 acres.

Frondorf silt loam makes up about 50 percent of the unit, Weikert channery silt loam makes up 27 percent, and included soils make up the rest.

Typically, the surface layer of the Frondorf soil is grayish brown silt loam about 2 inches thick. The subsurface layer is about 5 inches of brown silt loam. The subsoil is about 17 inches thick. It is strong brown light silty clay loam to a depth of 18 inches and yellowish brown channery silt loam to a depth of 24 inches. The substratum is brown channery loam about 6 inches thick. Rippable grayish sandstone bedrock is at a depth of 30 inches, and soft clayey shale is at a depth of 50 inches.

The Frondorf soil is low in natural fertility. It is strongly acid or very strongly acid throughout. The root zone is moderately deep. Permeability, organic matter content, and available water capacity are moderate. This soil has low strength and is 20 to 40 inches deep to bedrock.

Typically, the surface layer of the Weikert soil is brown channery silt loam about 5 inches thick. The subsoil is about 14 inches thick. It is yellowish brown channery silt loam. Bedded sandstone bedrock is at a depth of 19 inches.

The Weikert soil is low in natural fertility and organic matter content. It is strongly acid and very strongly acid throughout. Permeability is moderately rapid, and available water capacity is very low. In most places, this soil is stony, with stones 1 foot or larger in diameter and 30 to 100 feet apart. This soil has low strength and is 10 to 20 inches deep to bedrock.

Included with this unit in mapping are areas of Wellston soils that occupy approximately 10 percent of most areas; narrow areas of soils in valleys, dominantly Cuba soils; and areas of a clayey soil that formed in residuum from shale and occupies about 8 percent of areas. Some areas have rims of sandstone escarpments, and a few areas have severely eroded spots.

Most areas of this complex are used for woodland. A few areas have been cleared, and are being returned to woodland through natural revegetation or planned woodland conservation.

This complex has fair potential for northern red oak, yellow-poplar, shortleaf pine, black walnut, eastern white pine, and loblolly pine on north-facing slopes and for shortleaf pine, loblolly pine, and Virginia pine on south-facing slopes. Steepness of slope causes an erosion hazard and limits use of equipment. Shallow soil in places limits rooting depth.

This complex has fair potential for woodland wildlife habitat and for extensive recreation areas.

This complex has poor potential for farming and for urban development. The steepness of slope and shallow depth to bedrock are severe limitations and are very difficult to overcome.

This complex is in capability subclass VIIe. The woodland suitability group for the Frondorf soil is 2r, north aspect, and 3r, south aspect, and for the Weikert soil is 4d, north aspect, and 5d, south aspect.

HbB—Hammack-Baxter complex, 2 to 6 percent slopes. This map unit consists of well drained, deep Hammack and Baxter soils that are so intermingled that to separate them in mapping was not practical. These soils are in relatively broad, irregular karst areas. In most places the Baxter soil is around shallow depressions 100 to 300 feet across, and the Hammack soil is on connecting ridges 100 to 300 feet across. Runoff is medium. Areas of this unit are 5 to 40 acres. Areas of each soil are 1 to 3 acres.

Hammack silt loam makes up approximately 45 to 55 percent of the unit, Baxter cherty silt loam makes up 30 to 40 percent, and included soils make up the rest.

Typically, the surface layer of the Hammack soil is brown silt loam about 8 inches thick. The subsoil is more than 91 inches thick. It is brown silty clay loam to a depth of 28 inches and below that, to a depth of 42 inches, is brown very cherty silty clay loam. Between depths of 42 and 99 inches, the subsoil is red cherty silty clay in the upper few inches and grades to red cherty clay in the lower part.

The Hammack soil is medium to high in natural fertility. It is medium acid to very strongly acid, except where limed. Permeability is moderate, the root zone is deep, and available water capacity is high. The organic matter content is moderate, and tilth is good. This soil has low strength. Shrink-swell potential is moderate in the clayey lower part of the subsoil.

Typically, the surface layer of the Baxter soil is dark grayish brown cherty silt loam about 5 inches thick. The subsoil is more than 91 inches thick. It is yellowish brown cherty silt loam to a depth of 17 inches and below that, to a depth of 22 inches, is red silty clay loam. Between depths of 22 and 75 inches the subsoil is red cherty silty clay, and between 75 and 96 inches it is red silty clay and yellowish brown clay.

The Baxter soil is medium in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Organic matter content in the surface layer is moderate. Tilth is only fair because of the chert content. This soil has low strength. Shrink-swell potential is moderate below a depth of about 20 inches.

Included with this unit in mapping are small areas of Nolin soils in depressions. Also included are areas of Vertrees and Baxter silt loams and areas of a soil that has 10 to 20 inches of silt mantle over very cherty limestone residuum.

Most areas of this unit are used for cultivated crops, hay, and pasture. A few areas are wooded.

This complex has good potential for cultivated crops. The moderate hazard of erosion and fair tilth are slight limitations. Contour tillage is not practical on the short irregular slopes; however, minimum tillage, return of crop residue to the soil, and cropping systems that include grasses and legumes help to control erosion and maintain the organic matter content.

This complex has good potential for pasture and hay. If management is good, these soils have no significant limitations for these uses. Deep-rooted crops are suited to the soils.

This complex has good potential for native upland trees. If seedlings are planted, control of plant competition is needed.

This complex has fair potential for urban development. Low strength, moderate shrink-swell potential, and high content of clay are limitations, but these can be overcome by good design and proper construction.

This complex has good potential for openland and woodland wildlife habitat.

This complex is in capability subclass IIe. The woodland suitability group is 2o.

HbC—Hammack-Baxter complex, 6 to 12 percent slopes. This map unit consists of well drained, deep Hammack and Baxter soils that are so intermingled that to map them separately was not practical. These soils are in relatively broad karst areas that have depressions and are on rolling ridges. Runoff is medium. Areas of this unit are 5 to 20 acres, and areas of each soil are 1 to 3 acres.

Hammack silt loam makes up about 45 percent of each mapped area, Baxter cherty silt loam makes up 42 percent, and included soils make up the rest.

Typically, the surface layer of the Hammack soil is brown silt loam about 8 inches thick. The subsoil is more than 91 inches thick. It is brown silty clay loam to a depth of 28 inches and below that, to a depth of 42 inches, is brown very cherty silty clay loam. Between depths of 42 and 99 inches, the subsoil is red cherty silty clay in the upper few inches and grades to red cherty clay in the lower part.

The Hammack soil is medium to high in natural fertility. It is medium acid to very strongly acid, except where limed. Permeability is moderate, the root zone is deep, and available water capacity is high. Organic matter content in the surface layer is moderate, and tilth is good. This soil has low strength. Shrink-swell potential is moderate in the clayey lower part of the subsoil.

Typically, the surface layer of the Baxter soil is dark grayish brown cherty silt loam about 5 inches thick. The subsoil is more than 91 inches thick. It is yellowish brown cherty silt loam in the upper 17 inches and below that, to a depth of 22 inches, is red silty clay loam. Between depths of 22 and 75 inches the subsoil is red cherty silty clay, and between 75 and 96 inches it is red silty clay and yellowish brown clay

The Baxter soil is medium in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Organic matter content in the surface layer is moderate. Because of the content of chert, tilth is only fair. This soil has low strength. Shrink-swell potential is moderate below a depth of about 20 inches.

Included with this unit in mapping are small areas of Nolin soils in depressions and small areas of Vertrees soils around depressions. Also included are a few areas of soils that have a silt mantle 10 to 20 inches thick over very cherty residuum.

Most areas of this complex are used for pasture and hay and occasional cultivated crops in the rotation. Some areas are wooded.

This complex has fair potential for cultivated crops. When this soil is cultivated, the hazard of erosion is severe. Slopes are irregular, and cultivating on the contour is difficult. Therefore, to help control erosion, no-till farming or minimum tillage and returning crop residue to the soil need to be included in management. Crops respond well to a high level of fertility, and good production can be obtained.

Pasture and hay are better suited than most other uses to this complex, and potential for these crops is good. Deep-rooted pasture and hay crops are well suited, and good production can be obtained. Crops should be seeded late in summer and early in fall to prevent excessive erosion. Also, good stands can be established easier and faster during these periods. A high level of fertility and rotation grazing help to obtain good production, maintain good stands, and help control erosion.

This complex has good potential for native upland trees. If seedlings are planted, control of plant competition is needed.

This complex has fair potential for most urban uses. Low strength is a severe limitation. Moderate shrink-swell potential, high content of clay, and irregular slope are moderate limitations for most uses, but these can be overcome by proper design and construction.

This complex has good potential for openland and woodland wildlife habitat.

This complex is in capability subclass IIIe. The woodland suitability group is 2o.

HbC3—Hammack-Baxter complex, 6 to 12 percent slopes, severely eroded. This map unit consists of severely eroded Hammack and Baxter soils that are so intermingled that to separate them in mapping was not feasible. This complex is on karst upland and on a few side slopes along the major streams. Generally, the Baxter soil has irregular slopes and is around potholes and on side slopes, and the Hammack soil is rolling and is on narrow ridgetops between areas of the Baxter soils. Runoff is medium to rapid. Areas of this unit are 5 to 20 acres. Areas of each soil are 1 to 3 acres.

Hammack silty clay loam makes up approximately 40 percent of each mapped area, Baxter cherty silty clay loam makes up 40 percent, and included soils make up the rest.

Typically, the surface layer of the Hammack soil is brown light silty clay loam about 7 inches thick. The subsoil is about 87 inches thick. It is brown silty clay loam to a depth of 24 inches and below that, to a depth of 38 inches, is brown very cherty silty clay loam. Between depths of 38 and 95 inches, the subsoil is red cherty silty clay in the upper few inches and grades to red cherty clay in the lower part.

This Hammack soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid, except where limed. Permeability is moderate, available water capacity is high, and the root zone is deep. Three-fourths or more of the original surface layer has been removed by water erosion. Small gullies and rills are common. Tilth is fair. This soil has low strength.

Typically, the surface layer of the Baxter soil is yellowish brown cherty silty clay loam about 10 inches thick. The subsoil is more than 86 inches thick. It is red cherty silty clay to a depth of 68 inches and is red silty clay and yellowish brown clay between depths of 68 and 96 inches.

This Baxter soil is low in natural fertility and organic matter content. It is strongly acid and very strongly acid, except where limed. Permeability is moderate, available water capacity is high, and the root zone is deep. Three-fourths or more of the original surface layer has been removed by water erosion. Small gullies and rills are common. Tilth is poor because of the low content of organic matter and the high content of chert fragments. This soil has low strength. Shrink-swell potential is moderate below a depth of about 10 inches.

Included with this complex in mapping are small alluvial areas of Nolin soils and a few areas of Vertrees and Baxter silt loam. Also included are areas of a soil that has 10 to 20 inches of silt mantle over very cherty residuum from limestone.

Most areas of this complex are used for hay and pasture. Some areas are wooded, and a few areas are covered with scrub bushes and weeds.

This complex has poor potential for cultivated crops. The very severe hazard of erosion is the main limitation. Because of the irregular slope, contour cultivation is not practical. Cultivated crops accelerate erosion and prevent build-up of organic matter.

Pasture and hay are better suited than most other uses to this complex, and the potential for these crops is good. The soils are suited to deep-rooted plants, and good production of pasture can be obtained. The very severe hazard of erosion, low organic matter content, poor tilth, and irregular slopes are limitations to establishing grasses and legumes. Establishing these crops late in summer and early in fall, when risk of erosion and weed competition are minimal, is desirable. A short fallow in summer assists in preparing a good seedbed. Optimum lime and fertility are needed for maximum growth and good cover. Rotation grazing and renovation of old stands without plowing allow for continuous cover and help to control erosion.

This complex has good potential for native upland trees. If seedlings are planted, control of plant competition is needed.

This complex has fair potential for most urban uses. Low strength, moderate shrink-swell potential, high content of clay, and steepness of slope limit use for most urban development, but these limitations can be overcome with proper design and construction practices.

This complex has good potential for openland and woodland wildlife habitat.

This complex is in capability subclass IVe. The woodland suitability group is 3o.

Hn—Henshaw silt loam. This deep, somewhat poorly drained, nearly level soil is in broad valleys. Areas are 10 to 50 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. It is mottled brownish and grayish heavy silt loam to a depth of 20 inches, and below that, to a depth of 48 inches, it is mottled brown and light brownish gray silty clay loam. The substratum is light gray heavy silt loam to a depth of 68 inches, and between depths of 68 and 83 inches it is mottled yellowish brown, yellowish red, and light gray silty clay.

This soil is medium in natural fertility. It is strongly acid to mildly alkaline in the upper part and neutral to moderately alkaline in the lower part. The root zone is deep, permeability is moderately slow, and available water capacity is high. Runoff is slow. The organic matter content in the surface layer is moderately low. Tilth is good. This soil has a high water table at a depth of 1 to 2 feet in winter and spring. This soil has low strength.

Included with this soil in mapping are a few small areas of Sadler and Lawrence soils. The included soils make up less than 10 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil have been cleared and are used for cultivated crops, hay, pasture, and specialty crops, including tobacco.

This soil has fair potential for cultivated crops, hay, and pasture. High production can be obtained. Wetness is the main limitation because it delays planting. For cultivated crops, short-season varieties that mature early and can be harvested before rains in fall are best suited. Artificial drainage lengthens the time for farming operations and widens the range of suited plants. Most areas do not have suitable outlets for tile drainage systems. The silt loam plow layer is easy to work. Tilth can be improved and organic matter content can be increased by returning all crop residue to the soil and including grasses and legumes in the cropping system. Grasses and legumes that tolerate wetness are better suited than most other crops.

This soil has good potential for pin oak, yellow-poplar, sweetgum, white ash, and eastern cottonwood. Wetness is a moderate limitation to use of equipment; therefore, dry periods should be selected when using equipment. Control of weeds is needed to establish seedlings in open fields.

This soil has poor potential for urban development. Wetness caused by a seasonal high water table is a severe limitation for most uses. Also, for local roads and streets, low strength is a moderate limitation. This soil is a good source of topsoil.

This soil has good potential for openland and woodland wildlife habitat.

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

La—Lawrence silt loam. This deep, somewhat poorly drained, nearly level soil is on stream terraces and in concave areas on the uplands. Flooding of very brief duration is common in most areas from January to April. A few areas are seldom flooded. Areas are 5 to 75 acres.

Typically, the surface layer is grayish brown silt loam about 8 inches thick. The subsoil is more than 52 inches thick. To a depth of about 26 inches, it is light olive brown light silty clay loam that has grayish mottles. Between depths of 26 and 44 inches, the subsoil is a firm, compact, brittle layer or fragipan that is light silty clay loam mottled in shades of brown and gray. Below that, to a depth of more than 60 inches, the subsoil is yellowish red silty clay loam mottled in shades of gray.

This soil is medium in natural fertility. It is strongly acid to very strongly acid throughout, except where limed. The root zone is only moderately deep because of the fragipan at a depth of about 26 inches. Permeability is slow, and available water capacity is moderate. Runoff is slow. Organic matter content in the surface layer is low. Tilth is fair, but the surface layer is easily worked because of the silt loam texture. A high water table is at a depth of 1 to 2 feet in winter and spring. This soil has low strength.

Included with this soil in mapping are small areas of Robertsville, Nicholson, and Henshaw soils. The included soils make up from 10 to 20 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Areas of this soil are used mostly for cultivated crops, hay, and pasture. Some areas are wooded.

This soil has fair potential for cultivated crops. The wetness, moderately deep root zone, and moderate water capacity are the main limitations. These limitations are caused by the firm, dense fragipan at a depth of about 2 feet. Wetness delays planting in most years from one to several weeks. Harvesting is a problem in rainy seasons. Artificial drainage lengthens the time for farming operations and widens the range of suited plants. Short season varieties are better suited than other varieties in most years. If the soil is drained, soybeans have good potential. Return of all crop residue to the soil increases organic matter content and aids tilth.

This soil has fair potential for pasture and hay. Grasses and legumes that tolerate wetness are better suited than most other crops. The fragipan restricts rooting depths of deep-rooted plants. Grazing should be controlled to prevent overgrazing and to prevent grazing when the soil is saturated.

This soil has good potential for northern red oak, yellow-poplar, sweetgum, white ash, American sycamore, and loblolly pine. Wetness is a limitation to use of equipment, but dry periods can be selected for most equipment needs. If seedlings are planted, control of plant competition is needed.

This soil has poor potential for urban uses. Wetness and flooding are severe limitations and are difficult to overcome.

This soil has good potential for openland and woodland wildlife habitat. It has fair potential for wetland plants, shallow water areas, and wetland wildlife habitat.

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

Ln—Lindside silt loam. This deep, moderately well drained, nearly level soil is on flood plains and in upland depressions. Flooding of brief duration is common in most areas from December through May. Areas are 5 to 50 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 38 inches thick. It is brown silt loam and contains grayish mottles in the lower part. The substratum, to a depth of 60 inches or more, is mottled yellowish brown and grayish brown silty clay loam.

This soil is high in natural fertility. It is medium acid to neutral throughout. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. A high water table is at a depth of 18 to 36 inches in winter and spring.

Included with this soil in mapping are a few small areas of Nolin and Newark soils. Also included is a soil that has 10 to 24 inches of brown silt loam over very dark gray or black silt loam or silty clay loam and a soil that has 20 inches or more of brown silt loam with gray mottles over yellowish brown residuum from limestone. The included soils make up 5 to 20 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil have been cleared and are used intensively for cultivated crops. A few areas are used for pasture.

This soil has good potential for cultivated crops. It can be cropped intensively and have high production. The main limitations are flooding and slight wetness. In some years planting is delayed a few days because of wetness. Drainage is not required, although it can lengthen the time for field operations and improve the suitability of some crops (fig. 11). Diversion ditches are effective in controlling overwash from adjacent areas. Return of crop residue to the soil maintains the organic matter content and good tilth.

This soil has good potential for pasture and hay. Flooding is a hazard but duration of flooding is generally brief and crops are seldom destroyed. Tilling improves aeration of the lower part of the subsoil and permits deeper root growth. This soil is rated high for mid-summer supplemental pasture and hay crops. The high available water capacity permits good growth in relatively dry periods.

This soil has good potential for northern red oak, yellow-poplar, black cherry, black walnut, and eastern white pine. If trees are planted, control of plant competition is required.

For urban uses, this soil has poor potential because of the hazard of flooding. The flooding is difficult to overcome. This soil is a good source of topsoil. For embankment material this soil is subject to piping and has low strength.

This soil has good potential for development of openland and woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1w.

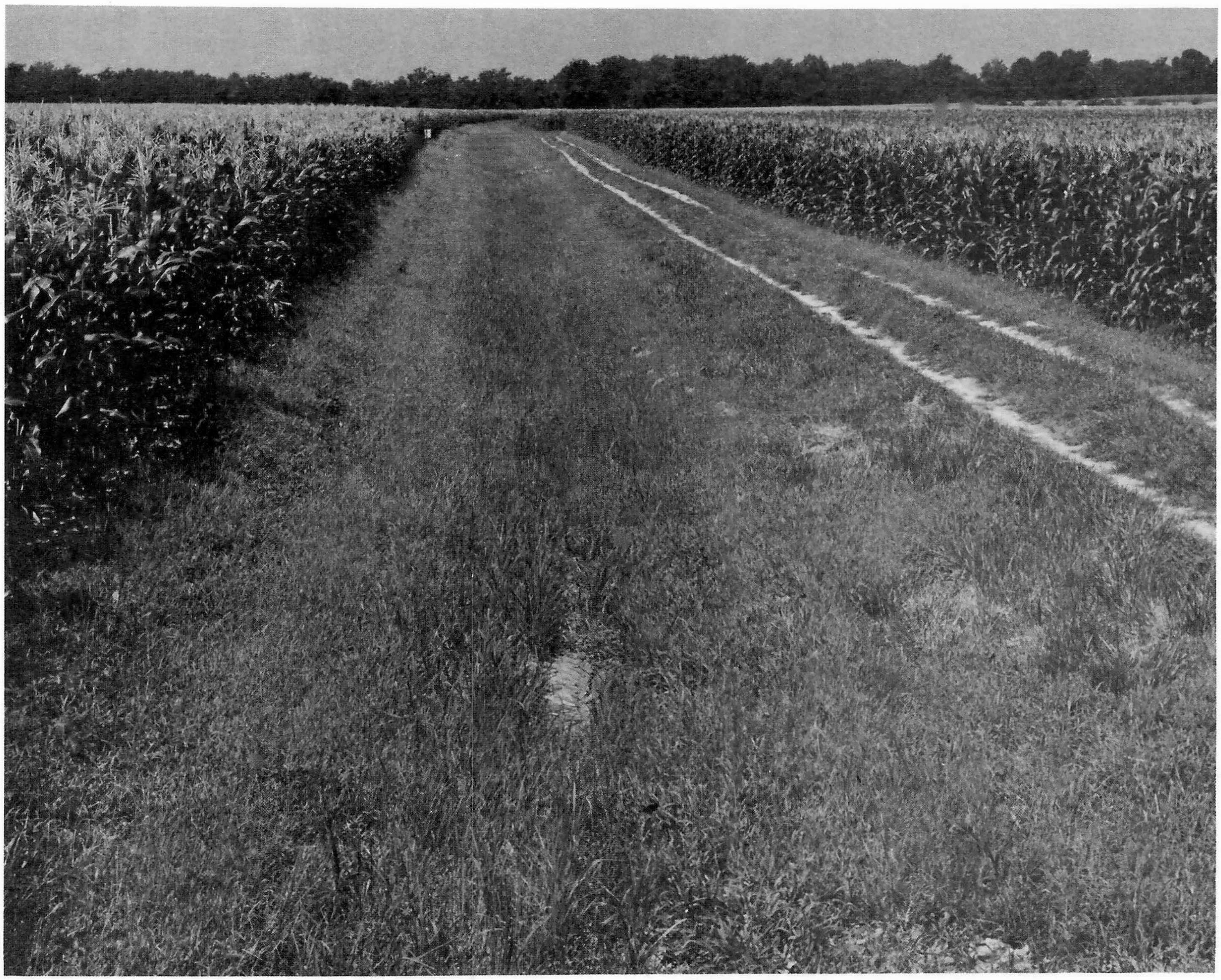


Figure 11.—Drainage ditch in cornfield. The soil is Lindside silt loam in a depression on upland.

Me—Melvin silt loam. This deep, poorly drained, nearly level soil is on flood plains and in upland depressions. This soil is commonly flooded from December to May. Areas are 5 to 50 acres.

Typically, the surface layer is grayish brown silt loam about 10 inches thick. It is mottled in shades of brown. The subsoil is about 10 inches thick. It is light brownish gray silt loam mottled in shades of brown. The substratum is at a depth of 20 inches. To a depth of 45 inches, it is gray silty clay loam mottled in shades of red and brown. Between depths of 45 and 66 inches or more, the substratum is mottled dark gray, yellowish brown, and dark brown silty clay loam.

This soil is medium in natural fertility. It is slightly acid to mildly alkaline throughout. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content is moderately low in the surface layer. Tilth is good. The high water table is at the surface or within a depth of 1 foot in winter and spring. This soil has low strength.

Included with this soil in mapping are small areas of Newark soils. Also included is a poorly drained soil that is mainly silty clay and clay. Included soils make up 5 to 15 percent of mapped areas. Individual areas of included soils are less than 3 acres.

This soil is used for cultivated crops, hay, pasture, and woodland.

This soil has poor potential for cultivated crops, unless drained. If drained, the potential is fair. Wetness and flooding are limitations that delay plowing, planting, tilling, and harvesting. Tile drainage, open ditches, and improvement of channels help reduce wetness. Suitable outlets are not available in some areas for tile drainage. Winter crops are poorly suited because of wetness and flooding in winter and spring. Returning crop residue, cover crops, and grasses and legumes in the cropping system maintain the organic matter content and improve tilth.

This soil has fair potential for pasture and hay crops. Wetness and flooding are the main limitations. Pasture grasses and legumes that tolerate flooding for short periods are better suited than other varieties. Grazing should be restricted in wet periods. Overgrazing and grazing when the water table is near the surface can damage the plant cover and compact the soil. The potential for these crops is increased if this soil is drained.

For woodland, the potential is good for pin oak, sycamore, sweetgum, and loblolly pine. Wetness imposes severe limitations on use of equipment, but dry periods can be selected for most equipment needs. If seedlings are planted, the mortality rate is severe. For seedlings, plant competition needs to be controlled and wetness needs to be reduced.

This soil has poor potential for urban uses. Flooding and wetness are severe limitations and are difficult to overcome.

The potential is good for wetland plants, shallow water areas, and wetland wildlife habitat.

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

Ne—Newark silt loam. This deep, somewhat poorly drained, nearly level soil is on flood plains and in upland depressions. Flooding of brief duration is common from December through May. Areas are 3 to 30 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is about 27 inches thick. In the upper part, the subsoil is brown silt loam that has grayish brown mottles, and in the lower part, it is grayish brown silt loam that has brownish mottles. The substratum is at a depth of about 36 inches. To a depth of 55 inches, it is grayish brown silt loam that has dark yellowish brown mottles, and between depths of 55 and 76 inches or more, it is grayish brown silty clay loam that has mottles in shades of brown.

This soil is high in natural fertility. It is medium acid to mildly alkaline in the surface layer and subsoil and strongly acid to mildly alkaline in the substratum. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content is moderate in the surface layer. Tilth is good. The high water table is at a depth of 6 to 18 inches during winter and spring. This soil has low strength.

Included with this soil in mapping are small areas of Melvin and Lindside soils. Also included are a few small areas of a soil that has 8 to 16 inches of brown silt loam overwash over gray silt loam. The included soils make up 10 to 20 percent of mapped areas. Individual areas of included soils are less than 2 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture. Some areas are used for woodland.

This soil has fair potential for cultivated crops. Wetness and flooding are the main limitations. They delay planting and tillage and, in some areas, harvesting. Artificial drainage lengthens the effective growing season and widens the range of suitable plants (fig. 12). Tile drainage systems are very effective on this soil where suitable outlets are available. Good tilth and organic matter content are maintained by returning crop residue to the soil. Crops responds well to a high level of fertility. Crop failures caused by flooding are common in many areas of this soil.

This soil has fair potential for pasture and hay crops. Grasses and legumes that tolerate moderate wetness and withstand flooding for short periods are better suited than other varieties. If this soil is drained, most commonly grown plants can be grown. Grazing should be avoided when the soil is saturated.

This soil has good potential for pin oak, eastern cottonwood, northern red oak, yellow-poplar, and sweetgum. Other trees preferred for planting are loblolly pine, American sycamore, and eastern white pine. Wetness is a moderate limitation in use of equipment,

Figure 12—Tile drainage lengthens effective growing season and widens range of suitable plants. Area of Newark silt loam.

but dry periods can be selected for most needs. Control of plant competition is needed for seedlings.

For urban uses this soil has poor potential. Flooding and wetness are limitations that are difficult to overcome. This soil is a good source of topsoil. For embankments, dikes, and levees it is subject to piping.

This soil has good potential for woodland wildlife habitat.

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

NhA—Nicholson silt loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on broad ridges on uplands and in low areas around the heads of drains. Areas are 3 to 10 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is more than 62 inches thick. To a depth of 23 inches, the subsoil is yellowish brown silt loam or silty clay loam. Between depths of 23 and 42 inches, it is a very firm, compact, silty clay loam fragipan that is brown and has grayish brown mottles. Beneath the fragipan, to a depth of 60 inches, the subsoil is strong brown silty clay loam and has distinct gray mottles; and at a depth of 60 to more than 70 inches, it is mottled reddish, brownish, and grayish silty clay.

This soil is medium in natural fertility. It is medium acid to very strongly acid through the fragipan, except where limed. The root zone is only moderately deep, because the fragipan is at a depth of about 2 feet. Permeability is moderate above the fragipan and slow in the fragipan. Runoff is slow, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 18 to 30 inches during winter and spring. This soil has low strength. It has moderate shrink-swell potential in the lower part of the subsoil below the fragipan.

Included with this soil in mapping are small areas of Lawrence soils and small areas of a soil that is similar to this Nicholson soil in the upper part of the subsoil but is clayey in the lower part, is moderately well drained, and does not have a fragipan. Also included along streams are a few areas of soils that are similar to this Nicholson soil, except the underlying material in which the soil formed is old stratified alluvium rather than resdiuum of limestone. The included soils make up 5 to 15 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture.

This soil has fair potential for cultivated crops, including tobacco. Wetness is a moderate limitation that delays planting in most years and in some years delays harvesting. The moderate rooting depth, which is limited by the dense fragipan, and the moderate available water capacity result in this soil being droughty during dry seasons. Drainage of this soil increases potential production but is not feasible in some areas. Return of crop residue to the soil, cover crops, and a cropping system that includes grasses and legumes help maintain the organic matter content and good tilth.

This soil has good potential for pasture and hay crops. The moderate rooting depth limits the variety of plants. Some deep rooted plants are not suited. Optimum fertility and rotation grazing help produce good yields and lengthen lifespan of stands.

This soil has good potential for northern red oak, black walnut, yellow-poplar, eastern white pine, shortleaf pine, and white ash. If seedlings are planted, undesirable plant competition should be controlled.

This soil has fair potential for most urban uses. Wetness and low strength are limitations for most uses. They are severe limitations for buildings with basements. Slow permeability and wetness are severe limitations for septic tank absorption fields. Expansion of filter fields is needed. Low strength is a severe limitation in constructing streets and buildings. Most limitations for urban uses can be overcome by drainage and proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IIw. The woodland suitability group is 2w.

NhB—Nicholson silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is mainly on broad ridgetops and benchlike positions on uplands. Also, to a minor extent, it is on stream terraces. Areas are 5 to 40 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is more than 62 inches thick. To a depth of 23 inches, the subsoil is yellowish brown silt loam. Between depths of 23 and 42 inches it is a very firm, compact, light silty clay loam fragipan that is brown and has grayish brown mottles. Beneath the fragipan, to a depth of 60 inches, the subsoil is strong brown silty clay loam that has distinct gray mottles; and at a depth of 60 to more than 70 inches, it is mottled reddish, brownish, and grayish silty clay.

This soil is medium in natural fertility. It is medium acid to very strongly acid through the fragipan, except where limed. A fragipan is at a depth of about 2 feet, and the root zone is only moderately deep. Permeability is moderate above the fragipan and slow in the fragipan. Runoff is medium, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 18 to 30 inches during winter and spring. This soil has low strength. It has moderate shrink-swell potential in the lower part of the subsoil below the fragipan.

Included with this soil in mapping are a few small areas of Crider and Lawrence soils and a few small spots of severely eroded soils. Also included along streams are a few areas of soils that are similar to this Nicholson soil except they are underlain by old alluvium. A few areas along streams are subject to floods. The included soils make up about 15 percent of most areas. Except along streams, some included areas are less than 4 acres.

Most areas of this soil are used for commonly grown cultivated crops, hay, and pasture. A few areas are used for specialty crops, such as tobacco, and a few areas are wooded.

This soil has fair potential for cultivated crops, including tobacco. The hazard of erosion is a moderate limitation. No-till farming, contour tillage (fig. 13), stripcropping, cover crops, and grasses and legumes in the cropping system help slow runoff and control erosion. Returning crop residue to the soil, in addition, helps control erosion and maintain organic matter content and good tilth. The fragipan at a depth of about 2 feet restricts rooting depth and air and water movement and results in droughtiness in dry periods. Also, the fragipan causes a perched water table in spring, and planting is generally delayed because of wetness.

This soil has good potential for pasture and hay. These crops fit well into a cropping system with grain crops, and they supplement other practices that help control erosion and maintain good tilth. The fragipan limits rooting depth of deep-rooted plants. Good pasture production is obtained by optimum fertility and rotation grazing.

This soil has good potential for northern red oak, black walnut, yellow-poplar, eastern white pine, shortleaf pine, and white ash. Wetness is a moderate limitation in use of equipment, but dry periods can be selected for most needs. If seedlings are planted, undesirable plant competition needs to be controlled.

For most urban uses, this soil has fair potential. Wetness and low strength are limitations for most uses. They are severe limitations for buildings with basements. Slow permeability and wetness are severe limitations for septic tank absorption fields. Expansion of filter fields is needed. Low strength is a severe limitation in constructing roads and streets. Most limitations for urban uses can be overcome by drainage and proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IIe. The woodland suitability group is 2w.

NhC—Nicholson silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on breaks of broad ridges. Most areas are smooth, convex, and elongated and are 5 to 20 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is more than 62 inches thick. To a depth of about 23 inches, the subsoil is yellowish brown silt loam; between depths of 23 and 42 inches it is a very firm, compact, light silty clay loam fragipan that is brown and has grayish brown mottles. Beneath the fragipan, to a depth of 60 inches, the subsoil is strong brown silty clay loam that has distinct gray mottles; and from 60 inches to a depth of more than 70 inches it is mottled reddish, brownish, and grayish silty clay.

This soil is medium in natural fertility. It is medium acid to very strongly acid through the fragipan, except where limed. The root zone is only moderately deep, because

Figure 13.—Tobacco set on the contour. The soil is Nicholson silt loam, 2 to 6 percent slopes

the fragipan is at a depth of about 2 feet. Permeability is moderate above the fragipan and slow in the fragipan. Runoff is medium, and available water capacity is moderate. The organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 18 to 30 inches during winter and spring. This soil has low strength. It has moderate shrink-swell potential in the lower part of the subsoil below the fragipan.

Included with this soil in mapping are small areas of Crider soils and a few small areas of gently sloping Nicholson soils. Also included are small spots of severely eroded soils that have a surface layer of yellowish brown silt loam.

This soil is used mainly for hay and pasture and occasional row crops. A few areas are wooded.

This soil has fair potential for cultivated crops, but the hazard of erosion is severe. No-till farming, contour tillage, stripcropping, cover crops, and including grasses and legumes in the cropping system help to slow runoff, maintain organic matter content and good tilth, and control erosion. The fragipan at a depth of about 2 feet restricts rooting depth and air and water movement. This results in droughtiness in dry periods. Also, the fragipan causes a perched water table in spring, and planting is generally delayed because of wetness.

This soil has good potential for pasture and hay. Because of the hazard of erosion, pasture and hay are better suited than most other crops. Seeding late in summer or early in fall generally results in better stands, quicker cover, less competition from undesirable plants, and better erosion control. The fragipan limits the rooting depth of deep-rooted plants. High production is obtained by optimum fertility and rotation grazing.

This soil has good potential for yellow-poplar, eastern white pine, shortleaf pine, and white ash. The hazard of erosion is a moderate limitation in management. Trails and logging roads should be on the contour. If seedlings are planted, undesirable plant competition needs to be controlled.

This soil has fair potential for most urban uses. Steepness of slope, wetness, and low strength are limitations to most uses. For shallow excavations and buildings with basements, wetness is a severe limitation. Low strength is a severe limitation in constructing roads and streets and buildings. Slow permeability and wetness are severe limitations for septic tank absorption fields. Expansion of filter fields is needed. Most limitations for urban uses can be overcome by drainage and proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IIIe. The woodland suitability group is 2w.

No—Nolin silt loam. This deep, well drained, nearly level soil is on flood plains and upland depressions. Flooding is common for brief duration from December through May. Areas are 5 to 40 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is more than 51 inches thick. It is brown silt loam.

This soil is high in natural fertility. It is mainly slightly acid but ranges from strongly acid to moderately alkaline. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. It has a seasonal high water table at a depth of 3 to 6 feet.

Included with this soil in mapping are a few small areas of Lindside silt loam. Also included are a few areas of soils that have a very dark brown or black surface layer and a dark grayish brown or grayish brown subsoil and a few areas of soils that have 20 inches or more of brown silt loam over dark gray silty clay loam. These included soils are mostly in upland depressions and on low gradient positions on stream tributaries. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of included soils are less than 3 acres.

Most areas of this soil are used intensively for cultivated crops. A few small irregular areas are used for pasture, hay, or woodland.

This soil has good potential for intensive cultivated crops, and production is high. Flooding is the main limitation, but in most years common crops are not destroyed. Winter crops, such as small grain, are poorly suited because of flooding in winter and early in spring. This soil does not require drainage, but stream channel improvement in some areas decreases overflow. In places, diversion ditches from adjoining areas also reduces overwash. Crops responds well to optimum fertility. Returning crop residue to the soil helps maintain organic matter content and good tilth.

This soil has good potential for pasture and hay. In some years, flooding damages hay crops in spring. Grasses and legumes that withstand flooding for short periods are better suited. This soil has good potential for annual supplemental pasture and hay crops, and high production can be obtained in most years.

This soil has good potential for sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, and cherrybark oak. If seedlings are planted, undesirable plant competition needs to be controlled.

This soil has poor potential for urban uses because of flooding. It has good potential for topsoil and daily cover for landfill. Piping and low strength are concerns when this soil is used for embankments, dikes, and levees.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1o.

PmA—Pembroke silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on broad ridges. Areas are 3 to 20 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is more than 85 inches thick. To a depth of 31 inches, the subsoil is reddish brown and dark red silty clay loam. Between depths of 31 and 93 inches, the subsoil is dark red silty clay and has yellowish brown mottles in the lower part.

This soil in high in natural fertility. It is medium acid to very strongly acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. Shrink-swell potential is moderate below a depth of about 30 inches.

Included with this soil in mapping are a few small areas of Crider soils and some small local alluvial areas of Nolin soils. Included soils make up 5 to 15 percent of mapped areas. Individual areas of included soils are less than 2 acres.

Most areas of this soil have been cleared and are used intensively for cultivated crops and specialty crops, such as tobacco (fig. 14).

This soil has good potential for cultivated crops, specialty crops, pasture, and hay. It has no significant limitations for crop production, except for unseasonable weather. Organic matter content and good tilth are maintained by returning crop residue to the soil, using cover crops, and including grasses and legumes in the cropping system.

This soil has good potential for yellow-poplar, black walnut, white ash, eastern white pine, shortleaf pine, and loblolly pine. Control of weeds is needed to establish seedlings in open fields.

The potential for urban uses is good on this soil. Low

Figure 14.—Tobacco on Pembroke silt loam, 0 to 2 percent slopes. This soil is in capability class I

strength is a severe limitation for many uses but can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1o.

PmB—Pembroke silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad, slightly karst ridges. Slopes are somewhat irregular on an undulating landscape. Surface water drains to slight depressions and then sinks rapidly into underground caverns. Some areas drain to small streams that drain into larger caverns. Areas are 10 to 150 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is more than 85 inches thick. To a depth of 31 inches, the subsoil is reddish brown and dark red silty clay loam. Between depths of 31 and 93 inches, the subsoil is dark red silty clay and has yellowish brown mottles in the lower part.

This soil is high in natural fertility. It is medium acid to very strongly acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. Shrink-swell potential is moderate below a depth of about 30 inches.

Included with this soil in mapping are areas of Crider soils on ridgetops, Nolin soils in small depressions, and Fredonia soils around sinkholes. The Crider soils make up as much as 20 percent of some areas. Individual areas of Nolin and Fredonia soils generally are less than 1 acre.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are used for residential and urban developments. Most areas have been cleared.

This soil has good potential for cultivated crops. It makes up the largest unit for cultivated crops in the county and is one of the more productive soils. In most areas, it is used intensively in a rotation that produces three crops in two years, consisting of corn, small grain, and soybeans (fig. 15). The hazard of erosion is a moderate limitation for cultivated crops. No-till farming, contour tillage, stripcropping, cover crops, and return of crop residue to the soil help control erosion and maintain organic matter content and good tilth.

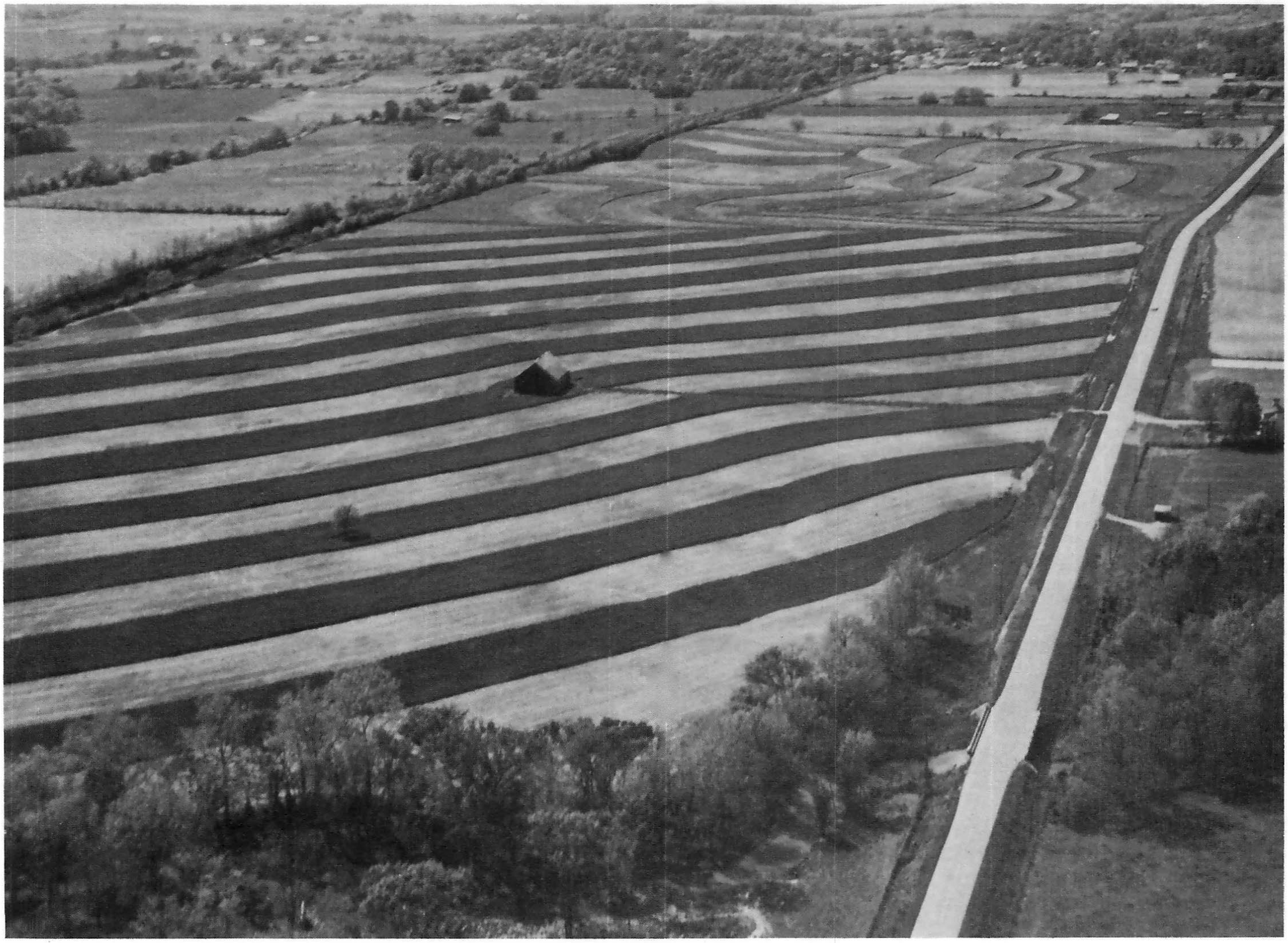


Figure 15.—Stripcropping in a rotation of corn, small grain, and soybeans. The soil is Pembroke silt loam, 2 to 6 percent slopes.

This soil has good potential for hay and pasture (fig. 16). Deep rooted crops are well suited, and production is high under a high level of management. Hay and pasture in a cropping system with cultivated crops supplement other practices in controlling erosion and maintaining organic matter content and good tilth.

This soil has good potential for yellow-poplar, black walnut, white ash, eastern white pine, shortleaf pine, and loblolly pine. Control of weeds is needed to establish seedlings in open fields.

The potential for urban uses is good on this soil. Low strength is a severe limitation for many uses but can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

PmC—Pembroke silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on narrow side slopes and in irregular karst areas. Surface water drains to small depressions or cavern sinkholes. Areas are 3 to 20 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is more than 85 inches thick. To a depth of 31 inches, the subsoil is reddish brown and dark red silty clay loam. Between depths of 31 and 93 inches, the subsoil is dark red silty clay and has yellowish brown mottles in the lower part.

This soil is high in natural fertility. It is medium acid to very strongly acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. Shrink-swell potential is moderate below a depth of about 30 inches.

Included with this soil in mapping are a few small areas of Vertrees, Baxter, and Fredonia soils. The included soils make up 10 to 20 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

Most areas of this soil are cleared and are used for pasture, hay, and cultivated crops. A few areas are wooded.

This soil has fair potential for cultivated crops. All crops commonly grown in the county are suited to this soil, but the hazard of erosion is severe when cultivated crops are grown. Some erosion control methods are difficult to apply because of the irregularity of the landscape. No-till farming, contour tillage, stripcropping, terraces, cover crops, and including grasses and legumes in the cropping system help to control erosion. Soils respond well to optimum fertility. The return of crop residue to the soil also aids in erosion control and helps maintain organic matter content and good tilth.

This soil has good potential for pasture and hay crops. Deep rooted grasses and legumes are well suited and production is good under a high level of management. This soil is better suited to pasture and hay than to most other crops in areas where use of erosion control methods is difficult. Optimum fertility and rotation grazing ensure good cover and high production and help to control erosion.

This soil has good potential for yellow-poplar, black walnut, white ash, eastern white pine, shortleaf pine, and loblolly pine. If seedlings are planted, competition from undesirable plants needs to be controlled.

This soil has fair potential for urban development. Low strength is a severe limitation for many uses. Slope limits some uses. For small commercial buildings, slope is a severe limitation. Proper planning, design, and construction procedures overcome most limitations.

This soil has good potential for openland and woodland wildlife habitat.

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

Pt—Pits. Pits are open excavations from which the soil and underlying material have been removed. They commonly are limestone quarries where the rock has been conditioned and piled for future use or removed for

Figure 16.—Alfalfa and grass on Pembroke silt loam, 2 to 6 percent slopes.

agricultural or industrial purposes. Areas are 20 to 100 acres.

Most pits are in the Mississippian Plateau limestone area in the southern part of the county. Three pits are near Hopkinsville. They are within areas of Fredonia, Pembroke, and Crider soils. These soils are well drained. Fredonia soils are moderately deep to limestone bedrock. Crider and Pembroke soils are deep.

In areas of pits, the bare rock that is exposed and the spoil material that is left support few or no plants. Most pits have vertical walls around the mined areas. Most of the natural soil has been destroyed, but in some pits a few small areas of Fredonia and Pembroke soils are included in mapping.

This map unit has not been assigned to a capability class or a woodland suitability group.

ReC—Riney loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is in somewhat broken areas of convex ridges, side slopes, and benches. Areas are 4 to 10 acres.

Typically, the surface layer is dark yellowish brown loam about 9 inches thick. The subsoil is about 39 inches thick. It is clay loam in the upper part, sandy clay loam in the lower part, and is yellowish red throughout. The substratum is about 12 inches thick. It is yellowish red sandy clay loam that has mottles in shades of brown. The substratum contains small, soft sandstone fragments. Soft reddish sandstone bedrock is at a depth of about 60 inches.

This soil is medium to low in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderately rapid, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is low. Tilth is good. Workability of the surface layer is good in a wide range of soil moisture. This soil has low strength.

Included with this soil in mapping are some areas of soils that have a thin loess mantle; these soils have a surface layer of silt loam. Also included are small areas of Wellston and Frondorf soils, a few spots of severely eroded soils, and small areas of soils that are less than 40 inches deep to soft sandstone. The included soils make up 5 to 15 percent of mapped areas. Individual areas of the included soils are less than 2 acres.

Where this soil is cleared, areas are used dominantly for hay and pasture. Several areas are wooded.

This soil has fair potential for cultivated crops. The severe hazard of erosion, small areas, and irregular slopes are limitations. Management that is needed to control erosion is difficult to apply in most areas. If this soil is cultivated, no-till farming, contour tillage, stripcropping, cover crops, grasses and legumes in the cropping system, and return of crop residue are needed to slow runoff, control erosion, and build up the organic matter content.

This soil has good potential for pasture and hay. Most grasses and legumes commonly grown in the county are suited. Stands that are established late in summer and early in fall minimize the hazard of erosion. In addition, better stands are established quicker with less competition from undesirable plants in this period. Fertility levels should be maintained at frequent intervals because of the moderately fast rate that plant nutrients are leached. Good growth can be maintained by rotation grazing and optimum fertility. Renovation of old stands can be accomplished without plowing. These methods help control erosion.

This soil has good potential for northern red oak, yellow-poplar, shortleaf pine, loblolly pine, black walnut, and eastern white pine. If seedlings are planted, undesirable plant competition needs to be controlled.

This soil has fair potential for urban development. Steepness of slope is a limitation for most uses. For small commercial buildings, slope is a severe limitation. Low strength is a limitation for local roads and streets. Proper planning and design and construction procedures overcome most limitations.

This soil has good potential for openland and woodland wildlife habitat.

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

ReD—Riney loam, 12 to 20 percent slopes. This deep, well drained, moderately steep soil is on side slopes and benches. Areas are 5 to 30 acres.

Typically, the surface layer is dark yellowish brown loam about 9 inches thick. The subsoil is about 39 inches thick. It is clay loam in the upper part, sandy clay loam in the lower part, and is yellowish red throughout. The substratum is about 12 inches thick. It is yellowish red sandy clay loam that has mottles in shades of brown, and it contains small, soft sandstone fragments. Soft, reddish sandstone bedrock is at a depth of about 60 inches.

This soil is medium to low in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderately rapid, and available water capacity is high. Runoff is rapid. Organic matter content is low in the surface layer. Tilth is good, and workability in the surface layer is good at a wide range of soil moisture. This soil has low strength.

Included with this soil in mapping are a few small areas of Dekalb, Frondorf, and Wellston soils. Also included are small spots of soils that are severely eroded and small areas of soils that are less than 40 inches deep to soft sandstone.

About one-fourth of the acreage of this soil is farmed, and the remainder is covered with trees or brush.

This soil has poor potential for cultivated crops. The very severe hazard of erosion is a major limitation and permits only occasional cultivation without excessive loss of soil. If this soil is used for cultivated crops, all practical measures, such as no-till farming, contour cultivation, stripcropping, and return of crop residue to the soil, are needed to help control erosion.

This soil has fair potential for pasture or hay. Very severe erosion is a danger while stands are being established. Seeding late in summer and early in fall helps establish good stands and fast early growth without excessive soil loss. Fertility level should be maintained by rotation grazing and optimum fertility. Old stands can be renovated without plowing. These measures help control erosion and increase returns.

This soil has good potential for northern red oak, yellow-poplar, shortleaf pine, loblolly pine, black walnut, and eastern white pine. If seedlings are planted, undesirable plant competition needs to be controlled.

The potential for urban development on this soil is poor. The moderately steep slope is a severe limitation that is difficult to overcome.

This soil has fair potential for openland and good potential for woodland wildlife habitat.

This soil is in capability subclass IVe. The woodland suitability group is 2o.

RmE3—Riney clay loam, 12 to 30 percent slopes, severely eroded. This deep, well drained, moderately steep to steep soil is on side slopes of broken areas. Areas are 5 to 30 acres.

Most of the original surface layer of this soil has been lost through erosion. Typically, the surface layer is yellowish red clay loam about 6 inches thick. The subsoil is about 34 inches thick. The upper part of the subsoil is yellowish red clay loam, and the lower part is sandy clay loam. The substratum is about 10 inches thick. It is yellowish red sandy clay loam that has mottles in shades of brown, and it contains small, soft sandstone fragments. Soft reddish sandstone bedrock is at a depth of about 50 inches.

This soil is low in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderately rapid, and available water capacity is high. Runoff is rapid. Organic matter content is low in the surface layer. Tilth is poor.

Included with this soil in mapping are a few areas of Dekalb soils on the steeper side slopes and small areas of Wellston soils on the upper ridges. Also included are some areas of Riney soils that are not severely eroded and a few small areas of gullied land. The included soils make up 15 to 30 percent of mapped areas. Individual areas of the included soils are less than 4 acres.

Most areas of this soil are covered with second growth timber or brush. A few areas are used for pasture.

This soil has poor potential for cultivated crops because of the very severe erosion hazard and steep slopes. These limitations are difficult to overcome.

This soil has fair potential for pasture. The very severe hazard of erosion, poor tilth, low organic matter content, irregular rough landscape, and steep slopes are concerns in establishing and maintaining pasture. Land smoothing is needed in some areas before pasture is established. Because of the erosion hazard and poor tilth, seeding pasture late in summer or early in fall is desirable. A short fallow in summer assists in preparing a good seedbed. Adding fertilizer and lime according to crop needs, establishing plant cover quickly, and avoiding overgrazing are important. Old stands of pasture can be renovated without plowing, thus lessening the chance of excessive erosion.

This soil has fair potential for northern red oak, shortleaf pine, Virginia pine, loblolly pine, and eastern white pine. The use of equipment has moderate limitations. Machine planting is difficult in most areas because of gullies and the uneven surface.

This soil has poor potential for urban development. The steepness of slope is a severe limitation and is difficult to overcome.

This soil has fair potential for openland wildlife habitat and good potential for woodland wildlife habitat.

This soil is in capability subclass VIe. The woodland suitability group is 3r.

Ro—Robertsville silt loam. This deep, poorly drained, nearly level soil is on stream terraces and in depressions on uplands. Flooding is common from January to April. Areas are 5 to 40 acres.

Typically, the surface layer is about 10 inches thick. It is grayish brown silt loam that has mottles in shades of gray and brown. The subsoil is about 35 inches thick. To a depth of about 16 inches, the subsoil is gray silt loam mottled in shades of brown. Below that, to a depth of 45 inches, it is a firm, brittle, dense silt loam fragipan that is gray and has yellowish brown mottles. The substratum, to a depth of 66 inches or more, is gray silty clay loam mottled in shades of brown.

This soil is medium in natural fertility. It is strongly acid to extremely acid, except where limed. The root zone is shallow because of the fragipan at a depth of about 16 inches. Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate, and runoff is very slow. The high water table is at the surface or within a depth of 12 inches during winter and spring. Organic matter content in the surface layer is low. Tilth is good.

Included with this soil in mapping are small areas of Lawrence soils along stream channels. Also included are a few areas of Melvin soils and areas of a soil that has a surface layer of dark gray silt loam over a subsoil of gray silty clay or clay and does not have a fragipan. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

Most areas of this soil are used as woodland. A few areas are used for cultivated crops and pasture.

This soil has poor potential for cultivated crops, unless drained. Wetness and flooding are severe limitations. The dense, slowly permeable fragipan at a depth of about 16 inches results in a seasonal high water table near the surface. Also, in dry seasons this soil is droughty because of the shallow root zone. Artificial drainage can increase the potential of this soil where suitable outlets are available. Many areas do not have suitable outlets.

The potential of this soil for pasture is poor. Wetness and flooding limit the range of suited plants and the number of grazing days.

This soil has good potential for pin oak, yellow-poplar, sweetgum, northern red oak, loblolly pine, and American sycamore. The use of equipment and seedling mortality are concerns in management because of the wetness and flooding limitations. Strong, healthy, properly planted seedlings that are protected from plant competition are most likely to survive. Equipment use is restricted mainly to dry periods.

This soil has poor potential for urban uses. Wetness and flooding are limitations and are too difficult to overcome.

This soil has good potential for wetland plants, shallow water areas, and wetland wildlife habitat.

This soil is in capability subclass IVw. The woodland suitability group is 1w.

SaA—Sadler silt loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on loess-capped ridgetops. Areas are 5 to 20 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 48 inches thick. To a depth of about 20 inches, the subsoil is yellowish brown silt loam. Below that, to a depth of about 24 inches, it is pale brown silt loam that is mottled yellowish brown. Between depths of 24 and 56 inches, the subsoil is a very firm, compact, yellowish brown silt loam fragipan that is mottled grayish brown. The substratum, to a depth of 74 inches, is strong brown silty clay loam that is mottled yellowish brown and grayish brown.

This soil is medium in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is moderately deep. It is restricted by the fragipan at a depth of about 2 feet. Permeability is moderate above the fragipan and slow in the fragipan. Runoff is slow, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 18 to 24 inches in winter and spring. This soil has low strength.

Included with this soil in mapping are small areas of the somewhat poorly drained Lawrence and Henshaw soils in depressions. Also included is a soil that contains more clay in the lower part and lacks a fragipan. The included soils make up about 5 to 15 percent of mapped areas. Individual areas of included soils are less than 2 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture.

This soil has fair potential for cultivated crops, including tobacco. Wetness is a moderate limitation. In most years it delays planting, and in some years it delays harvesting. The moderate rooting depth, caused by the dense fragipan at a depth of about 2 feet, and the moderate available water capacity result in this soil being droughty during dry seasons. Drainage of this soil increases potential for crop production but is not economically feasible in some areas. Return of crop residue to the soil, cover crops, and including grasses and legumes in the cropping system help maintain organic matter content and good tilth.

This soil has good potential for pasture and hay crops. The moderate rooting depth limits the selection of plants. Some deep rooted plants, such as alfalfa, are not suited. Optimum fertility and rotation grazing increase pasture production and lengthen the lifespan of stands. In an occasional dry period, the moderate available water capacity is a limitation.

This soil has good potential for northern red oak, yellow-poplar, Virginia pine, eastern white pine, and loblolly pine. Wetness is a moderate limitation to the use of equipment, but dry periods can be selected for most needs. If seedlings are planted, undesirable plant competition should be controlled.

This soil has poor potential for urban development because of wetness. This limitation is severe for some uses because of a seasonal high water table within a depth of 18 to 24 inches. Slow permeability in the fragipan and wetness are severe limitations for septic tank absorption fields. This soil has good potential as a source for topsoil. Low strength is a limitation for foundations, roads, and streets.

This soil has good potential for openland and woodland wildlife habitats.

This soil is in capability subclass IIw. The woodland suitability group is 3w.

SaB—Sadler silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on loess-capped ridgetops. Areas range from narrow to broad and are 5 to 40 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 48 inches thick. To a depth of about 20 inches, the subsoil is yellowish brown silt loam. Below that, to a depth of about 24 inches, it is pale brown silt loam that is mottled yellowish brown. Between depths of 24 and 56 inches, the subsoil is a very firm, compact, yellowish brown silt loam fragipan that is mottled grayish brown. The substratum, to a depth of 74 inches, is strong brown silty clay loam that is mottled yellowish brown and grayish brown.

This soil is medium in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is moderately deep. It is restricted by the fragipan at a depth of about 2 feet. Permeability is moderate above the fragipan and slow in the fragipan. Runoff is medium, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 18 to 24 inches in winter and spring. This soil has low strength.

Included with this soil in mapping are a few small areas of Zanesville soils on narrow ridges and small areas of the somewhat poorly drained Lawrence soil in depressions. Also included is a soil that contains more clay in the lower part and lacks a fragipan. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture.

This soil has fair potential for cultivated crops, including tobacco. The hazard of erosion is a moderate limitation. No-till farming, contour tillage, stripcropping, cover crops, and grasses and legumes in the cropping system slow runoff and help control erosion. Return of crop residue to the soil helps control erosion and maintain organic matter content and good tilth. The fragipan at a depth of about 2 feet restricts rooting depth and air and water movement, which results in this soil being droughty in dry periods. Also, the fragipan causes a perched water table in spring, and planting is generally delayed because of wetness.

This soil has good potential for pasture and hay. These crops fit well into a cropping system with grain crops, and they supplement other practices that help control erosion and maintain good tilth. The fragipan limits rooting depth of deep rooted plants and limits the moisture capacity in dry periods. Good pasture production is obtained by keeping fertility high and using rotation grazing.

This soil has good potential for northern red oak, yellow-poplar, Virginia pine, eastern white pine, and loblolly pine. Wetness is a moderate limitation in use of equipment, but dry periods can be selected for most needs. If seedlings are planted, undesirable plant competition should be controlled.

This soil has poor potential for urban development because of wetness. This limitation is severe for some uses because of a seasonal high water table at a depth of 18 to 24 inches. Slow permeability in the fragipan and wetness are severe limitations for septic tank absorption fields. The potential of this soil for topsoil is good. Low strength is a limitation for foundations, roads, and streets.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IIe. The woodland suitability group is 3w.

Sk—Skidmore gravelly loam. This deep, well drained, nearly level soil is on relatively narrow flood plains. Flooding of very brief duration is common from December through May. Areas are 5 to 15 acres.

Typically, the surface layer is brown gravelly loam about 7 inches thick. The subsoil is about 25 inches thick. To a depth of about 20 inches, the subsoil is yellowish brown gravelly loam and has pale brown mottles. Below that, to a depth of 32 inches, the subsoil is dark yellowish brown very channery loam. The substratum is about 13 inches thick. It is mottled gray, light gray, and yellowish brown very channery clay loam. Soft shale is at a depth of about 45 inches.

This soil is medium in natural fertility. It is medium acid to neutral. The root zone is moderately deep to deep, permeability is moderately rapid, and available water capacity is low. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is poor because of the 10 to 40 percent content of coarse fragments in the surface layer, but this soil can be worked at a wide range of soil moisture. The high water table is at a depth of 3 to 4 feet in winter and spring.

Included with this soil in mapping are spots of Nolin and Cuba soils near the uplands, and a few areas of soils that are strongly acid. Also included are a few areas of soils that are similar to this Skidmore soil, except the surface layer is silt loam. The included soils make up about 10 to 20 percent of mapped areas. Individual areas of the included soils are less than 2 acres.

Most areas of this soil are wooded. Most cleared areas are used for pasture. A few areas are used for cultivated crops, generally where other alluvial soils are dominant.

This soil has fair potential for cultivated crops. Common flooding is a limitation, but flooding generally is very brief and crops are rarely destroyed. Poor tilth, low available water capacity, and small narrow areas dissected by stream channels are concerns in management of cultivated crops.

The potential of this soil is fair for pasture. The seedbed for pasture plants is difficult to prepare because of coarse fragments. Production is generally good for established pasture, but low available water capacity in dry periods makes this soil droughty. Restricted grazing helps to maintain good stands and growth. Pasture plants that withstand flooding for short periods are better suited. Fertilizer should be applied somewhat frequently because excessive leaching is common in this soil.

This soil has good potential for northern red oak, yellow-poplar, black walnut, white ash, eastern white pine, and American sycamore. Native trees make up a large percentage of the timbered areas, and production is good. If seedlings are planted, undesirable plant competition should be controlled.

This soil has poor potential for urban uses. Flooding is a severe limitation and is difficult to overcome.

This soil has good potential for openland wildlife habitat.

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

Ss—Steff silt loam. This deep, moderately well drained, nearly level soil is on flood plains. Flooding is common from December through May. Areas are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is about 30 inches thick. To a depth of 30 inches, the subsoil is yellowish brown silt loam mottled in shades of brown and gray. Below that, to a depth of 39 inches, the subsoil is pale brown silt loam mottled in shades of brown and gray. The substratum, to a depth of 60 inches or more, is gray silt loam, mottled in shades of brown.

This soil is high in natural fertility. It is strongly acid to very strongly acid, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. This soil has low strength. The high water table is at a depth of 18 to 36 inches in winter and spring.

Included with this soil in mapping are small areas of the well drained Cuba soils along stream channels and small areas of the somewhat poorly drained Stendal soils near the uplands. The included soils make up 15 to 25 percent of the mapped area. Individual areas of included soils generally are less than 4 acres.

Most areas of this soil have been cleared and are used intensively for cultivated crops. A few areas are used for pasture, and a few areas are wooded.

The potential of this soil is good for cultivated crops. Crop production is good under intensive use. The main limitations are flooding and slight wetness. In some years, planting is delayed a few days because of wetness. Drainage is not required, although it lengthens the time for field operations and improves the suitability for some crops. Diversion ditches are used effectively for controlling overwash from adjacent areas. The return of crop residue to the soil helps maintain organic matter content and good tilth.

This soil has good potential for pasture and hay. Flooding is a hazard, but flooding is generally brief and crops are rarely destroyed. Tilling improves aeration in the lower part of the subsoil and permits deeper root growth. This soil is rated high for annual mid-summer supplemental pasture and hay crops. The high available moisture permits good growth in relatively dry periods.

This soil has good potential for northern red oak, yellow-poplar, eastern white pine, loblolly pine, sweetgum, and black walnut. If seedlings are planted, control of plant competition is needed; otherwise, woodland use or management has no significant limitations.

This soil has poor potential for urban uses because of flooding. This limitation is difficult to overcome. This soil is a good source for topsoil. For embankment material, it is subject to piping and has low strength.

This soil has good potential for development of openland and woodland wildlife habitat.

This soil is in capability class I. The woodland suitability group is 1w.

St—Stendal silt loam. This deep, somewhat poorly drained, nearly level soil is on flood plains. In most areas, flooding is frequent from December through May. Areas are 8 to 30 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The substratum to a depth of 22 inches is grayish brown silt loam and has mottles in shades of brown; below that, to a depth of 45 inches, it is gray silt loam mottled in shades of brown. Between depths of 45 and 66 inches, the substratum is gray fine sandy loam mottled with strong brown.

This soil is medium in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is slow. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 12 to 36 inches in winter and spring. This soil has low strength.

Included with this soil in mapping are small narrow bands of the moderately well drained Steff soils along stream channels and small areas of the poorly drained Bonnie soils near uplands. The included soils make up about 15 to 20 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

Most areas of this soil are used for cultivated crops. Some areas are used for pasture and hay, and some areas are wooded.

This soil has fair potential for cultivated crops. Wetness and the hazard of flooding delay planting, tillage, and harvesting in some years. A good drainage system increases the potential. Tile drainage systems are very effective where suitable outlets are available. Drainage lengthens the effective growing season and widens the range of suitable plants. Diversion ditches are effective in controlling overwash from adjacent areas. Good tilth and organic matter content are maintained by returning crop residue to the soil. Crops respond well to a high level of fertility and high production can be obtained. Crop failures caused by flooding are common in many areas in which flood control measures have not been taken.

This soil has fair potential for pasture and hay. Wetness caused by a seasonal high water table limits rooting depth in wet periods. Grasses and legumes that tolerate wetness and withstand flooding for short periods are better suited than most other varieties. If this soil is drained, most commonly grown pasture plants are suited and the grazing period is lengthened. Grazing should be avoided when the soil is saturated. This soil is rated high for annual mid-summer supplemental pasture and hay crops.

This soil has good potential for pin oak, sweetgum, yellow-poplar, and Virginia pine. In addition, eastern white pine, baldcypress, American sycamore, red maple, and white ash produce well and are suited to planting. Wetness is a moderate limitation to use of equipment, but dry seasons can be selected for most equipment needs. Planted seedlings need protection from plant competition until they are well established.

This soil has poor potential for urban development. Frequent flooding and wetness, which is caused by a seasonal high water table, are severe limitations and are difficult to overcome. This soil is a good source of topsoil. If this soil is used for embankments, dikes, and levees, it has low strength and is subject to piping.

This soil has good potential for woodland wildlife habitat.

This soil is in capability subclass IIw. The woodland suitability group is 2w.

Ud—Udorthents. This map unit consists of areas in the northern edge of the county from which coal has been removed by stripping. These areas include old abandoned mines and reclaimed areas. Slopes range from 5 to about 70 percent. Areas are about 5 to 150 acres.

The abandoned mines are deep cuts or pits that have a vertical wall on the uphill side and a cone-shaped dump of spoil material on the downhill side. These areas have not been reshaped and revegetated. The dumps of spoil have slopes of 20 to 70 percent. The floor of the pits generally consists of bedrock material. Most pits collect and hold water, and some are permanent reservoirs.

Reclaimed areas are mines that have been reshaped and revegetated. They are gently sloping to steep. Edges of the reshaped areas are strongly sloping to steep; the slopes, however, are smooth and short. The top and dominant part of areas have slopes that range from gently sloping to sloping. Drainage routes have been formed to carry surface water into natural drainage patterns. The surface of areas is relatively smooth except for an occasional large stone.

The texture, color, and thickness of the layers of the soils vary from one area to another. A profile in an area of spoil that has been resurfaced from nearby residual soil material consists of a surface layer of strong brown silty clay loam about 5 inches thick. The substratum, to a depth of more than 49 inches, is gray very channery clay or silty clay.

The spoil material is low in fertility, available water capacity, and organic matter content. It is dominantly neutral to alkaline but is strongly acid to very strongly acid in a few areas. Tilth is poor because of the clayey texture and the content of coarse fragments.

Included with these soils in mapping are some areas that have been disturbed by heavy equipment.

Udorthents have various uses and potentials. Some areas have potential for trees, and some have potential for pasture. Other potential uses are area type sanitary landfill, camp areas, picnic areas, playgrounds, and paths and trails. Areas are variable and, because of this, onsite investigation is necessary to determine the best use for a particular area.

This map unit has not been assigned to a capability subclass or woodland suitability group.

VeC—Vertrees silty clay loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is in karst areas. Slopes are moderately short and irregular and are dominantly around underground cavern sinkholes. Areas are 5 to 30 acres.

Typically, the surface layer is reddish brown silty clay loam about 8 inches thick. The subsoil is more than 64 inches thick. It is red silty clay to a depth of about 19 inches. Below that, to a depth of about 72 inches, the subsoil is red clay that has yellowish brown mottles.

This soil is medium in natural fertility. It is medium acid to very strongly acid, except where limed. The root zone is deep, permeability is moderately slow, and available water capacity is high. Runoff is medium to rapid. Organic matter content in the surface layer is low. Tilth is poor. The moisture range is narrow in which this soil can be worked without clods forming. In most cultivated areas, a crust forms on the surface following alternate wetting and drying. Shrink-swell potential is moderate. This soil has low strength.

Included with this soil in mapping are small areas of Pembroke soils on the less sloping parts, a few areas of Baxter soils around cavern sinkholes, some areas of soils that have a surface layer of silt loam, and a few spots of severely eroded soils that have a surface layer of silty clay. Also included are some areas of soils that have slopes of less than 6 percent. The included soils make up about 20 to 30 percent of mapped areas but do not affect use and management. Individual areas of the included soils are less than 4 acres.

Most areas of this soil are used for hay and pasture. Some areas are used for cultivated crops, and some are wooded.

This soil has only fair potential for cultivated crops because the hazard of erosion is severe. Irregular slopes and landscape prevent the use of some erosion control practices. Where possible, use should be made of no-till farming, contour tillage, cover crops, and returning crop residue to the soil. These methods slow runoff, help control erosion, build up organic matter content, and maintain tilth.

This soil has good potential for hay and pasture. The deep root zone and high available water capacity are well suited to most grasses and legumes, including deep-rooted plants such as alfalfa. Hay and pasture respond well to high fertility, and good production can be obtained. Because of the very severe hazard of erosion, stands are difficult to establish in some places without risk of excessive erosion. Stands are easier to establish late in summer and early in fall because crusting in seedbeds is less, erosion is less, and competition from undesirable plants is less. Renovation of old stands can be accomplished without plowing.

This soil has good potential for yellow-poplar, white oak, chinkapin oak, black oak, and northern red oak. In addition, other trees to plant are black walnut, white ash, and Virginia pine. When the surface of this soil is wet, it is slick and limits use of equipment.

This soil has fair potential for urban development. Low strength is a severe limitation for dwellings, commercial buildings, and construction of local roads and streets.

This limitation can be overcome by proper design and construction procedures. The moderately slow permeability is a severe limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption area or by modifying the filter field.

This soil has good potential for openland and woodland wildlife habitat.

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

WeB—Wellston silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on narrow ridgetops. Slopes are slightly convex. Areas are 2 to 10 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is 35 inches thick. To a depth of 22 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 33 inches, it is brown silty clay loam. Between depths of 33 and 42 inches, the subsoil is yellowish brown silty clay loam. The substratum, to a depth of 58 inches, is light yellowish brown loam and contains 10 percent sandstone fragments.

This soil is medium in natural fertility. It is strongly acid to extremely acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good. Sandstone or shale bedrock is at a depth of 40 to 72 inches.

Included with this soil in mapping are small areas of the moderately well drained Zanesville soils near the middle of ridges and the moderately deep, well drained Frondorf soils near the edge of ridges. The included soils make up less than 20 percent of mapped areas. Individual areas of the included soils are less than 2 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are wooded.

This soil has good potential for cultivated crops, hay, and pasture. It has good potential for specialty crops, including tobacco. The small size makes the use of this soil desirable for such high-value cash crops as tobacco and truck crops. The main limitation is the moderate hazard of erosion. Some methods that help control erosion and maintain organic matter content and good tilth are no-till farming, contour tillage, stripcropping, cover crops, returning crop residue to the soil, and including grasses and legumes in the cropping system. Adding fertilizer and lime according to crop needs and rotation grazing help production. Pasture plants and hay commonly grown in the county, including deep-rooted crops, are well adapted to this soil.

This soil has good potential for northern red oak, black walnut, yellow-poplar, eastern white pine, and Virginia pine. If trees are planted, undesirable plant competition needs to be controlled.

This soil has good potential for urban development. Depth to rock is a moderate limitation to shallow excavations, dwellings with basements, and septic tank absorption fields.

This soil has good potential for openland and woodland wildlife habitat.

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

WeC—Wellston silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on ridgetops and side slopes. Slopes are somewhat irregular. Areas are from 5 to 20 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is 35 inches thick. To a depth of 22 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 33 inches, it is brown silty clay loam. Between 33 and 42 inches, the subsoil is yellowish brown silty clay loam. The substratum, to a depth of 58 inches, is light yellowish brown loam and contains 10 percent sandstone fragments.

This soil is medium in natural fertility. It is strongly acid to extremely acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is moderate. Tilth is good. Sandstone or shale bedrock is at a depth of 40 to 72 inches.

Included with this soil in mapping are small areas of the moderately well drained Zanesville soils on ridgetops and the moderately deep, well drained Frondorf soils on side slopes. Also included in a few areas, and making up a large percentage in some, is a well drained soil that is similar to this Wellston soil in the upper part, but the subsoil below a depth of 20 inches is clayey and formed in shale residuum. The included soils make up less than 20 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

This soil is used for hay, pasture, cultivated crops, and trees.

This soil has fair potential for cultivated crops. The severe hazard of erosion is the main limitation. Small areas and irregular slopes in places limit the use of some erosion control practices. No-till farming, contour tillage, stripcropping, cover crops, and returning crop residue to the soil permit cultivated crops to be grown occasionally without excessive soil loss. Incorporating crop residue into the plow layer helps maintain good tilth and the organic matter content.

This soil has good potential for hay and pasture, and these crops are better suited than cultivated crops because of the erosion hazard. Pasture and hay plants commonly grown in the county are adapted to this soil, including deep-rooted grasses and legumes. The application of lime and fertilizer according to crop needs and the rotation of grazing help to increase production, retain long lasting stands, and control erosion. Renovation can be accomplished without plowing.

This soil has good potential for northern red oak, black walnut, yellow-poplar, eastern white pine, and Virginia pine. If trees are planted, undesirable plant competition needs to be controlled.

This soil has fair potential for urban development and uses. Slope is a severe limitation for small commercial buildings. The 40- to 72-inch depth to rock is a moderate limitation for shallow excavations and septic tank absorption fields. Proper design and construction procedures can overcome these limitations. The septic tank absorption field can be expanded to overcome the depth to rock limitation.

This soil has good potential for openland and woodland wildlife habitat.

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

WeD—Wellston silt loam, 12 to 20 percent slopes. This deep, well drained, moderately steep soil is on side slopes. Areas are irregular and range from 3 to 35 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is 35 inches thick. To a depth of 22 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 33 inches, it is brown silty clay loam. Between depths of 33 and 42 inches, the subsoil is yellowish brown silty clay loam. The substratum, to a depth of 58 inches, is light yellowish brown loam and contains 10 percent sandstone fragments.

This soil is medium in natural fertility. It is strongly acid to extremely acid throughout, except where limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content in the surface layer is moderate. Tilth is good. Sandstone or shale bedrock is at a depth of 40 to 72 inches.

Included with this soil in mapping are small areas of Frondorf soils on the steeper breaks. Also included are areas of a soil that is similar to this Wellston soil in the upper part, but the subsoil below a depth of 20 inches is clayey and formed in shale residuum. The included soils make up about 15 to 25 percent of mapped areas. Individual areas of the included soils are less than 3 acres.

Most areas of this soil are used for pasture, hay, and trees.

This soil has poor potential for row crops and small grain because of the very severe hazard of erosion. Excessive soil loss because of the moderately steep slope and rapid runoff limit the use of cultivated crops. This hazard is difficult to overcome.

This soil has good potential for pasture and hay. Excessive soil loss can occur if cover is poor or if stands are being established. The hazard of erosion is reduced by seeding late in summer and early in fall. Liming and fertilizing according to crop needs, deferment of grazing until crops are well established, and rotation grazing are needed. Renovation of old stands without plowing reduces the hazard of erosion. Tillage operations should be on the contour.

This soil has good potential for northern red oak, yellow-poplar, eastern white pine, and Virginia pine. Concerns in management are the moderate limitations of erosion and use of equipment. The limitations can partly be compensated for by constructing skid trails and logging roads on the contour and by using proper equipment. Control of weeds is needed to establish seedlings.

This soil has poor potential for urban uses. Moderately steep slope is a severe limitation for most uses and is difficult to overcome.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IVe. The woodland suitability group is 2r.

WlC3—Wellston silty clay loam, 6 to 12 percent slopes, severely eroded. This deep, well drained, sloping soil is on ridgetops and side slopes. Slopes are somewhat irregular. Excessive water erosion has removed most of the original surface layer and, in places, some of the upper part of the subsoil. Areas are 5 to 25 acres.

Typically, the present surface layer is strong brown silty clay loam about 7 inches thick. The subsoil is about 28 inches thick. To a depth of about 14 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 25 inches, it is brown silty clay loam. Between depths of 25 and 35 inches, the subsoil is yellowish brown silty clay loam. The substratum, to a depth of 51 inches, is light yellowish brown loam and contains 10 percent sandstone fragments.

This soil is low in natural fertility. It is strongly acid to extremely acid throughout, unless limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is medium. Organic matter content in the surface layer is low. Tilth is fair. Sandstone or shale bedrock is at a depth of 40 to 72 inches.

Included with this soil in mapping are small areas of severely eroded Zanesville soils on ridgetops and severely eroded Frondorf soils on side slopes. Also included are intermingled strips of uneroded soils, which are mainly Wellston soils. The included soils make up less than 25 percent of mapped areas. Individual areas of the included soils are less than 4 acres.

Most areas of this soil are in pasture, brush, or trees.

This soil has poor potential for cultivated crops. The very severe hazard of erosion, fair tilth, and low organic matter content are limitations and are very difficult to overcome. If cultivated crops are grown, all possible erosion control measures should be applied. Such measures as no-till farming, stripcropping, terraces, contour tillage, cover crops, and returning crop residue are needed.

For pasture, this soil has fair potential. Most grasses and legumes commonly grown in the county are suited, but tall fescue in combination with annual lespedeza generally has better production and gives better erosion control. The hazard of erosion is reduced by seeding late in summer and early in fall. The application of lime and fertilizer according to crop needs and rotation grazing gives good production, retains long lasting stands, and helps control erosion. Renovation of old stands can be accomplished without plowing.

This soil has good potential for northern red oak, black walnut, yellow-poplar, eastern white pine, and Virginia pine. If trees are planted, undesirable plant competition needs to be controlled.

This soil has fair potential for urban development and uses. Slope is a severe limitation for small commercial buildings. The 40- to 72-inch depth to rock is a moderate limitation for shallow excavations, buildings with basements, and septic tank absorption fields. Use of proper design and equipment can overcome these limitations. The septic tank absorption field can be expanded to overcome the depth to rock limitation.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IVe. The woodland suitability group is 2o.

WlD3—Wellston silty clay loam, 12 to 20 percent slopes, severely eroded. This deep, well drained, moderately steep soil is on side slopes in sandstone and shale areas in the northern part of the county. Slopes are somewhat irregular. Excessive water erosion has removed most of the original surface layer and, in places, some of the upper part of the subsoil. Areas are 5 to 40 acres.

Typically, the present surface layer is strong brown silty clay loam about 2 inches thick. The subsoil is about 28 inches thick. To a depth of 14 inches, it is strong brown silty clay loam; below that, to a depth of 25 inches, the subsoil is brown silty clay loam. Between depths of 25 and 35 inches, the subsoil is yellowish brown silty clay loam. The substratum, to a depth of about 51 inches, is light yellowish brown loam and contains 10 percent sandstone fragments.

This soil is low in natural fertility. It is strongly acid to extremely acid throughout, unless limed. The root zone is deep, permeability is moderate, and available water capacity is high. Runoff is rapid. Organic matter content in the surface layer is low. Tilth is fair. Sandstone or shale bedrock is at a depth of 40 to 72 inches.

Included with this soil in mapping are narrow bands of Frondorf soils on slope breaks and areas of a soil that is similar to this Wellston soil in the upper part, but the subsoil below a depth of 20 inches is clayey and formed in shale residuum. Also included are intermingled small areas of uneroded Wellston soils. The included soils make up about 15 to 25 percent of mapped areas. Individual areas of the included soils are less than 5 acres.

Most areas of this soil are used for pasture or are covered with brush or trees.

This soil has poor potential for cultivated crops because of the very severe hazard of erosion, moderately steep slopes, and low organic matter content. These limitations are difficult to overcome.

This soil has fair potential for pasture. The very severe hazard of erosion, low organic matter content, rough surface, and moderately steep slopes make it difficult to establish good cover before soil loss is excessive. The hazard of erosion is less if pasture is seeded late in summer and early in fall. The application of lime and fertilizer, according to crop needs, and deferment of grazing until crops are well established aid in good cover and help to control erosion. Most grasses and legumes commonly grown in the county are adapted, but tall fescue in combination with annual lespedeza generally gives better production and erosion control. Good pasture stands and growth can generally be obtained by maintaining a high level of fertility and by rotation grazing. Renovation of old stands without plowing reduces the hazard of erosion. Tillage operations should be on the contour.

This soil has good potential for northern red oak, yellow-poplar, eastern white pine, and Virginia pine. Concerns in management are the moderate hazard of erosion and the moderate limitation to use of equipment. These limitations can be overcome by constructing skid trails and logging roads on the contour and by using proper equipment.

This soil has poor potential for urban uses. Moderately steep slope is a severe limitation for most uses and is difficult to overcome.

This soil has good potential for woodland wildlife habitat.

This soil is in capability subclass VIe. The woodland suitability group is 2r.

ZnB—Zanesville silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on loess-capped ridgetops. Slopes are relatively smooth and slightly convex. Areas are 8 to 40 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 33 inches thick. To a depth of about 19 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 26 inches, it is yellowish brown silty clay loam that has grayish brown mottles. Between depths of 26 and 40 inches, the subsoil is a firm, brittle, yellowish brown silty clay loam fragipan that has mottles of dark brown and grayish brown. The substratum, to a depth of 68 inches, is light yellowish brown sandy clay loam mottled in shades of brown and gray.

This soil is medium in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is moderately deep and is restricted by the fragipan at a depth of about 26 inches. Permeability is moderate above the fragipan and moderately slow to slow in the fragipan. Runoff is medium, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 24 to 36 inches in winter and spring. This soil has low strength. Depth to bedrock ranges from 40 to 80 inches.

Included with this soil in mapping are a few small areas of the moderately well drained Sadler soils near drainage outlets and small areas of the well drained Wellston soils near the edge of areas. The included soils make up less than 25 percent of mapped areas. Individual areas of the included soils are less than 4 acres.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are wooded.

This soil has fair potential for cultivated crops, including tobacco. The hazard of erosion is moderate. Measures that will slow surface runoff and help control erosion are needed. Such measures are no-till farming, contour tillage, stripcropping, cover crops, and including grasses and legumes in the cropping system. Returning crop residue to the soil helps control erosion and maintains organic matter content and tilth. The fragipan at a depth of about 2 feet restricts rooting depth and available water capacity. The fragipan results in this soil being droughty in dry periods. Also the fragipan causes a perched water table that generally delays planting in spring.

This soil has good potential for pasture and hay. These crops fit well in a cropping system with grain crops, and they supplement other measures that help control erosion and maintain tilth. The fragipan limits rooting depth of deep-rooted plants and limits available moisture capacity. The soil is droughty in dry periods. Good pasture production is obtained by maintaining a high level of fertility and by rotation grazing.

This soil has good potential for northern red oak, yellow-poplar, and Virginia pine. Good trees to plant are Virginia pine, eastern white pine, and shortleaf pine. If seedlings are planted, undesirable plant competition should be controlled.

This soil has fair potential for urban development. Wetness caused by a seasonal perched water table is a moderate limitation for most uses. Low strength is a severe limitation for constructing local roads and streets. This soil has severe limitations for septic tank absorption fields because of the moderately slow to slow permeability in the fragipan and because of wetness. These limitations can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

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

ZnC—Zanesville silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on ridgetops and side slopes. Most slopes are convex and somewhat irregular. Areas are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 33 inches thick. To a depth of 19 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 26 inches, it is yellowish brown silty clay loam that has grayish brown mottles. Between depths of 26 and 40 inches, the subsoil is a firm, brittle, yellowish brown silty clay loam fragipan that has mottles of dark brown and grayish brown. The substratum, to a depth of 68 inches, is yellowish brown sandy clay loam mottled in shades of brown and gray.

This soil is medium in natural fertility. It is strongly acid to very strongly acid throughout, except where limed. The root zone is moderately deep but is restricted by the fragipan at a depth of about 26 inches. Permeability is moderate above the fragipan and moderately slow to slow in the fragipan. Runoff is medium, and available water capacity is moderate. Organic matter content in the surface layer is moderate. Tilth is good. The high water table is at a depth of 24 to 36 inches in winter and spring. This soil has low strength. Depth to bedrock ranges from 40 to 80 inches.

Included with this soil in mapping are relatively large areas of Sadler soils, small areas of Wellston soils, and a few areas of soils that have slopes of more than 12 percent. The included Sadler soils make up about 25 percent of mapped areas, but do not affect use and management. Individual areas of the included soils are less than 5 acres.

Most areas of this soil are used for hay, pasture, and cultivated crops. A few areas are wooded.

This soil has fair potential for cultivated crops. The severe hazard of erosion is the main limitation. Small areas and irregular slopes in places limit the use of some erosion control practices. Some practices that permit cultivated crops to be grown occasionally without excessive soil loss are no-till farming, contour tillage, stripcropping, cover crops, and returning crop residue to the soil. Incorporating crop residue into the plow layer helps maintain tilth and the organic matter content. The fragipan restricts rooting depth and the available water capacity. The soil is droughty in dry periods.

This soil has good potential for hay and pasture, and these crops are better suited than cultivated crops because of the erosion hazard. Seeding late in summer or early in fall generally results in better stands, quicker cover, less competition from undesirable plants, and better erosion control. The fragipan limits the rooting depth of deep-rooted plants. All plants commonly grown in the county are suited. High production is obtained by maintaining optimum level of fertility and by rotation grazing.

This soil has good potential for northern red oak, yellow-poplar, and Virginia pine. Good trees to plant are Virginia pine, eastern white pine, and shortleaf pine. If seedlings are planted, undesirable plant competition needs to be controlled.

This soil has fair potential for urban development. Slope and wetness are moderate limitations for most uses. Low strength is a severe limitation for constructing local roads and streets. This soil has severe limitations for septic tank absorption fields because of the moderately slow to slow permeability in the fragipan and because of wetness. These limitations can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IIIe. The woodland suitability group is 3o.

ZnC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded. This deep, moderately well drained, sloping soil is on ridgetops and side slopes. Most slopes are convex and somewhat irregular. Excessive water erosion has removed most of the original surface layer and, in places, some of the upper part of the subsoil. Areas are 5 to 30 acres.

Typically, the surface layer is strong brown silt loam about 6 inches thick. The subsoil is about 30 inches thick. To a depth of about 16 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 20 inches, it is yellowish brown silty clay loam that has grayish brown mottles. Between depths of 20 and 36 inches, the subsoil is a firm, brittle, yellowish brown silty clay loam fragipan that has mottles of dark brown and grayish brown. The substratum, to a depth of 60 inches, is yellowish brown sandy clay loam mottled in shades of brown and gray.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout, except where limed. The root zone is moderately deep and is restricted by the fragipan at a depth of about 20 inches. Permeability is moderate above the fragipan and moderately slow to slow in the fragipan. Runoff is medium to rapid, and available water capacity is moderate. Organic matter content in the surface layer is low. Tilth is fair. This soil has low strength. It has a high water table at a depth of 2 to 3 feet in winter and spring. Depth to bedrock ranges from 40 to 80 inches.

Included with this soil in mapping are small areas of Wellston soils. Also included are small, intermingled areas of uneroded Zanesville soils. The included soils make up less than 25 percent of mapped areas. Individual areas of the included soils are less than 4 acres.

Most areas of this soil are used for pasture. A few areas are wooded or are covered with brush.

This soil has poor potential for cultivated crops. The very severe hazard of erosion, fair tilth, and low organic matter content are limitations to cultivated crops and are difficult to overcome. The fragipan restricts rooting depth and the available water capacity. The soil is droughty in dry periods. All possible erosion control measures should be applied where this soil is used for cultivated crops. No-till farming, stripcropping, terraces, contour tillage, cover crops, and returning crop residue to the soil help control erosion.

This soil has fair potential for pasture. The severe hazard of erosion, low organic matter content, and fair tilth are concerns in management. Most grasses and legumes commonly grown in the county are suited, except some deep-rooted plants. The fragipan restricts root growth and the available water capacity. The soil is droughty in dry periods. Seeding late in summer and early in fall results in better stands, quicker cover, less competition from undesirable plants, and better erosion control. Application of lime and fertilizers according to crop needs, deferred grazing until crops are well established, and rotation grazing result in good production, long lasting stands, and erosion control. Renovation can be accomplished without plowing.

This soil has fair potential for northern red oak, Virginia pine, and shortleaf pine. Seedling mortality is the main management concern. Strong healthy plants that are properly set are most likely to survive.

This soil has fair potential for urban development. Slope and wetness are moderate limitations for most uses. Low strength is a severe limitation for constructing local roads and streets. The moderately slow to slow permeability in the fragipan and wetness are severe limitations for septic tank absorption fields. These limitations can be overcome by proper design and construction procedures.

This soil has good potential for openland and woodland wildlife habitat.

This soil is in capability subclass IVe. The woodland suitability group is 4d.

Zu—Zanesville-Gullied land complex. This map unit consists of soils that have been washed and eroded by water to such an extent that most of the original surface layer has been lost and an intricate pattern of moderately deep and deep gullies has formed. Identifiable soils, mostly Zanesville soils, are in strips 10 to 25 feet wide between the gullies. The areas are mostly on broken loess-capped ridges. They are 2 to 8 acres. Slopes are 4 to 25 percent.

Gullies make up 60 to 70 percent of this unit, Zanesville soils make up 18 to 25 percent, and included soils make up the rest.

Depth of the gullies ranges from 2 to 6 feet; width ranges from 2 to 18 feet at the bottom and from 12 to 125 feet at the top. Side slopes range from near vertical to a slanting 6 to 1 ratio. Most gullies penetrate the bedrock or fragipan of the original soil.

Typically, the surface layer of the Zanesville soil is strong brown silt loam about 6 inches thick. The subsoil is about 30 inches thick. To a depth of about 16 inches, the subsoil is strong brown silty clay loam; below that, to a depth of 20 inches, it is yellowish brown silty clay loam that has grayish brown mottles. Between depths of 20 and 36 inches, the subsoil is a firm, brittle, yellowish brown silty clay loam fragipan that has mottles of dark brown and grayish brown. The substratum, to a depth of 60 inches, is yellowish brown sandy clay loam mottled in shades of brown and gray.

The Zanesville soil is low in natural fertility. Reaction is strongly acid or very strongly acid throughout. The root zone is moderately deep and is restricted by the fragipan at a depth of about 20 inches. Permeability is moderate above the fragipan and moderately slow to slow in the fragipan. Runoff is medium to rapid, and available water capacity is moderate. Organic matter content in the surface layer is low. Tilth is fair. This soil has a high water table at a depth of 2 to 3 feet in winter and spring. It has low strength. Depth to bedrock is 40 to 80 inches.

Included with this complex in mapping are narrow strips, 10 to 25 feet wide, of Frondorf and Riney soils. Also included are a few areas of Pembroke, Vertrees, and Caneyville soils.

Most areas of this unit have a very sparse cover of brush or weeds. In their present state, they have poor potential for any use. The very severe hazard of erosion and presence of gullies prevent use of common equipment. These limitations can be partly overcome by filling and smoothing the areas. After reclamation, most areas have potential for hay, pasture, trees, and some type of urban development. Reclamation should be followed quickly with liming, fertilizing, seeding, and mulching to establish stands of good cover.

Areas vary in slope, soil material, and other characteristics. For this reason, onsite investigation is necessary to predict the behavior under various land use conditions. Areas of this map unit need to be in a permanent plant cover that will protect them from further damage by erosion.

This map unit has not been assigned to a capability subclass. Zanesville soil is in woodland suitability group 4d.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

Elmus R. Hutchins, Sr., district conservationist, Soil Conservation Service, assisted in writing this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; 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 presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 293,000 acres in the survey area was used for crops and pasture in 1967, according to the Conservation Needs Inventory (*8*). Of this total, 72,000 acres was used for permanent pasture; 69,000 acres was used for row crops, mainly corn; 25,000 acres was used for close-growing crops, mainly wheat and barley; 50,000 acres was used for rotation hay and pasture; 15,000 acres was used for hayland; and 28,000 acres was used for conservation reserve. The rest was idle cropland and openland, formerly cropped.

The soils in Christian County have good potential for increased production of food. About 22,000 acres of potentially good cropland is currently used as woodland, and about 43,000 acres is pasture. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can help facilitate the application of such technology. The use of this soil survey to help make land use decisions that will influence the future role of farming in the survey area is discussed in the section "General soil map for broad land use planning."

Soil erosion is the major concern on about three-fourths of the cropland and pasture in Christian County. If slope is more than 2 percent, erosion is a hazard. Nicholson, Sadler, and Zanesville soils, for example, have slopes of 2 to 6 percent and are also wet.

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 Baxter, Caneyville, Fredonia, and Vertrees soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include a fragipan, as in Nicholson, Sadler, and Zanesville soils, or bedrock, as in Dekalb, Frondorf, Caneyville, Fredonia, and Weikert soil. Erosion also reduces productivity on soils that tend to be droughty, such as Dekalb channery sandy loam and Caneyville soils. Second, soil erosion on farmland results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey or hardpan spots because the original friable surface soil has been eroded away. Such spots are common in areas of severely eroded Baxter and Caneyville soils, and in areas of Vertrees soils.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration (fig. 17). A cropping system that keeps vegetative cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land, provide nitrogen, and improve tilth for the following crop.

Slopes are so short and irregular that contour tillage or terracing is not practical in most areas of the sloping Vertrees, Hammack, and Baxter soils, and in some areas of the Pembroke, Crider, and Riney soils. On these soils, a cropping system that provides substantial plant cover is required to control erosion unless minimum tillage is practiced. 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, but they are more difficult to use successfully on the eroded soils. Good management includes the no-till method for corn and soybeans because it effectively helps reduce erosion on sloping land and can be adapted to most soils in the survey area. No-till methods, however, are more difficult to use successfully on soils that have a clayey surface layer.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Most areas of Crider soils and some areas of Pembroke, Wellston, and Zanesville soils are suitable for terraces. The other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the terrace channels, a clayey subsoil which would be exposed in terrace channels, or bedrock at a depth of less than 40 inches.

Contour farming and stripcropping are widespread erosion control practices in the survey area (figs. 10 and 13). They are best adapted to soils that have smooth, uniform slopes, including most areas of Crider, Nicholson, and Pembroke soils, and some areas of Frondorf, Riney, Sadler, Vertrees, Wellston, and Zanesville soils.

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

Soil drainage is the major management need on about 10 percent of the acreage used for crops and pasture in the survey area. Some soils are so wet that the production of crops common to the area is generally not possible. These are the poorly drained and very poorly drained Bonnie, Dunning, Melvin, and Robertsville soils that make up about 13,400 acres in the survey area.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years. In this category are the Henshaw, Lawrence, Newark, and Stendal soils that make up about 20,900 acres.

The moderately well drained soils in which wetness is significant but not a major problem are the nearly level Lindside, Nicholson, Sadler, Steff, and Zanesville soils. These soils make up about 12,000 acres in the county. Artificial drainage is generally not required for crops, but if these soils are drained, they can be tilled earlier, crops can be planted earlier, and the injury to crops from wetness is reduced.

The gently sloping Sadler soils and the gently sloping and sloping Nicholson and Zanesville soils are moderately well drained and have slopes of more than 2 percent. Soil erosion is a concern in management on these soils. These soils become saturated in winter and are somewhat slow to dry out and warm up early in the growing season. Although artificial drainage can lengthen the growing season on these fragipan soils, many crops

Figure 17.—Returning crop residue slows runoff, helps control erosion, and maintains organic matter content and good tilth. An area in the Pembroke-Crider unit.

commonly grown in the county are suited to the undrained soils. If the soil is tiled, the benefit of drainage should be weighed against the cost for the intended use.

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 poorly drained and very poorly drained soils used for intensive row cropping. Drains have to be more closely spaced in slowly permeable soils than in more permeable soils. Tile drainage is very slow in Lawrence, Robertsville, and Dunning soils. Finding adequate outlets for tile drainage is difficult in many areas of these soils and in some areas of Melvin, Bonnie, Newark, and Stendal soils.

Other soil features are major problems to some crops and pasture in Christian County. For example, the high content of gravel in the Skidmore soils and the outcrops of rock associated with the Fredonia and some Caneyville soils make these soils less useful for crops and pasture. These features interfere with machine operations or limit available water capacity, or both of these.

Natural soil fertility is medium or low in most soils on uplands when compared to the nutrients needed for maximum production. All soils on uplands in the county are naturally acid throughout the profile, except Caneyville and Fredonia soils, which range to neutral or mildly alkaline in the lower part. The soils on flood plains include acid and non-acid groups. Dunning, Melvin, Newark, Lindside, Nolin, and Skidmore soils range from medium acid to mildly alkaline and are higher in natural plant nutrients than most upland soils. Bonnie, Stendal, Steff, and Cuba soils are acid alluvial soils. Soils on stream terraces are acid, except for Henshaw soils which are mildly alkaline in the lower part.

Many soils on uplands are very strongly acid or strongly acid in their natural state. If the soil has never been limed, applications of ground limestone are required to raise the pH level sufficiently for good growth of alfalfa and other crops that grow only on nearly neutral soils. Available phosphorus and potash levels are naturally low in most of the soils. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of production. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water. A soil that has good tilth is granular and porous.

Some soils used for crops in the survey area have a surface layer of silt loam that is light in color and low in content of organic matter. 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 help improve soil structure and reduce crust formation. A few soils used for crops in the survey area have a silty clay loam surface layer in addition to a low content of organic matter, because erosion has removed most of the original surface layer and exposed the more clayey subsoil. These soils tend to form clods unless they are suitably worked within a fairly narrow range of soil moisture. Regular additions of crop residue, manure, and other organic material to the soil help improve soil structure and reduce crust and clod formation.

Fall plowing is generally not a good practice on the light colored soils that have a surface layer of silt loam because of the crust that forms during winter and spring. After fall plowing, many soils are nearly as dense and hard at planting time as they were before plowing. Also, about two-thirds 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 the soils often stay wet until late in the spring. If they are wet when plowed, they tend to be very cloddy when dry and good seedbeds are difficult to prepare. Fall plowing on such wet soils generally results in good tilth in the spring.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn, tobacco, and, to an increasing extent, soybeans are the row crops. Grain sorghum, sunflowers, navy beans, peanuts, potatoes, and similar crops can be grown if economic conditions are favorable.

Wheat and barley are common close-growing crops. Rye and oats could be grown, and grass seed could be produced from fescue and bluegrass.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the county is used for melons, strawberries, cucumbers, snap beans, cabbage, sweet corn, tomatoes, peppers, and other vegetables and small fruits. In addition, large areas can be adapted to other special crops, such as blueberries, grapes, and many vegetables. Apples and peaches are the most important tree fruits grown in the survey area.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. Such soils are the Crider, Elk, Hammack, Baxter, Pembroke, and Wellston soils that have slopes of less than 6 percent. They make up about 123,000 acres of the county. The Elk soils on stream terraces are subject to flooding, which can damage or delay planting. Crops can generally be planted and harvested earlier on all of these soils than on other soils in the county.

Most 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, however, generally are poorly suited to early vegetables, small fruits, and orchards.

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

Farming and other land uses are competing for large areas. About 14,000 acres, or 3 percent of the county, was urban or built-up land in 1967, according to the Conservation Needs Inventory (*8*). This figure has been growing at the rate of about 400 acres per year. Much of this acreage was well suited to cropland. Each year additional land is being developed for urban uses in Hopkinsville and other towns.

In general, soils in the county that are well suited to crops are also well suited to urban development. The data about specific soils in this soil survey can be used in planning future land use patterns. Potential productive capacity in farming should be weighed against soil limitations and potential for nonfarm development.

In some areas, however, soils are well suited to farming but poorly suited to nonfarm development. The area identified as map unit 4 on the general soil map at the back of this publication is an example. In this area the dominant soils are Bonnie and Stendal soils, which are wet and create serious hazards for nonfarm development. Many areas of these soils, however, have been drained and are productive for farm crops.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

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

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

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system as used in this survey area, all kinds of soil are grouped at two levels: capability class and subclass (*15*). These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil mapping unit in the section "Soil maps for detailed planning."

Woodland management and productivity

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

Christian County is in the western mesophytic forest region. Of the several forest types in the county, the oak-hickory is the largest. It makes up 75 percent of the 169,600 acres of commercial forest (*4*). Practically all of the forest is privately owned and in small holdings averaging about 23 acres. Tree growth averages 27 cubic feet per acre per year, and sawtimber averages 75 board feet per acre per year. Growth is below the potential productivity of most sites. With proper management, tree growth, stocking, and quality could be improved. This soil survey can be useful in providing soil interpretations for tree growth based on such soil characteristics as depth, texture, available water, and natural fertility.

No commercial sawmills are in the county, but markets for wood products are available in adjoining counties.

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the woodland suitability group symbol for each soil is given. All soils bearing the same woodland suitability group symbol require the same general kinds of woodland management and have about the same potential productivity.

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

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some 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 equipment; *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 that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings 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 or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. 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* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of 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 (*5, 6, 7, 11, 13*). Common 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 suitable for commercial wood production and that are suited to the soils.

Engineering

Billy H Vivrette, civil engineer, Soil Conservation Service, assisted in writing this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in other tables.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for 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 for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

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

Wildlife habitat

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

The wildlife population of Christian County consists of an estimated 43 species of mammals, 65 species of reptiles and amphibians, and 114 species of breeding birds. Many of the more than 200 other kinds of birds that visit Kentucky each year probably can be found during certain seasons.

Important kinds of wildlife in the county are those that are hunted and trapped. They include the cottontail rabbit, gray squirrel, fox squirrel, white-tailed deer, raccoon, red fox, mink, muskrat, bobwhite quail, mourning dove, woodcock, and various kinds of waterfowl. Although there is much overlap in the types of habitat required by these animals, the white-tailed deer, gray squirrel, and fox squirrel are generally classified as woodland wildlife. The rabbit, quail, and dove are generally considered openland species. Ducks and those mammals that spend much of their time in or about water are thought of as wetland wildlife.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants (*1*).

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties 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.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland wildlife habitat 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.

Woodland wildlife habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants.

Wetland wildlife habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 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 soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*3*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*2*).

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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance (*2, 12*). In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 19. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Physical and chemical analyses of selected soils

The results of physical analysis of several typical pedons of the survey area are given in table 17. The results of chemical analysis of these soils are given in table 18. The data presented are for samples from soil series that are important in the survey area. All samples were collected from carefully selected sites that are typical of the series and discussed in the section "Soil series and morphology." The soil samples were analyzed by the Kentucky Agricultural Experiment Station.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. All capacity measurements are reported on an oven-dry basis. The methods that were used in obtaining the data are indicated in the list that follows. The codes, in parentheses, refer to published methods codes (*16*).

Coarse materials—(2-76 mm fraction) weight estimates of the percentages of all materials less than 75 mm (3B1).

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) by difference, weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (602), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).

Cation-exchange capacity—sodium acetate, pH 8.2 (5A2a).

Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1a).
Reaction (pH)—potassium chloride (8C1c).
Aluminum—potassium chloride extraction, fluoride titration (6G1d).
Soil resistivity—saturated paste (8E1).
Available phosphorus—(Bray No. 1).
Field sampling—site selection (1A1).
Field sampling—soil sampling (1A2).
Laboratory preparation—standard (air dry) material (1B1).
Particles < specified size > 2mm (2A2).
Particles < 2mm (2A1).
Data sheet symbols (2B).
Particles greater than 2mm by field or laboratory weighing (3B1a).
Extractable bases (5B1a).
Calcium carbonate equivalent. Procedure (236b) USDA Handbook 60, USDA Salinity Laboratory 1954 (6N7).

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 19.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the Division of Research, Bureau of Highways, Department of Transportation, Commonwealth of Kentucky.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials (*2*). The codes for Unified classification, and California bearing ratio are those assigned by the American Society for Testing and Materials (*3*).

The methods and codes are AASHTO classification (M-145-73); Unified classification (D-2487-69); mechanical analysis (T88-72); liquid limit (T89-68); plasticity index (T90-70); moisture-density, method A (T99-74); California bearing ratio (D-1883); specific gravity of soils (T100-70).

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*14*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Baxter series

The Baxter series consists of deep, well drained, nearly level to steep, moderately permeable soils that formed in red clayey cherty residuum from limestone. These soils are on karst upland plateaus and on side slopes along the West Fork of Red River and Little River in the southern part of the county. Slopes are dominantly about 10 percent, but range from 2 to 30 percent.

Baxter soils are geographically closely associated with Hammack, Crider, Pembroke, Nicholson, and Nolin soils. Hammack soils are mapped in complex with Baxter soils in gently sloping to sloping karst areas. Hammack soils have 20 to 40 inches of loess over a very cherty layer. Crider, Pembroke, and Nicholson soils are gently sloping and are chert free. In addition, Nicholson soils have a fragipan. Nolin soils are in small depressions. They formed in alluvium, and do not have an argillic horizon.

Typical pedon of Baxter cherty silt loam, 12 to 20 percent slopes, in woods 100 feet north of Lonnie Walker Highway, at entrance of Little River Church Road, 1.4 miles southeast of Peedee, about 14 miles southwest of Hopkinsville. Laboratory sample number 73KY-24-6:

A1—0 to 5 inches; dark grayish brown (10YR 4/2) cherty silt loam; moderate fine and medium granular structure; very friable; common fine and medium roots; 30 percent chert; neutral; abrupt smooth boundary.

A2—5 to 17 inches; yellowish brown (10YR 5/4) cherty silt loam; weak medium and fine subangular blocky and granular structure; very friable; common fine and medium roots; common fine pores; 40 percent chert fragments of which half is less than 3 inches in diameter; slightly acid; clear smooth boundary.

B21t—17 to 22 inches; red (2.5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; common clay films; few silt coatings and root channels; 10 percent chert; slightly acid; clear smooth boundary.

B22t—22 to 75 inches; red (2.5YR 4/6) cherty silty clay; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium parting to weak fine and very fine angular blocky structure; firm; few fine roots to about 60 inches; many clay films; 35 percent chert fragments of which one-fourth is less than 3 inches in diameter; very strongly acid; gradual smooth boundary.

B23t—75 to 86 inches; red (2.5YR 4/6) silty clay; moderate coarse angular blocky structure; very firm; many clay films; few black stains on coatings of peds; very strongly acid; clear smooth boundary.

B24t—86 to 96 inches; yellowish brown (10YR 5/4) clay; moderate coarse angular blocky structure; relic platy shale structure within peds; many reddish clay films; common black stains on films of peds; very strongly acid.

Thickness of the solum ranges from 60 to more than 120 inches. Depth to bedrock is 5 to more than 30 feet. Reaction ranges from slightly acid in the A horizon and upper part of the B horizon to very strongly acid in the middle and lower parts of the B horizon. Sand content averages less than 20 percent in the B horizon. Weighted average of chert fragments in the control section ranges from 15 to 35 percent.

The Ap or A1 horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is mainly cherty silt loam or silt loam but rarely is very cherty silt loam.

The B1 horizon, when present, has hue of 10YR to 2.5YR, and value and chroma of 4 to 6. It is heavy cherty silt loam to heavy cherty silty clay loam. The B2 horizon has hue of 5YR to 10R, value of 4 or 5, and chroma of 4 or 6. In some pedons this horizon is below a depth of 60 inches and has value and chroma of 3. The B2 horizon is silty clay loam and, as depth increases, grades to silty clay or clay and their cherty or very cherty analogs. A B3 horizon is in some pedons. It is red, brown, and gray or is mottled in shades of red, brown, and gray. It is silty clay or clay and their cherty or very cherty analogs.

Bonnie series

The Bonnie series consists of deep, poorly drained, acid soils. These soils formed in alluvium washed from loess-capped sandstone, siltstone, shale, and, to a minor extent, limestone soils. These soils are on flood plains and in upland depressions. Slopes are dominantly 1 percent but range to 2 percent.

Bonnie soils are geopraphically associated with Stendal, Steff, Cuba, Lawrence, Sadler, and Elk soils. Stendal, Steff, and Cuba soils have higher chroma and are better drained. Lawrence and Sadler soils have a fragipan. Elk soils are well drained and have an argillic horizon.

Typical pedon of Bonnie silt loam, 0.2 mile north of Apex on Kentucky Highway 189, then 4.2 miles north on county road to West Fork Pond River, 200 feet south of river and 200 feet east of county road:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; common fine faint grayish brown (2.5Y 5/2), few fine distinct dark brown (7.5YR 4/4), and few medium distinct very dark brown (10YR 2/2) mottles; weak medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

C1g—8 to 30 inches; gray (10YR 6/1) silt loam; common medium distinct brown (10YR 5/3) and few medium distinct dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; weak fine granular structure; friable; few fine roots; strongly acid; clear smooth boundary.

C2g—30 to 66 inches; gray (10YR 5/1) silt loam; common medium distinct yellowish brown (10YR 5/6) and common coarse distinct very dark brown (10YR 2/2) mottles; massive; friable; strongly acid.

Depth to bedrock is more than 60 inches. Reaction is strongly acid or very strongly acid, except where the soil is limed.

The A1 or Ap horizon commonly has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is silt loam and is 6 to 10 inches thick.

The C horizon commonly has hue of 10YR, 2.5Y, or 5Y; value of 5 to 7; and chroma of 1 or 2. It has mottles in shades of brown. The 10- to 40-inch control section averages 18 to 27 percent clay. The C horizon has weak, fine or medium, granular structure or is massive. It is dominantly silt loam, but in some pedons it is stratified sandy loam or loam.

Caneyville series

The Caneyville series consists of moderately deep, well drained, gently sloping to moderately steep soils. Permeability is moderately slow. These soils formed in material weathered from limestone. They are on upland ridges and side slopes. Some areas are karst, and some areas have outcrops of rock. Slopes range from 2 to 30 percent but are dominantly 6 to 20 percent.

Caneyville soils are geographically closely associated with Crider, Frondorf, Weikert, and Nolin soils. All of the associated soils are less clayey. Frondorf and Weikert soils are commonly above Caneyville soils on the landscape and formed in residuum of sandstone, siltstone, and shale. Crider soils are deep and loamy and are on convex ridges at about the same elevation as Caneyville soils or at a higher elevation. Nolin soils are loamy and are on flood plains.

Typical pedon of Caneyville silt loam, 2 to 6 percent slopes, in a pasture, about 1,000 feet north of Kentucky Highway 800, 1 mile east of intersection of Kentucky Highways 800 and 107, 15 miles northeast of Hopkinsville. Laboratory sample number 73KY-24-1:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; mildly alkaline; abrupt smooth boundary.

B21t—5 to 16 inches; yellowish red (5YR 4/6) silty clay; common medium faint yellowish brown (10YR 5/4)

mottles in the lower few inches; weak medium parting to fine and very fine angular blocky structure; firm; few fine roots; few fine pores; many clay films; strongly acid; gradual smooth boundary.
B22t—16 to 25 inches; yellowish brown (10YR 5/4) clay; many medium distinct yellowish red (5YR 4/6) and light brownish gray (10YR 6/2) mottles; weak medium and fine angular blocky structure; very firm; few fine roots; common clay films; very strongly acid; gradual smooth boundary.
B23t—25 to 34 inches; yellowish brown (10YR 5/4) clay; common fine faint light brownish gray (10YR 6/2) mottles; weak medium angular blocky structure; very firm; common clay films; few small chert fragments; few small black concretions; two limestone flagstones about 10 inches long; mildly alkaline; abrupt smooth boundary.
R—34 inches; hard light gray limestone.

Thickness of the solum and depth to bedrock ranges from 20 to 40 inches. Where the soil is unlimed, reaction is very strongly acid to medium acid in the upper part of the profile and is medium acid to slightly alkaline in the lower part.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The A1 horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3. Where an A2 horizon is present, it has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. The A horizon is silt loam, loam, silty clay loam, and silty clay. It is 5 to 10 inches thick.

A B1 horizon is present in some pedons. It has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. This horizon is mainly silt loam or silty clay loam but in some pedons is loam. This horizon is 3 to 8 inches thick. The B2 horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. The lower part of the horizon has few to many mottles in shades of red, brown, yellow, olive, and gray. In some pedons, the B21t horizon is silty clay loam, but below the B21t horizon, the texture is silty clay or clay.

Crider series

The Crider series consists of deep, well drained, nearly level to sloping, moderately permeable soils. These soils formed in loess and the underlying material weathered from limestone. They are on uplands on broad ridges. Some areas are karst. Slopes range from 0 to 12 percent but are dominantly 2 to 6 percent.

Crider soils are geographically associated with Fredonia, Nicholson, Nolin, and Pembroke soils. Fredonia soils have bedrock at a depth of 20 to 40 inches. Nicholson soils have a fragipan and are moderately well drained. Nolin soils formed in alluvium and do not have an argillic horizon. Pembroke soils are redder in the upper part of the B horizon and have a darker colored A horizon.

Typical pedon of Crider silt loam, 2 to 6 percent slopes, half mile east of Newstead on Kentucky Highway 164, half mile southwest on county road, then 600 feet south on private road, 50 feet west of private road:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B21t—9 to 18 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; few thin clay films; few fine roots; medium acid; gradual smooth boundary.
B22t—18 to 33 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots; common clay films; few small black concretions; strongly acid; abrupt smooth boundary.
IIB23t—33 to 61 inches; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common clay films; silt coating on some peds; few small black concretions; strongly acid; clear smooth boundary.
IIB24t—61 to 99 inches; dark red (10R 3/6) clay; moderate medium blocky structure; firm; few fine roots; common clay films; few black concretions; strongly acid.

Thickness of the solum is more than 60 inches. Depth to bedrock ranges from 60 to more than 100 inches. The upper part of the solum is free of chert fragments, but the lower part is 0 to 15 percent chert fragments, by volume. Reaction is strongly acid to neutral in the Ap horizon and the B2t horizon and strongly acid to medium acid in the IIB2t horizon.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. It is silt loam 6 to 11 inches thick.

Some pedons have a B1 horizon. This horizon has hue of 10YR or 7.5YR and value and chroma of 4. The B1 horizon is silt loam 1 to 10 inches thick. The B21t horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. The B22t horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. The B21t and B22t horizons range from silt loam to silty clay loam.

The IIB23t and IIB24t horizons have hue of 5YR to 10R, value of 3 or 5, and chroma of 4 to 6. They are silty clay loam, silty clay, or clay.

Cuba series

The Cuba series consists of deep, well drained, moderately permeable, acid soils. These soils formed in alluvium washed from loess-capped sandstone, siltstone, and shale. They are on flood plains and in small alluvial areas in upland depressions. Slopes are dominantly 1 percent but range from 0 to 2 percent.

Cuba soils are geographically associated with Steff, Stendal, and Skidmore soils. Steff and Stendal soils are not well drained. Skidmore soils have more coarse fragments than Cuba soils.

Typical pedon of Cuba silt loam, in corn field, 200 feet west of Tradewater River, 1 mile east of Kentucky Highway 109, 1-1/4 miles south of Outwood Hospital, and 15 miles north of Hopkinsville:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; gradual smooth boundary.
B2—10 to 30 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.
C1—30 to 50 inches; dark yellowish brown (10YR 4/4) silt loam; few fine faint pale brown (10YR 6/3) and few fine distinct dark brown (7.5YR 3/2) mottles; massive; friable; few roots; strongly acid; clear smooth boundary.
C2—50 to 66 inches; pale brown (10YR 6/3) and light brownish gray (2.5Y 6/2) silt loam; few fine distinct dark brown (7.5YR 3/2) mottles; massive; friable; very strongly acid.

Thickness of the solum ranges from 20 to 40 inches. Reaction is strongly acid or very strongly acid, except where the soil is limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The A horizon is silt loam 6 to 10 inches thick.

The B horizon has hue of 10YR and value and chroma of 3 to 6. It is silt loam to a depth of at least 30 inches. Thickness of the B horizon ranges from 10 to 24 inches.

The C horizon has hue of 10YR and value and chroma of 3 to 6. It is silt loam. The C horizon has mottles in shades of brown and gray. Some pedons have a IIC horizon. It is finely stratified silt loam, loam, or fine sandy loam alluvium. The C horizon commonly contains more sand as depth increases below 30 inches.

Dekalb series

The Dekalb series consists of moderately deep, well drained, sloping to steep soils. Permeability is moderately rapid. These soils formed in material weathered from gray and brown acid sandstone. They are on broken uplands. Slopes range from 20 to 40 percent but are dominantly about 30 percent.

Dekalb soils are geographically closely associated with Riney, Wellston, Zanesville, Frondorf, Weikert, and Cuba soils. Riney, Wellston, and Zanesville soils have a thicker solum and have an argillic horizon. In addition, Zanesville soils have a fragipan. Frondorf soils have a fine-loamy control section and have an argillic horizon. Weikert soils are shallow to bedrock and have less sand and more silt. Cuba soils are deep and formed in alluvium.

Typical pedon of Dekalb channery sandy loam, 20 to 40 percent slopes, in Pennyrile State Forest, 100 yards east of bathhouse on entrance road to beach and 0.5 mile west of Kentucky Highway 398, approximately 18 miles northwest of Hopkinsville; Dawson Springs southwest quadrangle, 37 degrees 4'07' N. and 37 degrees 39'23' W.

Ap—0 to 5 inches; dark brown (10YR 4/3) channery sandy loam; weak very fine granular structure; very friable; many fine roots; 20 percent coarse fragments; very strongly acid; abrupt smooth boundary.
B1—5 to 11 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine granular structure and weak fine subangular blocky; very friable; many fine roots; 20 percent coarse fragments; very strongly acid; abrupt smooth boundary.
B2—11 to 17 inches; yellowish brown (10YR 5/6) channery sandy loam; weak fine subangular blocky structure and weak fine granular; very friable; common fine and medium roots; 30 percent coarse fragments; very strongly acid; clear smooth boundary.
B3—17 to 28 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; very friable; common medium roots; 75 percent coarse fragments; very strongly acid; abrupt smooth boundary.
C—28 to 30 inches; yellowish brown (10YR 5/4) very channery loamy sand; single grained; very friable; 85 percent coarse fragments; very strongly acid; abrupt smooth boundary.
R—30 inches; grayish brown sandstone.

Thickness of the solum and depth to bedrock ranges from 20 to 40 inches. Content of coarse fragments ranges from 10 to 60 percent in individual horizons of the solum and from 50 to 90 percent in the C horizon. Reaction is very strongly acid or strongly acid, except where the soil is limed.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4.

The B horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 4 to 8. It is loam or sandy loam or their channery or very channery analogs.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. It is very channery or very flaggy sandy loam or loamy sand.

Dunning series

The Dunning series consists of deep, nearly level, very poorly drained to poorly drained, slowly permeable soils on flood plains and at streamheads and in ponded areas. These soils formed mostly in slackwater alluvium derived from soils that formed in residuum of limestone. They are saturated in winter and spring. Slopes are dominantly less than 1 percent but range to 3 percent on streamheads and drainageways.

Dunning soils are geographically associated with Melvin, Newark, Nolin, Robertsville, Lawrence, Elk, and Pembroke soils. Melvin, Newark, and Nolin soils have a fine-silty control section and do not have a mollic epipedon and the fine texture that Dunning soils have. Robertsville and Lawrence soils have a fragipan and are on stream terraces. Elk and Pembroke soils have an argillic horizon.

Typical pedon of Dunning light silty clay loam in an area of Dunning soils, in fescue pasture, 75 yards north of Christian County school bus terminal and 5 yards west of North Drive, in Hopkinsville:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam; common fine faint gray (10YR 5/1) and few distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; many fine and medium roots; mildly alkaline; abrupt smooth boundary.

A1g—7 to 16 inches; very dark gray (10YR 3/1) silty clay loam; few distinct light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; common fine and medium roots; few round black concretions; mildly alkaline; gradual smooth boundary.

Bg—16 to 45 inches; dark gray (N 4/0) silty clay; many medium distinct light olive brown (2.5Y 5/4) and few distinct reddish brown (5YR 4/4) mottles; moderate coarse prismatic structure parting to medium and coarse angular blocky; firm, sticky, plastic; common roots in upper part and few in lower part; few black and brown concretions; few small rounded pebbles; mildly alkaline; gradual smooth boundary.

Cg—45 to 68 inches; dark gray (N 4/0) clay; many medium prominent light olive brown (2.5Y 5/4) and few medium strong brown (7.5YR 5/6) mottles; massive; firm, sticky, plastic; common concretions; about 5 percent gravel; mildly alkaline.

Thickness of the solum ranges from 30 to 50 inches, and depth to bedrock ranges from 60 to more than 100 inches. Thickness of the mollic epipedon ranges from 12 to 24 inches. Reaction is medium acid to mildly alkaline throughout.

The A horizon has hue of 10YR to N, value of 2 or 3, and chroma of 0 to 3. It is silty clay loam or silt loam.

The Bg horizon dominantly has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. It is silty clay loam, silty clay, sandy clay, or clay.

The Cg horizon dominantly has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. It is silty clay loam, silty clay, sandy clay, or clay. In some pedons the Cg horizon is stratified silt loam, loam, sandy loam, and gravel below a depth of 40 inches.

Elk series

The Elk series consists of deep, nearly level to sloping, well drained, moderately permeable soils on stream terraces. These soils formed in mixed alluvium derived from soils formed in residuum from limestone, sandstone, siltstone, shale, and loess. Slopes are dominantly 3 percent but range from 0 to 12 percent.

Elk soils are geographically associated with Nolin, Nicholson, Lawrence, and Crider soils. Nolin soils are on first bottoms and do not have an argillic horizon. Nicholson and Lawrence soils are on adjacent uplands and stream terraces and have a fragipan. Crider soils are on adjacent uplands and have a solum thicker than 60 inches.

Typical pedon of Elk silt loam, 2 to 6 percent slopes, in pasture, 600 feet north of Riverside Creek, 0.8 mile north of Kentucky Highway 272, 3 miles west of Hopkinsville city limits; Church Hill quadrangle, 36 degrees 51'61' N. and 87 degrees 35'58' W.

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

B21t—9 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium angular and subangular blocky structure; friable; few clay films; many roots; medium acid; abrupt smooth boundary.

B22t—24 to 34 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable; few clay films; many roots; medium acid; clear smooth boundary.

B23t—34 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light gray (10YR 7/2) mottles; moderate fine and medium subangular blocky structure; firm; common clay films; few small black concretions; medium acid; clear smooth boundary.

C—50 to 68 inches; yellowish brown (10YR 5/4) heavy silty clay loam; common fine faint brownish yellow (10YR 6/6) and common fine distinct light gray (10YR 7/2) mottles; massive; firm; few small black concretions; medium acid.

Thickness of the solum ranges from 36 to 54 inches. Depth to bedrock ranges from 60 to more than 200 inches. Reaction, except in areas that are limed, ranges from medium acid to very strongly acid in the solum and from slightly acid to strongly acid in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is heavy silt loam or light silty clay loam. The B22t, C, or B3t horizons in some pedons have few to common mottles that have chroma of 2.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is commonly silt loam or silty clay loam. The C horizon in some pedons, however, has stratified fine sandy loam, loam, clay loam, or silty clay and has as much as 35 percent gravel.

Fredonia series

The Fredonia series consists of moderately deep, gently sloping to sloping, well drained soils. Permeability is moderately slow to slow. These soils formed in red and reddish brown clayey residuum from limestone. They are on uplands on the Mississippian Plateau. A large percentage of the areas of this soil are karst and have rock outcrop. Slopes are dominantly 4 or 5 percent but range from 2 to 12 percent.

Fredonia soils are geographically closely associated with Pembroke, Vertrees, and Baxter soils. The solum of Pembroke, Vertrees, and Baxter soils is more than 60 inches thick. In addition, Pembroke soils have less than 35 percent clay in the upper 20 inches of the B horizon, and Baxter soils have more than 15 percent chert fragments.

Typical pedon of Fredonia silt loam in an area of Fredonia silt loam, very rocky, 2 to 12 percent slopes, in a field 50 feet east of Kentucky Highway 1027, 700 feet south of U.S. Highway 68, about 8 miles east of Hopkinsville:

Ap—0 to 8 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.

B21t—8 to 17 inches; dark red (2.5YR 3/6) silty clay; moderate fine angular and subangular blocky structure; firm; many clay films; strongly acid; gradual smooth boundary.

B22t—17 to 30 inches; dark red (2.5YR 3/6) silty clay; moderate fine and medium angular and subangular blocky structure; very firm; many clay films; medium acid.

R—30 inches; gray limestone.

Thickness of the solum and depth to bedrock ranges from 20 to 40 inches. Content of coarse fragments of chert ranges from 0 to 5 percent. Reaction ranges from strongly acid to medium acid in the A and B21t horizons, except where the soil is limed, and from medium acid to neutral in the B22t horizon.

The Ap horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. It is silt loam or silty clay loam.

The B2t horizon has hue of 2.5YR and 10R, value of 3 or 4, and chroma of 4 to 6. This horizon is mainly clay or silty clay, but in some pedons it is silty clay loam in the upper part.

Some pedons have a B3 horizon or a C horizon that is 2 to 6 inches thick. These horizons have hue of 2.5YR and 10R, value of 3 or 4, and chroma of 4 to 6 and are mottled in shades of brown, yellow, olive, and gray.

Frondorf series

The Frondorf series consists of moderately deep, well drained, moderately permeable soils that formed in a mantle of loess over residuum from acid sandstone, siltstone, and shale. These soils are on narrow ridgetops, side slopes, and benches in the northern part of the county. Slopes are dominantly about 15 percent but range from 6 to 40 percent.

Frondorf soils are geographically closely associated with Sadler, Wellston, Weikert, and Zanesville soils. Sadler and Zanesville soils on ridgetops have a fragipan. Wellston soils are more than 40 inches deep to bedrock. Weikert soils, on steep and moderately steep side slopes with Frondorf soils, are less than 20 inches deep to bedrock.

Typical pedon of Frondorf silt loam in an area of Frondorf-Weikert complex, 12 to 20 percent slopes, in Pennyrile State Forest, 1,000 feet north of Kentucky Highway 1348, 1.2 miles east of intersection of Kentucky Highways 398 and 1348, 26 miles northwest of Hopkinsville:

A1—0 to 2 inches; grayish brown (10YR 5/2) silt loam; weak fine and medium granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

A2—2 to 7 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; very friable; many fine roots; strongly acid; clear smooth boundary.

B21t—7 to 18 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many clay films; 2 percent small sandstone fragments; strongly acid; clear smooth boundary.

IIB22t—18 to 24 inches; yellowish brown (10YR 5/6) channery silt loam; common medium faint strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few clay films; 40 percent hard and soft sandstone fragments; very strongly acid; clear smooth boundary.

IIC—24 to 30 inches; brown (7.5YR 4/4) channery loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; few fine roots; 50 percent soft and hard sandstone fragments; very strongly acid; abrupt smooth boundary.

Cr—30 to 60 inches; rippable grayish sandstone in 6 to 8 inch beds; fractures in a few places; soft clayey shale at 50 inches.

Thickness of the solum and depth to bedrock ranges from 20 to 40 inches. Where the soil is unlimed, reaction ranges from very strongly acid to strongly acid. Content of coarse fragments ranges from 0 to 5 percent to a depth of 12 to 24 inches and from 15 to 75 percent below that depth. Coarse fragments consist of sandstone, siltstone, or shale.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The A horizon is silt loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. The B21 horizon is silt loam or silty clay loam. The B22 horizon is silt loam or silty clay loam and their gravelly, shaly, or channery analogs. Some pedons have a B1 horizon and some have a B3 horizon.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, silty clay loam, silty clay, clay loam, loam, or sandy clay loam and their gravelly, shaly, or channery analogs.

Soils correlated in the Frondorf series in Christian County have slightly lower base saturation than that required for an Alfisol. Therefore, these soils are considered taxadjuncts to the Frondorf series.

Hammack series

The Hammack series consists of deep, well drained, moderately permeable soils that formed in a loess mantle and the underlying cherty residuum from limestone. These soils are on ridgetops and side slopes on the Mississippian Plateau in the southern part of the county. Slopes are dominantly about 7 percent but range from 2 to 12 percent.

Hammack soils are geographically closely associated with Baxter, Crider, Pembroke, Nicholson, and Nolin soils. Baxter soils are in a complex with Hammack soils and are more than 35 percent clay and 15 to 35 percent chert in the upper 20 inches of the argillic horizon. Crider and Pembroke soils are in adjoining areas and are less than 15 percent chert in the IIB horizon. In addition, Pembroke soils have value of 2 or 3 in the Ap horizon. Nicholson soils are in nearby and adjoining areas and have a fragipan. Nolin soils are in level depressions within areas of Hammack soils. They formed in alluvium and do not have an argillic horizon.

Typical pedon of Hammack silt loam, in borrow area, 25 feet south of Interstate 24 right-of-way, 0.25 mile west of intersection of Interstate 24 and U.S. Highway 41A, 11 miles south of Hopkinsville:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and very fine roots; neutral; abrupt smooth boundary.

B21t—8 to 28 inches; brown (7.5YR 4/4) light silty clay loam; weak fine subangular blocky structure; friable; few fine roots; few fine pores; few clay films; 3 percent chert fragments; medium acid; abrupt smooth boundary.

IIB&A'2—28 to 42 inches; brown (7.5YR 5/4) very chery silty clay loam; few fine faint yellowish red (5YR 4/6) mottles; weak fine subangular blocky structure; firm; few clay films; 75 percent chert fragments of which 45 percent are smaller than 3 inches in diameter; A'2 part makes up about 10 percent and consists of light brownish gray (10YR 6/2) and pale brown (10YR 6/3) silt coatings around chert fragments and some peds; few black concretions; strongly acid; clear smooth boundary.

IIB22t—42 to 48 inches; red (2.5YR 4/6) cherty silty clay; few fine distinct very pale brown (10YR 7/4) and few fine faint reddish brown (5YR 4/3) mottles; weak fine subangular blocky structure; firm; few fine pores; many clay films; 30 percent chert fragments of which half are smaller than 3 inches in diameter; few small black concretions; very strongly acid; clear smooth boundary.

IIB23t—48 to 99 inches; red (2.5YR 4/6) cherty clay; common medium prominent very pale brown (10YR 7/4), pinkish gray (7.5YR 7/2), and reddish yellow (7.5YR 6/6) mottles and few medium faint reddish brown (5YR 4/3) mottles; moderate medium angular blocky structure parting to fine and very fine; very firm; few fine pores; many clay films; 35 percent chert fragments; few small black concretions; very strongly acid.

Thickness of the solum ranges from 6 to more than 10 feet. Depth to limestone ranges from 8 to 30 feet. Reaction is medium acid to very strongly acid, except where the soils are limed. The Ap horizon and upper part of the B horizon range to neutral. The upper 20 to 40 inches of the solum formed in loess. Content of chert fragments ranges from 0 to 5 percent in the upper part of the solum and from 35 to 80 percent in the IIB&A'2 horizon. Chert fragments range from 0 to 80 percent in individual horizons of the IIB2t horizon, but the weighted average is 15 to 50 percent.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

In some pedons a B1 horizon is present. It is silt loam or silty clay loam 3 to 8 inches thick. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The B2t horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. In some pedons this horizon is mottled in shades of brown. It is silty clay loam or silt loam.

The IIB&A'2 horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 4 to 6. In some pedons this horizon is mottled in shades of brown and gray. It is very cherty silt loam or very cherty silty clay loam. The A'2 part consists of silt coatings that constitute from 5 to 15 percent of the horizon and range from discontinuous to 2 millimeters in thickness. The A'2 part has hue of 10YR or 7.5YR, value of 6 or 7, and chroma of 1 to 4.

The IIB2t horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 or 6. It has few or common mottles in shades of yellow, brown, gray, or red. It is commonly clay or silty clay and their cherty or very cherty analogs, but in some pedons it is clay loam or rarely silty clay loam or their cherty analogs.

Henshaw series

The Henshaw series consists of deep, nearly level, somewhat poorly drained soils that formed in old alkaline alluvium or limestone residuum capped with a loess mantle. Permeability is moderately slow. These soils are in broad valleys. Slopes are dominantly about 2 percent but range from 0 to 3 percent.

Henshaw soils are geographically associated with Sadler and Lawrence soils. Sadler and Lawrence soils are on adjoining areas, are acid, and have a fragipan.

Typical pedon of Henshaw silt loam, in a garden, 50 feet behind house at intersection of a county road and the loop road off Kentucky Highway 800, about 1.2 miles east of Crofton:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; weak fine and medium granular structure; very friable; common fine roots; mildly alkaline; abrupt smooth boundary.

B21t—8 to 20 inches; mottled pale brown (10YR 6/3), light gray (2.5Y 7/2), and light olive brown (2.5Y 5/4) heavy silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; few clay films; slightly acid; abrupt smooth boundary.

B22t—20 to 30 inches; brown (10YR 5/3) light silty clay loam; many medium distinct light brownish gray (2.5Y 6/2) and many medium prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common clay films; medium acid; gradual smooth boundary.

B23t—30 to 48 inches; light brownish gray (2.5Y 6/2) light silty clay loam; common fine medium and coarse yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to fine and medium subangular blocky; firm; common clay films; mildly alkaline; gradual smooth boundary.

Cg—48 to 68 inches; light gray (2.5Y 7/2) heavy silt loam; few fine and medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; few brownish stains; moderately alkaline; abrupt smooth boundary.

IIC—68 to 83 inches; mottled yellowish brown (10YR 5/6), yellowish red (5YR 4/6), and light gray (10YR 7/2) light silty clay; massive; firm; many coarse black concretions; moderately alkaline.

Thickness of the solum ranges from 40 to 60 inches, and depth to bedrock ranges to more than 120 inches. Reaction in the solum is strongly acid to mildly alkaline. It is neutral to moderately alkaline in the lower part of most pedons.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. It is silt loam.

The B2 horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 3 to 6. It has few to many mottles of light brownish gray to strong brown. This horizon is silt loam or silty clay loam. The B3 and Cg horizons have hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 2 or less. They have common or many mottles of olive brown to brownish yellow. They are silt loam or silty clay loam.

The IIC horizon is silty clay or clay and has a matrix and mottles in shades of brown, red, olive, or gray.

Lawrence series

The Lawrence series consists of deep, nearly level, somewhat poorly drained, slowly permeable soils. These soils formed in old mixed alluvium or colluvium derived from residuum of limestone, shale, siltstone, sandstone, and loess. They are on stream terraces and in concave areas on uplands. These soils are saturated in winter and spring. Slopes are dominantly less than 2 percent.

Lawrence soils are geographically closely associated with Robertsville, Nicholson, Crider, Sadler, and Newark soils. Robertsville soils are lower lying in concave upland depressions or on stream terraces. They have dominantly gray colors above the fragipan. Nicholson and Sadler soils are on adjoining ridges on uplands. Unlike Lawrence soils, they do not have gray mottles in the upper 10 inches of the argillic horizon. Crider soils are on adjoining uplands and, unlike Lawrence soils, do not have a fragipan. Newark soils are alluvial soils on flood plains or in depressions on uplands and, unlike Lawrence soils, do not have a fragipan.

Typical pedon of Lawrence silt loam, in pasture, about 1 mile southwest of Garrettsburg, west of Garrettsburg 1/3 mile on a county road to first gravel road south and 1 mile to end of road, half mile northeast of farmhouse:

Ap—0 to 8 inches; grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; very friable; many fine and very fine roots; slightly acid; abrupt smooth boundary.

B21t—8 to 18 inches; light olive brown (2.5Y 5/4) light silty clay loam; few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; many fine roots; few clay films; medium acid; clear smooth boundary.

B22t—18 to 26 inches; light olive brown (2.5Y 5/4) light silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) and fine light yellowish brown (2.5Y 6/4) mottles; weak fine angular blocky structure; friable; common clay films; strongly acid; clear smooth boundary.

Bx1—26 to 32 inches; light brownish gray (2.5Y 6/2) light silty clay loam; common medium faint light gray (2.5Y 7/2) and common fine faint light yellowish brown (2.5Y 6/4) mottles; moderate very coarse prismatic structure parting to weak fine angular blocky; firm, brittle; common clay films; few silt coats on prisms; strongly acid; clear smooth boundary.

Bx2—32 to 44 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct brown (7.5YR 4/4) and common fine faint light gray (2.5Y 7/2) mottles; moderate very coarse prismatic structure parting to moderate fine and medium angular blocky; firm, compact and brittle; continuous clay films; few silt coats on prisms; few black concretions; very strongly acid; clear smooth boundary.

B3—44 to 60 inches; yellowish red (5YR 4/6) silty clay; common fine distinct gray (10YR 6/1) and light gray (10YR 7/2) mottles; weak fine angular and subangular blocky structure; very firm; continuous clay films; common medium black concretions; very strongly acid.

Thickness of the solum ranges from 40 to 80 inches, and depth to bedrock ranges from 60 to more than 200 inches. Reaction from the A horizon through the fragipan is strongly acid or very strongly acid, except where the soil is limed. In the B3 horizon it ranges from very strongly acid to neutral.

The Ap horizon has hue of 2.5Y to 10YR, value of 4 or 5, and chroma of 2 to 4.

The B2t horizon has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 3 to 6. It has few to many mottles with chroma of 2 or less and in some pedons it has mottles in shades of brown. This horizon is silt loam or silty clay loam, and has clay content of less than 35 percent. In some pedons the Bx horizon has a matrix and mottles that range from light gray (N 7/0) to reddish yellow (7.5YR 6/8). In many pedons, this horizon does not have a dominant color. The Bx horizon is silt loam or silty clay loam.

The B3 and C horizons have a matrix and mottles that range from light gray (N 7/0) to yellowish red (5YR 4/6). These horizons are silt loam to silty clay.

The C horizon is residuum from limestone in some pedons, and in other pedons it has stratified sand, silt, and clay below a depth of 40 inches.

Lindside series

The Lindside series consists of deep, moderately well drained, moderately permeable soils. These soils formed in silty alluvium that washed from soils formed in residuum of limestone, siltstone, sandstone, and shale and from loess. These soils are on flood plains and in upland depressions. In unprotected areas, brief flooding is common from December to May. Slopes are generally less than 2 percent.

Lindside soils are geographically closely associated with Nolin, Newark, and Melvin soils on flood plains and Elk, Nicholson, and Lawrence soils on stream terraces. Nolin, Newark, and Melvin soils are in the same drainage sequence with Lindside soils. Poorly drained Melvin and somewhat poorly drained Newark soils are nearer to uplands on broad flood plains. The well drained Nolin soils are near the stream channels and on narrow flood plains. Elk soils are on adjacent terraces and have an argillic horizon. Nicholson and Lawrence soils are on adjacent nearly level terraces and have a fragipan.

Typical pedon of Lindside silt loam, in cornfield, near Riverside Creek, 0.5 mile north of Kentucky Highway 272, 4 miles west of Hopkinsville:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine roots; neutral; gradual smooth boundary.

B1—8 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; common medium faint yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; few fine roots; slightly acid; gradual smooth boundary.

B2—18 to 26 inches; brown (10YR 4/3) silt loam; few medium distinct yellowish brown (10YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure breaking to weak fine granular; firm; few roots; medium acid; gradual smooth boundary.

B3—26 to 46 inches; brown (10YR 4/3) silt loam; common fine faint dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; medium acid; gradual smooth boundary.

C—46 to 60 inches; mottled yellowish brown (10YR 5/6), grayish brown (10YR 5/2), and brown (10YR 4/3) silty clay loam; massive; firm; few black concretions; medium acid.

Thickness of the solum ranges from 25 to 50 inches. Unless the soil is limed, reaction ranges from medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. It is mainly silt loam or silty clay loam, but in some pedons it has thin, stratified fine sandy loam or loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is mottled. In some pedons the C horizon is weakly stratified silty clay loam, silt loam, loam, or fine sandy loam.

Melvin series

The Melvin series consists of deep, poorly drained, moderately permeable soils. These soils formed in alluvium washed from soils formed from residuum of limestone, siltstone, and sandstone and from loess. They are on flood plains and in upland depressions. These soils are saturated in winter and spring in most years. Brief flooding is common from December through May. Slopes are generally 1 percent or less.

Melvin soils are geographically closely associated with Newark, Lindside, Nolin, Dunning, Nicholson, Lawrence, and Robertsville soils. Newark, Lindside, and Nolin soils are the better drained members in a drainage sequence with Melvin soils. Dunning soils have a darker colored, thicker A horizon. Nicholson, Lawrence, and Robertsville soils are on adjacent terraces and have a fragipan.

Typical pedon of Melvin silt loam, in pasture, approximately 2,000 feet west of railroad crossing and Dulin Road, about 7 miles southeast of Hopkinsville off

U.S. Highway 41; Hopkinsville quadrangle, 36 degrees 47'24' N. and 87 degrees 23'08' W.

Ap—0 to 10 inches; grayish brown (10YR 5/2) silt loam; few fine distinct brown (7.5YR 4/4) mottles; weak fine granular structure; very friable; many fine and very fine roots; mildly alkaline; abrupt smooth boundary.

Bg—10 to 20 inches; light brownish gray (2.5Y 6/2) silt loam; few fine distinct brown (7.5YR 4/4) mottles; weak fine granular structure; very friable; common fine roots; mildly alkaline; gradual smooth boundary.

C1g—20 to 37 inches; gray (10YR 6/1) light silty clay loam; few fine distinct yellowish red (5YR 4/6) mottles; structureless; firm; few fine roots; neutral; gradual smooth boundary.

C2g—37 to 45 inches; gray (N 5/0) silty clay loam; many coarse distinct yellowish brown (10YR 5/6) and few fine distinct brown (7.5YR 4/4) mottles; structureless; very firm; few roots; neutral; gradual smooth boundary.

C3g—45 to 66 inches; mottled dark gray (N 4/0), yellowish brown (10YR 5/6), and dark brown (7.5YR 3/2) silty clay loam; firm; neutral.

Thickness of the solum ranges from 18 to 40 inches. Depth to bedrock ranges from 60 to more than 200 inches. Reaction ranges from slightly acid to mildly alkaline.

The Ap horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 3.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it has hue of N and value of 4 to 7. It has mottles in shades of brown and red. The Bg horizon is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. Above a depth of 40 inches, it is silt loam or silty clay loam. Below 40 inches in some pedons, this horizon is stratified loam, clay loam, silty clay, fine sandy loam, and gravel.

Newark series

The Newark series consists of deep, somewhat poorly drained, moderately permeable soils. The soils formed in alluvium washed from soils that formed in residuum of limestone, siltstone, and sandstone and in loess. They are on flood plains and in upland depressions. These soils are saturated in winter and spring, except where tiled. Periods of brief flooding are common from December to May. Slopes are dominantly 1 percent or less.

Newark soils are geographically closely associated with Melvin, Lindside, Nolin, Elk, Nicholson, Lawrence, and Robertsville soils. Melvin soils are poorly drained and Nolin and Lindside are the better drained soils in a drainage sequence with Newark soils. Elk, Nicholson, Lawrence, and Robertsville soils are on adjacent terraces. Elk soils are well drained and have an argillic horizon. Nicholson, Lawrence, and Robertsville soils are gently sloping to nearly level and have a fragipan.

Typical pedon of Newark silt loam, in cornfield, 50 feet north of bridge across Dulin Creek at junction of Dulin and Buck Creeks, 1 mile north of Red Bridge, junction of Kentucky Highways 800 and 107 about 15 miles northeast of Hopkinsville. Laboratory sample number 71KY-24-52:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; few fine faint yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak fine and medium subangular blocky structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

B21—9 to 17 inches; brown (10YR 4/3) silt loam; common medium faint grayish brown (2.5Y 5/2) mottles; weak medium subangular and angular blocky structure; friable; common fine roots; common fine pores; medium acid; gradual smooth boundary.

B22g—17 to 36 inches; grayish brown (10YR 5/2) silt loam; many medium faint brown (10YR 4/3) and distinct yellowish brown (10YR 5/6) mottles; weak medium subangular and angular blocky structure; friable; few fine roots; common fine pores; medium acid; gradual smooth boundary.

C1g—36 to 55 inches; grayish brown (10YR 5/2) silt loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; firm; strongly acid; gradual smooth boundary.

C2—55 to 76 inches; mottled grayish brown (10YR 5/2), brown (10YR 4/3), and yellowish brown (10YR 5/4) silty clay loam; massive; firm; strongly acid.

Thickness of the solum ranges from 22 to 44 inches. Reaction ranges from medium acid to mildly alkaline in the Ap horizon and the B horizon and from strongly acid to mildly alkaline in the C horizon. Content of coarse fragments ranges from 0 to 5 percent, by volume, to a depth of 30 inches, to 15 percent below 30 inches, and to 60 percent below 40 inches.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The B21 horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It has mottles in shades of brown and gray. The B21 horizon is silt loam or silty clay loam. The B22g horizon has hue of 2.5Y to 7.5YR, value of 4 to 7, and chroma of 1 or 2. It has mottles in shades of brown.

The C1g horizon has hue of 2.5Y to 7.5YR, value of 4 to 7, and chroma of 1 or 2. The C2 horizon has a matrix and mottles that range from brown through neutral. It is silt loam or silty clay loam.

Nicholson series

The Nicholson series consists of deep, nearly level to sloping, moderately well drained, slowly permeable soils.

These soils formed in loess or silty material and the underlying residuum of limestone. They are on broad ridges and plateaus and on side slopes adjacent to streams throughout the county. Slopes are dominantly about 3 percent but range from 0 to 12 percent.

Nicholson soils are geographically closely associated with Crider, Pembroke, and Lawrence soils. Crider and Pembroke soils are on the same positions on the landscape and have similar slopes but do not have a fragipan. Lawrence soils are on nearly level, adjacent areas and are somewhat poorly drained.

Typical pedon of Nicholson silt loam, 2 to 6 percent slopes, in roadbank of Kentucky Highway 1027, 500 feet south of farmhouse, 2 miles north of Pembroke; Pembroke quadrangle, 36 degrees 48'6' N. and 87 degrees 21'23' W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B1—8 to 14 inches; yellowish brown (10YR 5/4) heavy silt loam; weak medium subangular blocky structure; friable; many fine roots; strongly acid; gradual smooth boundary.

B21t—14 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common clay films; strongly acid; clear wavy boundary.

Bx—23 to 42 inches; brown (7.5YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; strong very coarse prismatic structure parting to coarse angular blocky; firm and brittle; few fine roots between prisms; thin common gray clay films on faces of prisms; strongly acid; gradual wavy boundary.

IIB22t—42 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; thin common gray clay films on faces of peds; few small round black concretions; medium acid; gradual wavy boundary.

IIB23t—60 to 70 inches; mottled red (2.5YR 4/6) and yellowish brown (10YR 5/6) silty clay; many coarse distinct brownish gray (10YR 6/2) mottles; strong medium angular blocky structure; very firm; gray (10YR 6/1) to pale brown (10YR 6/3) clay films on faces of peds; few large black concretions; strongly acid.

Thickness of the solum ranges from 40 to 80 inches. Depth to the fragipan is 16 to 30 inches. Reaction ranges from very strongly acid to medium acid from the surface through the fragipan, except where the soil is limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The B21t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. A B1 horizon is in some pedons and 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 3 to 8 inches thick. The Bx horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 4 to 8. It has few to many mottles that have chroma of 2 or less. The Bx horizon is silt loam or silty clay loam.

The IIB horizon is mottled and has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. It has few to common mottles that have chroma of 2 or less. The IIB horizon is silty clay loam in the upper part and silty clay or clay in the lower part.

The IIC horizon, where present, has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. It has mottles which have chroma of 2 or less. The IIC horizon is silty clay loam, silty clay, or clay. It has 0 to 35 percent coarse fragments.

Nolin series

The Nolin series consists of deep, well drained, moderately permeable soils that formed in alluvium derived from soils formed in residuum of limestone, sandstone, siltstone, and shale and from loess. These soils are on flood plains and in depressions, mainly in the middle and in the southern part of the county. Brief flooding is common in most areas from December through May. Slopes are about 1 percent but range from 0 to 3 percent.

Nolin soils are geographically closely associated with Lindside, Newark, and Melvin soils on flood plains; Elk, Nicholson, and Lawrence soils on stream terraces; and Crider, Baxter, and Pembroke soils on uplands. Lindside, Newark, and Melvin soils are the more poorly drained members in the same drainage sequence with Nolin soils. They are adjacent to the Nolin soils on the flood plain but are nearer to the uplands. Nicholson and Lawrence soils have a fragipan. Elk, Crider, Pembroke, and Baxter soils have an argillic horizon.

Typical pedon of Nolin silt loam, in pasture, 100 feet south of Little River, 300 feet east of Kentucky Highway 107, 4 miles south of Hopkinsville; Church Hill quadrangle, 36 degrees 47'58' N. and 87 degrees 31'19' W. Laboratory sample number 71KY-24-50:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

B1—9 to 16 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure and weak medium subangular blocky; very friable; few small roots; medium acid; clear smooth boundary.

B21—16 to 36 inches; brown (7.5YR 4/4) silt loam; weak medium and coarse subangular blocky structure parting to weak fine and medium granular; very friable; few fine roots; few fine pores; strongly acid; gradual smooth boundary.

B22—36 to 63 inches; brown (7.5YR 5/4) silt loam; weak medium and coarse subangular and angular blocky structure; friable; few fine roots in upper part; common fine pores; few brown (10YR 5/3) silt coatings; strongly acid.

Thickness of the solum is 40 inches or more. Thickness of alluvial deposits ranges from 40 to more than 100 inches. Content of coarse fragments, mostly pebbles, ranges from 0 to 5 percent. Reaction ranges from strongly acid to mildly alkaline, but most pedons are slightly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 5, and chroma of 2 or 3.

Most pedons have a B1 horizon. It has hue of 10YR or 2.5Y, value of 4 to 5, and chroma of 2 or 3. The B1 horizon is mainly silt loam but ranges to loam and silty clay loam. The B2 horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 3 or 4. Below a depth of 24 inches in some pedons, the B2 horizon has mottles with chroma of 2 or less. This horizon is silt loam or silty clay loam.

The C horizon, where present, has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 2 to 4. It is silty clay loam, silt loam, loam, fine sandy loam, or sandy loam or is layers of these or their gravelly analogs. A yellowish brown to yellowish red buried B horizon is below a depth of 40 inches in some pedons.

Pembroke series

The Pembroke series consists of deep, well drained, moderately permeable soils that formed in a thin mantle of loess and in the underlying residuum of limestone or old alluvium. These soils are on broad ridges of the Mississippian Plateau. The landscape is slightly karst. Most areas are cleared. Slopes are dominantly about 4 percent but range from 0 to 12 percent.

Pembroke soils are geographically closely associated with Crider, Nicholson, Baxter, and Nolin soils. Crider soils have hue yellower than 5YR in the upper part of the B horizon and they have a lighter colored A horizon than the Pembroke soils. Nicholson soils have a fragipan. Baxter soils are on steeper karst areas and side slopes and have more than 15 percent chert in the B horizon. Nolin soils are in depressions and stream alluvial areas. They formed in alluvium and do not have an argillic horizon.

Typical pedon of Pembroke silt loam, 2 to 6 percent slopes, in pasture, 800 feet south of a pond, 50 feet east of Kentucky Highway 1027, 0.9 mile north of intersection of Kentucky Highways 115 and 1027; Pembroke quadrangle, 36 degrees 47'41' N. and 87 degrees 21'15' W.

Ap—0 to 8 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable; many fine and very fine roots; slightly acid; clear smooth boundary.

B1t—8 to 13 inches; reddish brown (5YR 4/4) silty clay loam; weak fine subangular blocky structure; friable; many fine roots; few clay films; slightly acid; gradual smooth boundary.

B21t—13 to 21 inches; reddish brown (2.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; common clay films; few fine black concretions; medium acid; gradual smooth boundary.

B22t—21 to 31 inches; dark red (2.5YR 3/6) silty clay loam; moderate medium subangular and angular blocky structure; friable; few fine roots; common clay films; common fine black concretions; medium acid; gradual smooth boundary.

B23t—31 to 55 inches; dark red (10R 3/6) silty clay; moderate medium angular blocky structure; firm; common clay films; few fine black concretions; strongly acid; gradual smooth boundary.

B24t—55 to 93 inches; dark red (10R 3/6) silty clay; moderate medium and coarse angular blocky structure; firm; common clay films; few silt coatings of yellowish brown (10YR 5/6); few black concretions; few small chert fragments; strongly acid.

Thickness of the solum ranges from 60 to more than 90 inches. Reaction ranges from very strongly acid to medium acid, except where the soil is limed.

The Ap horizon has hue of 10YR to 5YR, value of 3, and chroma of 2 or 3.

The B1t horizon has hue of 5YR, value of 4, and chroma of 4 to 6. It is silt loam or silty clay loam. The B21t and B22t horizons have hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 4 to 6. The B23t and B24t horizons have hue of 5YR to 10R, value of 3 or 4, and chroma of 6. They are silty clay loam or silty clay.

Riney series

The Riney series consists of deep, sloping to steep, well drained soils that formed in residuum of weakly consolidated sandstone and shale. Permeability is moderately rapid. These soils are on rolling ridges, side slopes, and benches in broken areas of Lower Pennsylvanian sandstone of the Caseyville Formation. Slopes range from 6 to 30 percent.

Riney soils are geographically closely associated with Caneyville, Zanesville, Dekalb, and Frondorf soils. Caneyville soils are on lower side slopes. They have a higher content of clay than Riney soils and are less than 40 inches to bedrock. Zanesville soils are on adjoining ridges. They have a fragipan and a loess mantle. Dekalb soils are on steep broken side slopes. They are skeletal and less than 40 inches to bedrock. Frondorf soils are on moderately steep to steep side slopes. They have a thin loess mantle and are less than 40 inches to bedrock.

Typical pedon of Riney loam, 6 to 12 percent slopes, 350 feet east of Ebenezer Church on Kentucky Highway

507, 1.25 miles west of Christian-Todd County line; Honey Grove quadrangle, 36 degrees 54'14' N. and 87 degrees 18'22' W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; slightly sticky; many fine roots; slightly acid; abrupt smooth boundary.
B21t—9 to 30 inches; yellowish red (5YR 4/8) clay loam; moderate fine and medium subangular blocky structure; slightly plastic; few fine and medium roots; nearly continuous clay films; strongly acid; clear smooth boundary.
B22t—30 to 48 inches; yellowish red (5YR 4/6) sandy clay loam; common coarse distinct pale brown (10YR 6/3) and few fine faint yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable; common clay films; very strongly acid; clear smooth boundary.
C—48 to 60 inches; yellowish red (5YR 4/6) sandy clay loam; common coarse distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; massive; 12 percent soft sandstone fragments; very strongly acid.
Cr—60 inches; soft reddish sandstone.

Thickness of the solum ranges from 40 to 80 inches. Depth to bedrock ranges from 4 to more than 10 feet. Reaction is strongly acid or very strongly acid, except in the surface layer and upper part of the B horizon where the soil is limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The surface layer in severely eroded areas has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or sandy clay loam. In most pedons, the B2t horizon has mottles in shades of red or brown in the lower part.

The C horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is sandy clay loam, sandy loam, fine sandy loam, or loamy sand. The C horizon is 0 to 20 percent soft sandstone fragments.

Robertsville series

The Robertsville series consists of deep, nearly level, poorly drained, slowly permeable soils. These soils formed in old mixed alluvium or colluvium from soils that formed in residuum of limestone, siltstone, sandstone, and shale and in loess. They are on stream terraces and in concave upland depressions. These soils are saturated in winter and spring in most years. Slopes are dominantly less than 1 percent.

Robertsville soils are geographically closely associated with Lawrence, Melvin, Newark, Nicholson, and Crider soils. Lawrence soils have a brownish argillic horizon and have grayish mottles above the fragipan. They are in landscape positions similar to those of Robertsville soils. Melvin and Newark soils are on flood plains and do not have a fragipan. Nicholson soils are on uplands. They have a brownish argillic horizon above the fragipan. Crider soils are on uplands and do not have a fragipan.

Typical pedon of Robertsville silt loam, 20 feet south of private drive, 50 feet west of county road, 0.8 mile north of Kentucky Highway 107, 2 miles north of Lafayette; Roaring Springs quadrangle, 36 degrees 41'40' N. and 87 degrees 38'19' W.

Ap—0 to 10 inches; grayish brown (10YR 5/2) silt loam; common coarse distinct dark brown (7.5YR 3/2) and common medium faint light brownish gray (10YR 6/2) mottles; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.
B2g—10 to 16 inches; gray (10YR 6/1) silt loam; few coarse distinct dark brown (7.5YR 3/2) mottles; weak medium subangular blocky structure; friable; common fine roots; very strongly acid; clear wavy boundary.
Bx—16 to 45 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct black (10YR 2/1) mottles; moderate very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle; few fine roots between prisms; common clay films; thin silt coatings; very strongly acid; gradual wavy boundary.
Cg—45 to 66 inches; gray (10YR 5/1) silty clay loam; common coarse distinct strong brown (7.5YR 5/6) mottles; massive; firm; common silt coatings on faces of peds; many coarse black and strong brown concretions; very strongly acid.

Thickness of the solum ranges from 40 to about 60 inches. Depth to bedrock ranges from 5 to more than 20 feet. Where the soil is unlimed, reaction ranges from strongly acid to extremely acid through the fragipan and very strongly acid to neutral below the fragipan.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2. It has mottles in shades of brown or gray.

The B2g horizon has hue of 5Y to 10YR, value of 6 or 7, and chroma of 1 or 2 in the matrix. It has mottles in shades of brown, yellow, and gray. It is silt loam or silty clay loam. The Bx horizon has hue of 5Y to 10YR, value of 5 to 7, and chroma of 1 or 2 and N5 to N7. It is silt loam or silty clay loam.

The C horizon has matrix and mottles in shades of gray or brown. It commonly is silt loam, silty clay loam, or silty clay, and in some pedons it has stratified loam, clay loam, or clay.

Sadler series

The Sadler series consists of deep, nearly level to gently sloping, moderately well drained soils that have a slowly permeable fragipan. These soils formed in a loess mantle and the underlying residuum of acid sandstone, siltstone, and shale. They are on ridges on uplands in the northern part of the county. They are saturated in winter and spring. Slopes are dominantly about 3 percent but range from 0 to 6 percent.

Sadler soils are geographically closely associated with Zanesville, Lawrence, Wellston, and Frondorf soils. Zanesville soils are on adjoining ridges and side slopes and do not have an A'2B horizon immediately above the fragipan. Lawrence soils are on flat adjacent areas and have mottles with chroma of 2 or less in the B horizon above the fragipan. Wellston and Frondorf soils are on adjacent side slopes and do not have a fragipan. In addition, Frondorf soils are 20 to 40 inches deep to bedrock.

Typical pedon of Sadler silt loam, 2 to 6 percent slopes, in a hayfield, 130 feet east of Kentucky Highway 109, 100 feet south of an abandoned road, 0.45 mile north of intersection of Kentucky Highways 109 and 100, about 14 miles northwest of Hopkinsville; Dawson Springs southeast quadrangle, 37 degrees 2'27' N. and 87 degrees 35'5' W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

B2t—8 to 20 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few clay films; many fine roots; few small black concretions; strongly acid; clear smooth boundary.

A'2B—20 to 24 inches; pale brown (10YR 6/3) silt loam; A' material has coating 1 to 3 millimeters thick on yellowish brown (10YR 5/6) silt loam peds; weak medium prismatic structure breaking into weak medium angular blocky peds; friable; few clay films; few fine roots; very strongly acid; clear wavy boundary.

IIBx—24 to 56 inches; yellowish brown (10YR 5/4) heavy silt loam; many medium distinct grayish brown (2.5Y 5/2) and faint yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure breaking into weak medium angular blocky peds; very firm; compact, brittle, clay films on faces of prisms; few roots between prisms; very strongly acid; gradual wavy boundary.

IIC—56 to 74 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct yellowish brown (7.5YR 5/4) and grayish brown (2.5Y 5/2) mottles; massive; firm; 14 percent sandstone fragments; very strongly acid.

IIR—74 inches; sandstone bedrock.

Thickness of the solum ranges from 40 to 70 inches. Depth to bedrock ranges from 50 to 100 inches. Thickness of the loess ranges from 12 to 48 inches. Depth to the fragipan ranges from 18 to 32 inches. Reaction is strongly acid to very strongly acid throughout, except where the soil is limed.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The B2t horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam or silty clay loam.

The A' part of the A'2B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. The coatings of A' material range from 1 to 20 millimeters in thickness, make up 55 to 70 percent of the horizon, and are thickest near the bottom of the horizon. They are silt or silt loam. The B part of the A'2B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is silt loam or silty clay loam.

The IIBx horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 6. It has some mottles that have value of 3. It is silt loam, silty clay loam, loam, or clay loam.

A B3 horizon 6 to 12 inches thick is in some pedons. It has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 6. The B3 horizon has some mottles that have value of 3. It can be silt loam, silty clay loam, loam, clay loam, silty clay, clay, sandy clay loam, or fine sandy loam.

The IIC horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 6. This horizon has some mottles that have value of 3. It commonly is silt loam, silty clay loam, loam, or clay loam but can also be silty clay, clay, sandy clay loam, or fine sandy loam.

Skidmore series

The Skidmore series consists of deep, well drained soils that formed in gravelly alluvial material. Permeability is moderately rapid. These soils are on relatively narrow flood plains of streams. Very brief flooding is common in winter and spring. Slopes are dominantly 1 percent but range to 3 percent.

Skidmore soils are geographically closely associated with Nolin, Cuba, and Steff soils on flood plains and with Frondorf, Weikert, Wellston, and Caneyville soils on uplands. Cuba and Steff soils are acid, and they have less than 15 percent coarse fragments in the upper 20 inches and less than 35 percent in the control section. In addition, Steff soils have mottles that have chroma of 2 or less above a depth of 24 inches. Nolin soils in adjoining areas have subhorizons of silt loam or silty clay loam. Frondorf, Wellston, and Caneyville soils have an argillic horizon. Weikert soils are shallow.

Typical pedon of Skidmore gravelly loam, in pasture, 300 feet west of Mt. Carmel Road, 2.3 miles north of intersection of Kentucky Highway 91 and Mt. Carmel Road:

Ap—0 to 7 inches; brown (10YR 4/3) gravelly loam; weak fine granular structure; very friable; many fine roots; 15 percent gravel; slightly acid; abrupt smooth boundary.

B2—7 to 20 inches; yellowish brown (10YR 5/4) gravelly loam; few fine faint pale brown (10YR 6/3) mottles; weak fine and medium subangular blocky structure; very friable; common fine roots; 25 percent gravel; slightly acid; abrupt smooth boundary.

IIB3—20 to 32 inches; dark yellowish brown (10YR 4/4) very channery loam; few fine faint brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; 75 percent gravel and pebbles; slightly acid; gradual wavy boundary.

IIC—32 to 45 inches; mottled gray (10YR 5/1), light gray (10YR 6/1), and yellowish brown (10YR 5/6) very channery clay loam; massive; 35 percent fragments and pebbles and 50 percent shale; medium acid; abrupt smooth boundary.

IICr—45 inches; soft gray shale.

Thickness of the solum ranges from 20 to 40 inches. Depth to bedrock ranges from 40 to more than 100 inches. Content of coarse fragments ranges from 10 to 40 percent in the A horizon and in the upper half of the B horizon. It ranges from 35 to 90 percent in the lower part of the B horizon and in the C horizon. Reaction ranges from medium acid to neutral.

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

The B and C horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Below a depth of 2 feet in some pedons these horizons have mottles that have chroma of 1 or 2. Fine earth in these horizons is loam, fine sandy loam, clay loam, or sandy loam.

Bedrock is gray shale, siltstone, sandstone, or a combination of these.

Steff series

The Steff series consists of deep, moderately well drained, moderately permeable soils that formed in acid alluvium on flood plains. Brief flooding is common in unprotected areas from December to May. Slopes are generally less than 2 percent.

Steff soils are geographically closely associated with Cuba, Skidmore, Stendal, and Bonnie soils on flood plains. Cuba soils are nearer the stream channels and do not have gray mottles above a depth of 24 inches. Skidmore soils have more than 35 percent coarse fragments in the control section. Stendal and Bonnie soils are nearer the uplands on broad flood plains, and they are dominantly gray between the Ap horizon and a depth of 30 inches.

Typical pedon of Steff silt loam, in hayfield, 600 feet south of Kentucky Highway 1296, 1.5 miles west of U.S. Highway 41 at Empire, about 5 miles northwest of Crofton; Dawson Springs southeast quadrangle, 37 degrees 4'54' N. and 87 degrees 31'11' W.

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

B1—9 to 15 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/8) and common fine faint pale brown (10YR 6/3) mottles; weak fine granular structure; friable; many fine roots; slightly acid; gradual smooth boundary.

B21—15 to 30 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light olive brown (2.5Y 5/4) and common fine distinct light brownish gray (2.5Y 6/2) mottles; weak fine granular structure; friable; few fine roots; very strongly acid; gradual smooth boundary.

B22—30 to 39 inches; pale brown (10YR 6/3) silt loam; common fine distinct yellowish brown (10YR 5/6) and faint light gray (10YR 7/2) mottles; weak fine subangular blocky structure and weak medium granular; friable; few fine roots; very strongly acid; gradual smooth boundary.

C—39 to 60 inches; gray (10YR 6/1) silt loam; few medium prominent strong brown (7.5YR 5/6) and fine faint yellowish brown (10YR 5/4) mottles; massive; firm; very strongly acid.

Thickness of the solum ranges from 24 to 50 inches. Thickness of the alluvial deposit ranges from about 60 to 200 inches. Reaction is strongly acid or very strongly acid, except where the soil is limed. Content of sandstone or siltstone pebbles ranges from 0 to 5 percent to a depth of about 40 inches and from 0 to 50 percent below a depth of 40 inches.

The Ap horizon is less than 10 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B1 horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. It is silt loam or loam. The B21 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It has mottles that have chroma of 2 or lower at a depth of less than 24 inches. It is silt loam or silty clay loam. The B22 horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2 to 4. It has common or many mottles in shades of gray and brown. The B22 horizon is silt loam or silty clay loam.

The C horizon has matrix and mottles in shades of gray and brown. It is silt loam, loam, or very fine sandy loam.

Stendal series

The Stendal series consists of deep, somewhat poorly drained, acid, moderately permeable soils. These soils formed in alluvium washed mainly from loess-capped upland soils underlain by sandstone, siltstone, and shale. They are on flood plains. Brief flooding is frequent from December to May. These soils are saturated in winter and spring. Slopes are about 1 percent.

Stendal soils are geographically closely associated with Bonnie, Steff, and Cuba soils. Bonnie soils are grayer in the upper part of the solum. Steff soils are not so gray to a depth of 25 inches, and Cuba soils are well drained.

Typical pedon of Stendal silt loam, in cornfield, 300 feet west of county road and 100 feet from stream, 2.8 miles north of Kentucky Highway 189 on county road, 0.2 mile north of Apex; Graham quadrangle, 37 degrees 08'02' N. and 87 degrees 20'52' W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

C1g—8 to 22 inches; grayish brown (10YR 5/2) silt loam; common fine distinct dark brown (7.5YR 3/2) and very dark brown (10YR 2/2) mottles; weak medium granular structure; friable; few roots; strongly acid; gradual smooth boundary.

C2g—22 to 45 inches; gray (10YR 5/1) silt loam; common medium distinct strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4) mottles; massive; friable; common fine very dark brown (10YR 2/2) concretions; strongly acid; gradual smooth boundary.

C3g—45 to 66 inches; gray (10YR 5/1) fine sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; common dark brown concretions; very strongly acid.

Reaction is strongly acid to very strongly acid, except where the soil is limed. Depth to bedrock is more than 60 inches.

The Ap horizon has hue of 10YR, value of 4 to 7, and chroma of 2 or 3.

The C horizon to a depth of 40 inches or more has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 3. It has mottles that have brighter chroma than 3. The C horizon is silt loam or silty clay loam. Below a depth of 40 inches, it is typically fine sandy loam, silt loam, and loam but in some pedons is stratified fine sandy loam, silt loam, and loam.

Vertrees series

The Vertrees series consists of deep, well drained soils that formed in residuum from limestone. Most areas are karst. Permeability is moderately slow. Slopes are dominantly about 7 percent but range from 6 to 12 percent.

Vertrees soils are geographically closely associated with Pembroke, Crider, and Nicholson soils. Pembroke and Crider soils, in adjoining areas, have less than 35 percent clay in the control section. Nicholson soils on nearby ridges have a fragipan.

Typical pedon of Vertrees silty clay loam, in a cultivated field, 75 feet west of private road, 1 mile southwest of intersection of Caskey Lane and Kentucky Highway 109; Hopkinsville quadrangle, 36 degrees 48'27' N. and 87 degrees 26'56' W.

Ap—0 to 8 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium granular structure and weak fine subangular blocky; friable; medium acid; abrupt smooth boundary.

B21t—8 to 19 inches; red (2.5YR 4/6) silty clay; moderate medium subangular and angular blocky structure; firm; common clay films; few fine dark concretions; medium acid; gradual smooth boundary.

B22t—19 to 72 inches; red (2.5YR 4/6) clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; continuous clay films; many fine dark concretions; few fine chert fragments; strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. Reaction ranges from medium acid to very strongly acid, except where the soil is limed. Content of chert fragments ranges from 0 to 35 percent, by volume, in the A and B1 horizons and from 0 to 20 percent in individual layers of the Bt horizon.

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

The B1 horizon, where present, has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, silt loam, or silty clay loam. The B2t horizon has hue of 5YR to 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons, this horizon is mottled in shades of brown, red, or yellow. In the middle and lower parts, it has a value as low as 3. The B2t horizon is silty clay or clay.

Weikert series

The Weikert series consists of shallow, moderately steep and steep, well drained soils that formed in material weathered from sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on uplands in the northern part of the county. Slopes are dominantly about 25 percent but range from 12 to 40 percent.

Weikert soils are geographically closely associated with Frondorf, Wellston, Sadler, and Zanesville soils. Frondorf soils are in complex with Weikert soils and are 20 to 40 inches deep to bedrock. Wellston soils are on ridges and side slopes and are deeper than 40 inches to bedrock. Sadler and Zanesville soils are on ridgetops and have a fragipan.

Typical pedon of a Weikert channery silt loam, from an area of Frondorf-Weikert complex, 20 to 40 percent slopes, in woodland, 200 feet west of house, 2.9 miles north of Pool's Mill Bridge on county road; Dawson Springs southeast quadrangle, 37 degrees 5'4' N. and 87 degrees 35'12' W.

Ap—0 to 5 inches; brown (10YR 4/3) channery silt loam; weak fine granular structure; very friable; many fine roots; 25 percent sandstone fragments; medium acid; clear smooth boundary.

B21—5 to 12 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; very friable; many fine roots; 25 percent sandstone fragments; strongly acid; gradual wavy boundary.

B22—12 to 19 inches; yellowish brown (10YR 5/6) channery silt loam; weak subangular blocky structure; friable; common medium and coarse roots; 45 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

R—19 inches; bedded sandstone bedrock.

Thickness of the solum ranges from 8 to 20 inches. Depth to bedrock is 10 to 20 inches. Content of coarse fragments ranges from 20 to 50 percent in the Ap horizon, 30 to 65 percent in the B horizon, and 60 to 85 percent in the C horizon. Unless the soil is limed, reaction is strongly acid or very strongly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is channery or shaly silt loam or loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is channery or shaly silt loam or loam.

The C horizon, where present, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is very shaly or very channery silt loam or loam.

In Christian County, Weikert soils have a slightly thicker B horizon than is defined in the range for the Weikert series. This difference, however, does not affect use of management of these soils.

Wellston series

The Wellston series consists of deep, gently sloping to moderately steep, well drained, moderately permeable soils. These soils formed in a thin mantle of loess and the underlying residuum of sandstone, siltstone, and shale. They are on ridges and side slopes in the northern part of the county.

Wellston soils are geographically closely associated with Zanesville, Sadler, Frondorf, and Weikert soils. Zanesville and Sadler soils are on the adjoining ridges and have a fragipan. Frondorf soils are on side slopes. They are 20 to 40 inches deep to bedrock and have more than 15 percent coarse fragments in the control section. Weikert soils are shallow and are on the steeper part of the side slopes.

Typical pedon of Wellston silt loam, 6 to 12 percent slopes, in woodland in Pennyrile State Forest, 300 feet east of Kentucky Highway 398 and 300 feet north of firetower, 2 miles west of intersection of Kentucky Highways 109 and 1348, about 18 miles northwest of Hopkinsville:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

B21t—7 to 22 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine and medium subangular blocky structure; friable; few fine roots; few fine pores; thin continuous clay films; strongly acid; gradual smooth boundary.

B22t—22 to 33 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous clay films; very strongly acid; clear wavy boundary.

IIB3t—33 to 42 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine pores; common thin dark brown (7.5YR 4/4) clay films; very strongly acid; abrupt wavy boundary.

IIC—42 to 58 inches; light yellowish brown (10YR 6/4) loam; massive; firm; few fine pores; 10 percent sandstone fragments; very strongly acid.

R—58 inches; sandstone.

Thickness of the solum ranges from 32 to 50 inches. Depth to bedrock is 40 to 72 inches. The weighted average content of coarse fragments in the B horizon is less than 10 percent. Most pedons are relatively free of coarse fragments in the upper two-thirds of the B horizon. In unlimed soils, reaction ranges from strongly acid to extremely acid throughout the solum.

The Ap horizon is less than 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Ap horizon is silt loam or silty clay loam.

The B1t horizon, where present, is 2 to 8 inches thick. The B1t and B2t horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. These horizons are silt loam or silty clay loam.

The C horizon has hue of 10YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. Fine earth in the C horizon is silt loam, loam, clay loam, or silty clay loam. Content of coarse fragments ranges from 5 to more than 50 percent.

Zanesville series

The Zanesville series consists of deep, gently sloping to sloping, moderately well drained soils. Permeability is moderately slow to slow in the fragipan. These soils formed in a loess mantle over sandstone, siltstone, and shale residuum. They are on ridgetops and side slopes in the northern part of the county. Slopes range from 2 to 12 percent.

Zanesville soils are geographically closely associated with Sadler, Wellston, and Frondorf soils. Sadler soils are on adjoining slopes, have hue of 10YR or 2.5Y in more than 50 percent of the B2t horizon, and have an A'2B horizon above the fragipan. Wellston and Frondorf soils are on nearby side slopes and do not have a fragipan. In addition, Frondorf soils are 20 to 40 inches deep to bedrock.

Typical pedon of Zanesville silt loam, 2 to 6 percent slopes, in tobacco field, near private drive, 300 feet west of county road, 4.1 miles south of Kentucky Highway

800, 2.8 miles east of Crofton; Dawson Springs southeast quadrangle, 37 degrees 00'04' N. and 87 degrees 32'31' W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.
B21t—7 to 19 inches; strong brown (7.5YR 5/6) light silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; common clay films; strongly acid; clear smooth boundary.
B22t—19 to 26 inches; yellowish brown (10YR 5/6) light silty clay loam; few fine faint grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; friable; common fine roots; common clay films; very strongly acid; clear wavy boundary.
Bx—26 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; many medium dark brown (7.5YR 4/4) and common medium distinct grayish brown (2.5Y 5/2) mottles; weak medium prisms parting to weak medium blocky structure; firm, brittle; thick gray vertical streaks between prisms; common clay films on faces of prisms; very strongly acid; gradual irregular boundary.
IIC—40 to 68 inches; light yellowish brown (10YR 6/4) sandy clay loam; many medium distinct strong brown (7.5YR 5/6) and few medium distinct light brownish gray (2.5Y 6/2) mottles; massive; 10 percent soft sandstone fragments; very strongly acid.
R—68 inches; sandstone bedrock.

Thickness of the solum ranges from 35 to 60 inches. Depth to bedrock ranges from 40 to 80 inches. Reaction is strongly or very strongly acid throughout, except where the soil is limed.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The B21t horizon has hue of 5YR and 7.5YR. The B22t horizon has hue of 7.5YR and 10YR. The B21t and B22t horizons have value of 4 and 5 and chroma of 4 or 6. They are silt loam or light silty clay loam. The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It has few to many mottles that have chroma of 2 or less. It is light silty clay loam to silt loam.

The IIC horizon and the IIB horizon, where present, have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. They have few to many brown or gray mottles. The IIB and IIC horizons are sandy clay loam to clay loam. They are 5 to 50 percent coarse fragments.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*17*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 20, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

References

(1)
Allan, P. F., L. E. Garland, and R. Dugan. 1963. Rating northeastern soils for their suitability for wildlife habitat. 28th North Am. Wildl. Nat. Resour. Conf. Wildl. Manage. Inst., pp. 247-261, illus.

(2)
American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(3)
American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(4)
Barnard, Joseph E., and Teresa M. Bowers. 1977. A preview of Kentucky's forest resource. U.S. Dep. of Agric. Forest Serv., Northeast. Forest Exp. Sta. Forest Res. Note NE-234, 11 pp., illus.

(5)
Beck, Donald E. 1962. Yellow-poplar site index curves, U.S. Dep. Agric., Forest Serv., Southeast. Forest Exp. Stn. Res. Note 180, 2 pp., illus.

(6)
Broadfoot, W. M. 1963. Guide for evaluating water oak sites. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Pap. SO-1, 8 pp., illus.

(7)
Broadfoot, Walter M. 1964. Soil suitability for hardwoods in the midsouth. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Note SO-10, 10 pp., illus.

(8)
Kentucky Conservation Needs Inventory Committee. 1970. Kentucky soil and water conservation needs inventory. 256 pp., illus.

(9)
Kentucky Department of Commerce. 1975. Industrial resources, Hopkinsville, Kentucky. Ky. Dep. of Commer. in cooperation with the Hopkinsville-Christian County Chamber of Commer., 48 pp.

(10)
McFarlan, Arthur C. 1943. Geology of Kentucky. Univ. Ky., Lexington. 531 pp., illus.

(11)
Nelson T. C., J. L. Clutter, and L. E. Chaiken. 1961. Yield of Virginia pine. U.S. Dep. Agric., Southeast. Forest Exp. Stn. Pap. 124, 11 pp.

(12)
Portland Cement Association. 1962. PCA soil primer. 52 pp., illus.

(13)
Schnur, G. Luther. 1937. Yield, stand, and volume tables for even-aged upland oak forest. U.S. Dep. Agric. Tech. Bull. 560, 88 pp., illus. [Reprinted 1961]

(14)
United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(15)
United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(16)
United States Department of Agriculture. 1967. Soil survey laboratory methods and procedures for collecting soil samples. Soil Surv. Invest. Rep. 1, 50 pp., illus. [Revised 1972]

(17)
United States Department of Agriculture. 1975. Soil taxonomy: a basic system for making and interpreting soil surveys. U.S. Dep. of Agric. Handb. 436, 754 pp., illus.

(18)
United States Department of Commerce. 1977. 1974 Census of agriculture. Soc. and Econ. Statis. Admin., Bur. of the Census. Vol. 1, Pt. 17, Book 2, pp. 145-150.

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. 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 mapping 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 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5 2

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 frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

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.

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.

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 coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light 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.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

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.

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 (or contour farming). 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.

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. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects 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 for 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, as for example in "hillpeats" and "climatic moors."

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 running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

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.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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 from 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 (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. 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, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

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. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

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 single 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characterisitc that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4 5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6 1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9 1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

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.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground 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. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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 a landscape where limestone has been locally dissolved.

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.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. 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 or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

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 the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Hopkinsville Ky.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- 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----	44.7	24.1	34.4	73	-4	8	4.38	2.19	6.16	8	3.4
February---	48.5	26.4	37.5	75	1	16	4.15	2.30	5.65	7	2.5
March------	57.0	34.1	45.6	83	14	94	5.59	3.15	7.58	9	2.9
April------	69.8	45.5	57.7	88	27	244	4.46	2.98	5.80	9	.0
May--------	78.8	54.5	66.7	92	36	518	4.45	2.18	6.30	7	.0
June-------	86.6	62.7	74.7	99	47	741	3.71	1.79	5.27	6	.0
July-------	90.0	66.0	78.0	100	53	868	4.15	2.29	5.66	7	.0
August-----	89.5	64.6	77.1	101	52	840	3.49	1.99	4.70	5	.0
September--	83.5	57.6	70.6	98	40	618	3.02	1.02	4.62	5	.0
October----	73.3	45.2	59.3	91	28	308	2.60	1.16	3.77	5	.0
November---	58.6	34.7	46.7	82	15	39	4.18	2.19	5.80	7	.6
December---	47.6	27.7	37.7	72	4	20	4.41	2.61	6.02	8	1.5
Year-----	69.0	45.3	57.2	102	-7	4,314	48.59	41.40	55.50	83	10.9

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 1	April 14	April 24
2 years in 10 later than--	March 27	April 9	April 20
5 years in 10 later than--	March 17	March 31	April 12
First freezing temperature in fall:			
1 year in 10 earlier than--	October 28	October 24	October 13
2 years in 10 earlier than--	November 2	October 28	October 17
5 years in 10 earlier than--	November 10	November 4	October 26

[1]Recorded in the period 1951-75 at Hopkinsville, Ky.

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	218	199	180
8 years in 10	224	206	186
5 years in 10	237	217	197
2 years in 10	250	229	207
1 year in 10	256	235	213

[1]Recorded in the period 1951-75 at Hopkinsville, Ky.

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

Map symbol	Soil name	Acres	Percent
BaD	Baxter cherty silt loam, 12 to 20 percent slopes	1,680	0.4
BaE	Baxter cherty silt loam, 20 to 30 percent slopes	350	0.1
Bo	Bonnie silt loam	3,900	0.8
CaB	Caneyville silt loam, 2 to 6 percent slopes	1,320	0.3
CaC	Caneyville silt loam, 6 to 12 percent slopes	6,780	1.5
CnD3	Caneyville silty clay, 6 to 20 percent slopes, severely eroded	9,200	2.0
CoD	Caneyville-Rock outcrop complex, 6 to 30 percent slopes	15,890	3.4
CrA	Crider silt loam, 0 to 2 percent slopes	5,220	1.1
CrB	Crider silt loam, 2 to 6 percent slopes	40,850	8.8
CrC	Crider silt loam, 6 to 12 percent slopes	5,000	1.1
Cu	Cuba silt loam	2,290	0.5
DkF	Dekalb channery sandy loam, 20 to 40 percent slopes	4,620	1.0
Du	Dunning soils	1,330	0.3
ElA	Elk silt loam, 0 to 2 percent slopes	720	0.2
ElB	Elk silt loam, 2 to 6 percent slopes	3,610	0.8
ElC	Elk silt loam, 6 to 12 percent slopes	620	0.1
FdC	Fredonia silt loam, very rocky, 2 to 12 percent slopes	4,950	1.0
FnC	Frondorf silt loam, 6 to 12 percent slopes	10,260	2.2
FwD	Frondorf-Weikert complex, 12 to 20 percent slopes	18,540	4.0
FwF	Frondorf-Weikert complex, 20 to 40 percent slopes	32,160	6.9
HbB	Hammack-Baxter complex, 2 to 6 percent slopes	3,830	0.8
HbC	Hammack-Baxter complex, 6 to 12 percent slopes	7,590	1.6
HbC3	Hammack-Baxter complex, 6 to 12 percent slopes, severely eroded	4,860	1.0
Hn	Henshaw silt loam	2,080	0.4
La	Lawrence silt loam	6,150	1.3
Ln	Lindside silt loam	7,100	1.5
Me	Melvin silt loam	3,280	0.7
Ne	Newark silt loam	7,630	1.6
NhA	Nicholson silt loam, 0 to 2 percent slopes	2,380	0.5
NhB	Nicholson silt loam, 2 to 6 percent slopes	20,710	4.5
NhC	Nicholson silt loam, 6 to 12 percent slopes	1,810	0.4
No	Nolin silt loam	15,400	3.3
PmA	Pembroke silt loam, 0 to 2 percent slopes	3,080	0.7
PmB	Pembroke silt loam, 2 to 6 percent slopes	63,820	13.8
PmC	Pembroke silt loam, 6 to 12 percent slopes	9,290	2.0
Pt	Pits	290	0.1
ReC	Riney loam, 6 to 12 percent slopes	430	0.1
ReD	Riney loam, 12 to 20 percent slopes	500	0.1
RmE3	Riney clay loam, 12 to 30 percent slopes, severely eroded	310	0.1
Ro	Robertsville silt loam	4,850	1.0
SaA	Sadler silt loam, 0 to 2 percent slopes	1,360	0.3
SaB	Sadler silt loam, 2 to 6 percent slopes	21,670	4.7
Sk	Skidmore gravelly loam	2,290	0.5
Ss	Steff silt loam	1,500	0.3
St	Stendal silt loam	5,030	1.1
Ud	Udorthents	1,360	0.3
VeC	Vertrees silty clay loam, 6 to 12 percent slopes	12,850	2.8
WeB	Wellston silt loam, 2 to 6 percent slopes	1,720	0.4
WeC	Wellston silt loam, 6 to 12 percent slopes	8,110	1.7
WeD	Wellston silt loam, 12 to 20 percent slopes	1,760	0.4
WlC3	Wellston silty clay loam, 6 to 12 percent slopes, severely eroded	10,540	2.3
WlD3	Wellston silty clay loam, 12 to 20 percent slopes, severely eroded	4,080	0.9
ZnB	Zanesville silt loam, 2 to 6 percent slopes	24,660	5.3
ZnC	Zanesville silt loam, 6 to 12 percent slopes	13,310	2.9
ZnC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	16,230	3.5
Zu	Zanesville-Gullied land complex	1,120	0.2
	Water	1,860	0.4
	Total	464,130	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Tobacco	Corn	Wheat	Soybeans	Alfalfa hay	Grass-legume hay	Pasture
	Lb	Bu	Bu	Bu	Ton	Ton	AUM*
BaD----------------------- Baxter	1,600	75	---	---	---	3.5	6.5
BaE----------------------- Baxter	---	---	---	---	---	---	4.0
Bo------------------------ Bonnie	---	80	---	35	---	3.5	7.5
CaB----------------------- Caneyville	2,500	85	35	---	---	4.0	7.0
CaC----------------------- Caneyville	2,200	70	---	---	---	3.5	6.5
CnD3---------------------- Caneyville	---	---	---	---	---	---	3.0
CoD----------------------- Caneyville	---	---	---	---	---	---	3.0
CrA----------------------- Crider	3,200	135	45	45	5.5	4.5	10.5
CrB----------------------- Crider	3,200	135	45	45	5.5	4.5	10.5
CrC----------------------- Crider	2,900	115	40	35	5.0	4.0	9.5
Cu------------------------ Cuba	3,000	130	45	45	---	4.0	8.0
DkF----------------------- Dekalb	---	---	---	---	---	---	---
Du------------------------ Dunning	---	135	---	45	---	4.5	8.5
ElA----------------------- Elk	3,200	135	45	45	---	4.5	9.0
ElB----------------------- Elk	3,200	130	45	45	---	4.5	9.0
ElC----------------------- Elk	2,800	115	40	35	---	4.0	8.0
FdC----------------------- Fredonia	2,300	85	30	30	---	3.5	6.5
FnC----------------------- Frondorf	---	85	35	30	---	3.0	6.0
FwD----------------------- Frondorf	---	---	---	---	---	2.5	5.5
FwF----------------------- Frondorf	---	---	---	---	---	---	---
HbB----------------------- Hammack	2,800	110	40	35	4.5	4.0	9.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Tobacco	Corn	Wheat	Soybeans	Alfalfa hay	Grass-legume hay	Pasture
	Lb	Bu	Bu	Bu	Ton	Ton	AUM*
HbC----------------------- Hammack	2,400	90	35	30	4.0	4.0	9.0
HbC3----------------------- Hammack	1,900	80	30	25	3.5	3.5	7.5
Hn----------------------- Henshaw	---	110	45	45	---	4.0	7.7
La----------------------- Lawrence	1,700	80	---	35	---	3.0	5.5
Ln----------------------- Lindside	3,000	130	45	45	---	4.5	8.5
Me----------------------- Melvin	---	80	---	35	---	3.5	7.5
Ne----------------------- Newark	2,500	125	---	45	---	4.5	8.5
NhA----------------------- Nicholson	2,500	125	40	40	---	3.5	6.5
NhB----------------------- Nicholson	3,000	130	40	40	---	3.5	6.5
NhC----------------------- Nicholson	2,700	110	35	35	---	3.5	6.5
No----------------------- Nolin	3,300	135	45	45	---	4.5	8.5
PmA----------------------- Pembroke	3,200	140	45	45	5.5	5.0	9.5
PmB----------------------- Pembroke	3,200	135	45	45	5.5	5.0	9.5
PmC----------------------- Pembroke	2,900	120	40	40	5.0	4.5	8.5
Pt.** Pits							
ReC----------------------- Riney	2,600	85	40	30	---	3.0	6.0
ReD----------------------- Riney	---	75	35	25	---	2.5	5.0
RmE3----------------------- Riney	---	---	---	---	---	---	4.0
Ro----------------------- Robertsville	---	70	---	30	---	3.0	5.5
SaA----------------------- Sadler	2,350	105	40	35	---	3.5	6.5
SaB----------------------- Sadler	2,550	105	40	35	---	3.5	6.5
Sk----------------------- Skidmore	---	70	30	30	---	3.0	5.5
Ss----------------------- Steff	---	120	45	45	---	5.0	9.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Tobacco	Corn	Wheat	Soybeans	Alfalfa hay	Grass-legume hay	Pasture
	Lb	Bu	Bu	Bu	Ton	Ton	AUM*
St----------------------- Stendal	---	130	---	45	---	4.5	8.5
Ud.** Udorthents							
VeC---------------------- Vertrees	2,200	80	35	30	---	3.0	6.0
WeB---------------------- Wellston	2,500	120	40	40	4.5	4.5	7.5
WeC---------------------- Wellston	2,250	105	35	35	4.5	4.5	7.5
WeD---------------------- Wellston	---	95	---	---	4.0	4.0	7.0
WlC3--------------------- Wellston	---	80	---	---	4.0	4.0	7.0
WlD3--------------------- Wellston	---	---	---	---	3.5	3.5	6.0
ZnB---------------------- Zanesville	2,700	120	40	40	---	3.5	6.5
ZnC---------------------- Zanesville	2,450	100	35	35	---	3.5	6.5
ZnC3--------------------- Zanesville	2,000	60	30	---	---	3.0	5.5
Zu**--------------------- Zanesville	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

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

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. 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	35,310	---	---	---
II	179,970	159,200	18,480	2,290
III	106,920	92,260	14,660	---
IV	47,200	42,350	4,850	---
V	---	---	---	---
VI	37,430	37,430	---	---
VII	52,670	52,670	---	---
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Woodland suitability group	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
BaD, BaE----------- Baxter	2r	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar------- Shortleaf pine------	93 89 80	Eastern white pine, loblolly pine, shortleaf pine, yellow-poplar.
Bo----------------- Bonnie	2w	Slight	Severe	Severe	Severe	Pin oak------------- Eastern cottonwood--	90 100	Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, pin oak.
CaB, CaC----------- Caneyville	3c	Slight	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Eastern redcedar----	69 80 45	Eastern redcedar, Virginia pine, eastern white pine, shortleaf pine, loblolly pine.
CnD3:								
Caneyville-------- (south aspect)	4c	Severe	Severe	Moderate	Slight	Northern red oak---- Eastern redcedar----	60 40	Eastern redcedar, Virginia pine, shortleaf pine, loblolly pine.
Caneyville-------- (north aspect)	3c	Moderate	Severe	Severe	Slight	Northern red oak---- Eastern redcedar----	70 45	Eastern redcedar, Virginia pine, eastern white pine, shortleaf pine, loblolly pine.
CoD*:-------------- Caneyville-------- (north aspect)	2c	Severe	Severe	Moderate	Moderate	Yellow-poplar------- Black oak-----------	90 80	Yellow-poplar, Virginia pine, loblolly pine.
Caneyville-------- (south aspect)	3c	Moderate	Moderate	Moderate	Slight	Scarlet oak--------- Eastern redcedar----	69 45	Eastern redcedar, Virginia pine, eastern white pine, shortleaf pine, loblolly pine.
Rock outcrop.								
CrA, CrB, CrC------ Crider	1o	Slight	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Virginia pine------- Shortleaf pine------	88 97 78 80	Eastern white pine, yellow-poplar, black walnut, loblolly pine, white ash.
Cu----------------- Cuba	1o	Slight	Slight	Slight	Severe	Yellow-poplar-------	100	Eastern white pine, black walnut, yellow-poplar.
DkF:								
Dekalb------------ (north aspect)	2f	Moderate	Severe	Moderate	Moderate	Northern red oak----	79	Eastern white pine, Virginia pine, loblolly pine.
Dekalb------------ (south aspect)	3f	Moderate	Severe	Moderate	Moderate	Northern red oak----	64	Eastern white pine, Virginia pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Wood-land suita-bility group	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Plant competi-tion	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
Du*---------------- Dunning	1w	Slight	Severe	Severe	Severe	Pin oak------------- Sweetgum------------ Eastern cottonwood--	95 95 100	Loblolly pine, pin oak.
ElA, ElB, ElC------ Elk	2o	Slight	Slight	Slight	Severe	Northern red oak---- Yellow-poplar------- Shortleaf pine------ Eastern white pine--	80 90 80 90	Eastern white pine, yellow-poplar, black walnut, loblolly pine.
FdC---------------- Fredonia	3c	Slight	Moderate	Slight	Moderate	Northern red oak---- Eastern redcedar----	70 50	Virginia pine, eastern redcedar.
FnC---------------- Frondorf	2o	Slight	Slight	Slight	Moderate	Northern red oak----	86	Yellow-poplar, shortleaf pine, black walnut, eastern white pine, loblolly pine.
FwD*:								
Frondorf---------- (north aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	86	Yellow-poplar, shortleaf pine, black walnut, eastern white pine, loblolly pine.
Weikert----------- (north aspect)	4d	Slight	Moderate	Moderate	Slight	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Frondorf---------- (south aspect)	3r	Moderate	Moderate	Moderate	Moderate	Black oak-----------	70	Shortleaf pine, loblolly pine, Virginia pine.
Weikert----------- (south aspect)	5d	Moderate	Moderate	Severe	Slight	Northern red oak---- Virginia pine-------	55 52	Virginia pine, shortleaf pine.
FwF*:								
Frondorf---------- (north aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak----	86	Yellow-poplar, shortleaf pine, black walnut, eastern white pine, loblolly pine.
Weikert----------- (north aspect)	4d	Moderate	Severe	Moderate	Slight	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Frondorf---------- (south aspect)	3r	Severe	Severe	Moderate	Moderate	Black oak-----------	70	Shortleaf pine, loblolly pine, Virginia pine.
Weikert----------- (south aspect)	5d	Moderate	Severe	Severe	Slight	Northern red oak---- Virginia pine-------	55 52	Virginia pine, shortleaf pine.
HbB*, HbC*:								
Hammack-----------	2o	Slight	Slight	Slight	Severe	Northern red oak---- White oak----------- Yellow-poplar-------	82 82 92	Yellow-poplar, black walnut, shortleaf pine, loblolly pine, Virginia pine.
Baxter------------	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- Shortleaf pine------	93 89 80	Eastern white pine, loblolly pine, shortleaf pine, black locust, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	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
HbC3*:								
Hammack	3o	Slight	Slight	Slight	Moderate	Northern red oak White oak Yellow-poplar Shortleaf pine	70 70 80 70	Yellow-poplar, black walnut, shortleaf pine, loblolly pine, Virginia pine.
Baxter	3o	Slight	Slight	Slight	Moderate	Northern red oak Virginia pine Eastern redcedar	65 65 35	Shortleaf pine, loblolly pine, eastern redcedar.
Hn Henshaw	1w	Slight	Moderate	Slight	Severe	Pin oak Yellow-poplar Sweetgum	95 95 95	White ash, sweetgum, eastern cottonwood, yellow-poplar.
La Lawrence	2w	Slight	Moderate	Slight	Severe	Northern red oak Yellow-poplar Sweetgum Shortleaf pine	65 90 87 69	Yellow-poplar, white ash, loblolly pine, American sycamore.
Ln Lindside	1w	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar White oak	85 95 85	Eastern white pine, yellow-poplar, black walnut.
Me Melvin	1w	Slight	Severe	Severe	Severe	Pin oak	101	Pin oak, American sycamore, sweetgum, loblolly pine.
Ne Newark	1w	Slight	Moderate	Slight	Severe	Pin oak Eastern cottonwood Northern red oak Yellow-poplar Sweetgum	99 94 85 95 88	Eastern cottonwood, sweetgum, loblolly pine, American sycamore, eastern white pine, yellow-poplar.
NhA, NhB Nicholson	2w	Slight	Slight	Slight	Severe	Northern red oak	80	Black walnut, yellow-poplar, eastern white pine, shortleaf pine, white ash.
NhC Nicholson	2w	Moderate	Slight	Slight	Severe	Northern red oak	80	Black walnut, yellow-poplar, eastern white pine, shortleaf pine, white ash.
No Nolin	1o	Slight	Slight	Slight	Severe	Sweetgum	85	Sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, cherrybark oak.
PmA, PmB, PmC Pembroke	1o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar Virginia pine Shortleaf pine	95 95 85 95	Yellow-poplar, black walnut, white ash, eastern white pine, shortleaf pine, loblolly pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soils name	Woodland suitability group	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
ReC, ReD Riney	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Shortleaf pine	80 90 80	Yellow-poplar, shortleaf pine, loblolly pine, black walnut, eastern white pine.
RmE3 Riney	3r	Slight	Moderate	Moderate	Slight	Northern red oak Virginia pine Shortleaf pine	70 70 70	Shortleaf pine, loblolly pine, Virginia pine, eastern white pine.
Ro Robertsville	1w	Slight	Severe	Severe	Severe	Pin oak Yellow-poplar Sweetgum Northern red oak	89 100 93 86	Sweetgum, loblolly pine, American sycamore.
SaA, SaB Sadler	3w	Slight	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine	70 90 70	Eastern white pine, shortleaf pine, yellow-poplar, Virginia pine.
Sk Skidmore	1o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar	85 95	Yellow-poplar, black walnut, white ash, eastern white pine, American sycamore.
Ss Steff	1w	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Yellow-poplar, eastern white pine, loblolly pine, sweetgum, black walnut.
St Stendal	2w	Slight	Moderate	Slight	Moderate	Pin oak Sweetgum Yellow-poplar Virginia pine	90 85 90 90	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
VeC Vertrees	2c	Slight	Moderate	Slight	Moderate	Yellow-poplar White oak Chinkapin oak Black oak Northern red oak	90 80 80 80 80	Yellow-poplar, black walnut, white ash, Virginia pine, northern red oak.
WeB, WeC Wellston	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine	71 90 70	Eastern white pine, black walnut, yellow-poplar.
WeD, WlD3 Wellston	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine	81 97 76	Eastern white pine, black walnut, yellow-poplar.
WlC3 Wellston	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine	71 90 70	Eastern white pine, black walnut, yellow-poplar.
ZnB, ZnC Zanesville	3o	Slight	Slight	Slight	Moderate	Northern red oak Virginia pine	68 70	Virginia pine, eastern white pine, shortleaf pine.
ZnC3 Zanesville	4d	Slight	Slight	Moderate	Slight	Northern red oak Virginia pine	60 70	Virginia pine, shortleaf pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANGEMENT AND PRODUCTIVITY--Continued

Map symbol and soils name	Woodland suitability group	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
Zu*:								
Zanesville--------	4d	Moderate	Moderate	Moderate	Slight	Northern red oak---- Virginia pine-------	60 70	Virginia pine, shortleaf pine.
Gullied land.								

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

TABLE 8.--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]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BaD, BaE---------- Baxter	Severe: slope, too clayey.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope.
Bo---------------- Bonnie	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.
CaB--------------- Caneyville	Severe: depth to rock, too clayey.	Severe: low strength.	Severe: depth to rock, low strength.	Severe: low strength.	Severe: low strength.	Moderate: depth to rock.
CaC--------------- Caneyville	Severe: depth to rock, too clayey.	Severe: low strength.	Severe: depth to rock, low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope, depth to rock.
CnD3-------------- Caneyville	Severe: depth to rock, too clayey.	Severe: slope, low strength.	Severe: depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: too clayey.
CoD*-------------- Caneyville	Severe: slope, depth to rock, too clayey.	Severe: slope, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope.
CrA--------------- Crider	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.	Slight.
CrB--------------- Crider	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Severe: low strength.	Slight.
CrC--------------- Crider	Moderate: slope, too clayey.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
Cu---------------- Cuba	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
DkF--------------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Du*--------------- Dunning	Severe: floods, wetness, too clayey.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
ElA, ElB---------- Elk	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.	Slight.
ElC--------------- Elk	Moderate: slope, floods.	Severe: floods.	Severe: floods.	Severe: slope, floods.	Moderate: slope, floods, low strength.	Moderate: slope.
FdC--------------- Fredonia	Severe: depth to rock.	Severe: low strength.	Severe: depth to rock, low strength.	Severe: low strength.	Severe: low strength.	Moderate: depth to rock.

See footnote at end of table.

TABLE 8.--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
FnC: Frondorf	Moderate: slope, depth to rock, small stones.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, depth to rock, low strength.	Moderate: slope, depth to rock.
FwD*, FwF*:						
Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
HbB*:						
Hammack	Severe: small stones.	Moderate: low strength.	Severe: low strength.	Moderate: slope, low strength.	Severe: low strength.	Slight.
Baxter	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Moderate: small stones.
HbC*:						
Hammack	Severe: too clayey.	Moderate: slope, low strength.	Severe: low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
Baxter	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope, small stones.
HbC3*:						
Hammack	Severe: too clayey.	Moderate: slope, low strength.	Severe: low strength.	Severe: slope.	Severe: low strength.	Moderate: slope, too clayey.
Baxter	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope, small stones.
Hn: Henshaw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
La: Lawrence	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Moderate: low strength, wetness.	Moderate: wetness.
Ln: Lindside	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Moderate: floods.
Me: Melvin	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
Ne: Newark	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
NhA: Nicholson	Severe: wetness, too clayey.	Moderate: wetness, low strength.	Severe: wetness, low strength.	Moderate: wetness, low strength.	Severe: low strength.	Slight.
NhB: Nicholson	Severe: wetness, too clayey.	Moderate: wetness, low strength.	Severe: wetness, low strength.	Moderate: slope, wetness, low strength.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 8.--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
NhC---------------- Nicholson	Severe: wetness, too clayey.	Moderate: slope, wetness, low strength.	Severe: wetness, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
No----------------- Nolin	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
PmA---------------- Pembroke	Moderate: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
PmB---------------- Pembroke	Moderate: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
PmC---------------- Pembroke	Moderate: slope, too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
Pt.* Pits						
ReC---------------- Riney	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
ReD, RmE3---------- Riney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ro----------------- Robertsville	Severe: floods, wetness, low strength.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
SaA, SaB----------- Sadler	Severe: wetness.	Moderate: wetness, low strength.	Severe: wetness.	Moderate: wetness, low strength.	Severe: low strength.	Slight.
Sk----------------- Skidmore	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, small stones.
Ss----------------- Steff	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.	Moderate: floods.
St----------------- Stendal	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
Ud.* Udorthents						
VeC---------------- Vertrees	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
WeB---------------- Wellston	Moderate: depth to rock.	Slight----------	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Slight.
WeC---------------- Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: slope, low strength.	Moderate: slope.
WeD---------------- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WlC3--------------- Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.

See footnote at end of table.

TABLE 8.--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
WlD3-------------- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ZnB--------------- Zanesville	Moderate: wetness, depth to rock.	Moderate: wetness, low strength.	Moderate: depth to rock, wetness, low strength.	Moderate: slope, wetness, low strength.	Severe: low strength.	Slight.
ZnC, ZnC3--------- Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness, low strength.	Moderate: slope, wetness, depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope.
Zu*:						
Zanesville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Gullied land.						

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

TABLE 9.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BaD: Baxter	Severe: slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
BaE: Baxter	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
Bo: Bonnie	Severe: floods, percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
CaB: Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
CaC: Caneyville	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
CoD*: Caneyville	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey.
CrA, CrB: Crider	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Good.
CrC: Crider	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope.
Cu: Cuba	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
DkF: Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
Du*: Dunning	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: wetness, thin layer.
ElA, ElB: Elk	Moderate: floods.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey.
ElC: Elk	Moderate: slope, floods.	Severe: slope, floods.	Moderate: floods, too clayey.	Moderate: slope, floods.	Fair: slope, too clayey
FdC: Fredonia	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
FnC: Frondorf	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.

See footnote at end of table.

TABLE 9.--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
FwD*:					
Frondorf	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer.
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
FwF*:					
Frondorf	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer.
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
HbB*:					
Hammack	Slight	Moderate: slope, seepage.	Severe: too clayey.	Slight	Fair: too clayey.
Baxter	Moderate: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight	Poor: too clayey.
HbC*, HbC3*:					
Hammack	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Baxter	Moderate: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Hn Henshaw	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
La Lawrence	Severe: percs slowly, wetness.	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Ln Lindside	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Me Melvin	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Ne Newark	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
NhA Nicholson	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Fair: too clayey.
NhB Nicholson	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Fair: too clayey.

See footnote at end of table.

TABLE 9.--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
NhC----------------- Nicholson	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Moderate: slope, wetness.	Fair: slope, too clayey.
No------------------ Nolin	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
PmA----------------- Pembroke	Slight-----------	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
PmB----------------- Pembroke	Slight-----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
PmC----------------- Pembroke	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Pt.* Pits					
ReC----------------- Riney	Moderate: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Fair: slope, too clayey.
ReD, RmE3----------- Riney	Severe: slope.	Severe: slope, seepage.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
Ro------------------ Robertsville	Severe: floods, percs slowly, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
SaA----------------- Sadler	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: too clayey.
SaB----------------- Sadler	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: too clayey.
Sk------------------ Skidmore	Severe: floods, wetness, depth to rock.	Severe: floods, seepage, wetness.	Severe: floods, seepage, depth to rock.	Severe: floods, seepage, wetness.	Poor: small stones.
Ss------------------ Steff	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Good.
St------------------ Stendal	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Ud.* Udorthents					
VeC----------------- Vertrees	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
WeB----------------- Wellston	Moderate: depth to rock.	Moderate: depth to rock, slope, seepage.	Severe: depth to rock.	Slight-----------	Fair: area reclaim.

See footnote at end of table.

TABLE 9.--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
WeC------------------ Wellston	Moderate: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, area reclaim.
WeD------------------ Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
WlC3----------------- Wellston	Moderate: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, area reclaim.
WlD3----------------- Wellston	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
ZnB------------------ Zanesville	Severe: percs slowly, wetness.	Moderate: slope, depth to rock.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: too clayey.
ZnC, ZnC3------------ Zanesville	Severe: percs slowly, wetness.	Severe: slope.	Severe: depth to rock, wetness.	Moderate: slope, wetness.	Fair: slope, too clayey.
Zu*:					
Zanesville-----------	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: depth to rock, wetness.	Severe: slope.	Poor: slope.
Gullied land.					

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

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BaD------------------- Baxter	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
BaE------------------- Baxter	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Bo-------------------- Bonnie	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
CaB, CaC,------------- Caneyville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
CoD*, CnD3------------ Caneyville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, too clayey, thin layer.
CrA, CrB-------------- Crider	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
CrC------------------- Crider	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
Cu-------------------- Cuba	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
DkF------------------- Dekalb	Poor: slope, thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Du*------------------- Dunning	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
ElA, ElB-------------- Elk	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
ElC------------------- Elk	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
FdC------------------- Fredonia	Poor: low strength.	Unsuited: excess fines	Unsuited: excess fines	Poor: too clayey.
FnC------------------- Frondorf	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, area reclaim.
FwD*:				
Frondorf--------------	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Weikert---------------	Poor: area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FwF*:				
Frondorf	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Weikert	Poor: slope, area reclaim.	Unsuited: excess fines.	Poor: excess fines.	Poor: slope, small stones.
HbB*:				
Hammack	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Baxter	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, too clayey.
HbC*:				
Hammack	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
Baxter	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
HbC3*:				
Hammack	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.
Baxter	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Hn Henshaw	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
La Lawrence	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Ln Lindside	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Me Melvin	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ne Newark	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
NhA, NhB Nicholson	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
NhC Nicholson	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
No Nolin	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
PmA, PmB Pembroke	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
PmC Pembroke	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Pt.* Pits				
ReC: Riney	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.
ReD, RmE3: Riney	Fair: slope, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Ro: Robertsville	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
SaA, SaB: Sadler	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Sk: Skidmore	Fair: low strength, area reclaim, large stones.	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
Ss: Steff	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
St: Stendal	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Ud.* Udorthents				
VeC: Vertrees	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WeB: Wellston	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
WeC: Wellston	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
WeD: Wellston	Fair: low strength, slope, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
WlC3: Wellston	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
WlD3: Wellston	Fair: low strength, slope, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
ZnB: Zanesville	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ZnC, ZnC3------------- Zanesville	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
Zu*:				
Zanesville-----------	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Gullied land.				

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

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
BaD, BaE Baxter	Seepage	Hard to pack	Not needed	Slope	Slope.
Bo Bonnie	Favorable	Wetness, piping.	Floods, percs slowly.	Not needed	Wetness, erodes easily, percs slowly.
CaB, CaC, CnD3, CoD* Caneyville	Seepage, depth to rock.	Hard to pack	Not needed	Dept to rock, slope, erodes easily.	Slope, erodes easily, depth to rock.
CrA, CrB, CrC Crider	Seepage	Low strength, hard to pack.	Not needed	Slope	Erodes easily, slope.
Cu Cuba	Seepage	Piping, low strength.	Floods	Not needed	Erodes easily.
DkF Dekalb	Depth to rock, seepage.	Piping, seepage.	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
Du* Dunning	Favorable	Hard to pack, wetness.	Floods, percs slowly.	Wetness, percs slowly.	Wetness, erodes easily, percs slowly.
ElA, ElB, ElC Elk	Seepage	Low strength, piping.	Not needed	Slope	Slope.
FdC Fredonia	Depth to rock, seepage.	Low strength, thin layer.	Not needed	Depth to rock, slope.	Slope, erodes easily, rooting depth.
FnC Frondorf	Seepage, depth to rock.	Thin layer, piping.	Not needed	Depth to rock, slope.	Slope, depth to rock.
FwD*, FwF*:					
Frondorf	Seepage, depth to rock.	Thin layer, piping.	Not needed	Depth to rock, slope.	Slope, depth to rock.
Weikert	Seepage, depth to rock.	Thin layer, low strength, seepage.	Not needed	Depth to rock, rooting depth, slope.	Depth to rock, rooting depth, droughty.
HbB*:					
Hammack	Seepage	Thin layers, large stones.	Not needed	Slope, large stones.	Favorable.
Baxter	Seepage	Hard to pack	Not needed	Slope	Slope.
HbC*, HbC3*:					
Hammack	Seepage	Thin layers, large stones.	Not needed	Slope, large stones.	Slope.
Baxter	Seepage	Hard to pack	Not needed	Slope	Slope.
Hn Henshaw	Favorable	Wetness	Favorable	Erodes easily, wetness.	Wetness, erodes easily.
La Lawrence	Favorable	Piping, wetness.	Percs slowly, wetness.	Not needed	Percs slowly, wetness, rooting depth.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
Ln---------------- Lindside	Seepage----------	Low strength, erodes easily, piping.	Floods------------	Not needed--------	Wetness.
Me---------------- Melvin	Seepage----------	Wetness----------	Wetness, floods.	Not needed--------	Wetness, erodes easily.
Ne---------------- Newark	Seepage----------	Wetness, piping.	Floods------------	Not needed--------	Wetness, erodes easily.
NhA, NhB, NhC----- Nicholson	Favorable--------	Hard to pack-----	Percs slowly, slope.	Rooting depth, wetness, erodes easily.	Rooting depth, erodes easily, slope.
No---------------- Nolin	Seepage----------	Piping, low strength.	Not needed--------	Not needed--------	Erodes easily.
PmA, PmB, PmC----- Pembroke	Seepage----------	Hard to pack-----	Not needed--------	Slope-------------	Slope.
Pt.* Pits					
ReC, ReD, RmE3---- Riney	Seepage----------	Piping-----------	Not needed--------	Slope-------------	Slope.
Ro---------------- Robertsville	Favorable--------	Low strength, wetness.	Percs slowly, floods.	Not needed--------	Rooting depth, wetness, erodes easily.
SaA, SaB---------- Sadler	Seepage----------	Hard to pack, piping.	Percs slowly, wetness, slope.	Rooting depth, wetness, erodes easily.	Rooting depth, erodes easily.
Sk---------------- Skidmore	Seepage, depth to rock.	Seepage----------	Not needed--------	Not needed--------	Droughty.
Ss---------------- Steff	Seepage----------	Wetness, piping.	Floods------------	Not needed--------	Wetness, erodes easily.
St---------------- Stendal	Seepage----------	Piping, wetness.	Floods------------	Not needed--------	Erodes easily, wetness.
Ud.* Udorthents					
VeC--------------- Vertrees	Favorable--------	Hard to pack-----	Not needed--------	Slope-------------	Slope, erodes easily.
WeB--------------- Wellston	Seepage, depth to rock.	Thin layer-------	Not needed--------	Favorable---------	Erodes easily.
WeC--------------- Wellston	Seepage, depth to rock.	Thin layer-------	Not needed--------	Favorable---------	Erodes easily, slope.
WeD--------------- Wellston	Seepage, depth to rock.	Thin layer-------	Not needed--------	Slope-------------	Erodes easily, slope.
WlC3-------------- Wellston	Seepage, depth to rock.	Thin layer-------	Not needed--------	Favorable---------	Erodes easily, slope.
WlD3-------------- Wellston	Seepage, depth to rock.	Thin layer-------	Not needed--------	Slope-------------	Erodes easily, slope.
ZnB--------------- Zanesville	Depth to rock, seepage.	Piping, thin layer, wetness.	Percs slowly------	Percs slowly, wetness, erodes easily.	Percs slowly, erodes easily, rooting depth.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Map symbol and soil name	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ZnC, ZnC3--------- Zanesville	Depth to rock, seepage.	Piping, thin layer, wetness.	Percs slowly, slope.	Percs slowly, wetness, erodes easily.	Percs slowly, erodes easily, rooting depth.
Zu:*					
Zanesville-------	Depth to rock, seepage.	Piping, thin layer, wetness.	Percs slowly, slope.	Slope, percs slowly, erodes easily.	Percs slowly, erodes easily, rooting depth.
Gullied land.					

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

TABLE 12.--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
BaD: Baxter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, small stones.
BaE: Baxter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bo: Bonnie	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
CaB: Caneyville	Moderate: percs slowly.	Slight	Moderate: slope, depth to rock.	Slight.
CaC: Caneyville	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
CnD3: Caneyville	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.
CoD*: Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CrA: Crider	Slight	Slight	Slight	Slight.
CrB: Crider	Slight	Slight	Moderate: slope.	Slight.
CrC: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Cu: Cuba	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
DkF: Dekalb	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Du*: Dunning	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.
ElA: Elk	Severe: floods.	Slight	Slight	Slight.
ElB: Elk	Severe: floods.	Slight	Moderate: slope.	Slight.
ElC: Elk	Severe: floods.	Moderate: slope.	Severe: slope.	Slight.
FdC: Fredonia	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
FnC: Frondorf	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
FwD*:				
Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
FwD*:				
Weikert	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope, small stones.
FwF*:				
Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
HbB*:				
Hammack	Slight	Slight	Moderate: slope.	Slight.
Baxter	Slight	Slight	Moderate: small stones.	Slight.
HbC*:				
Hammack	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Baxter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HbC3*:				
Hammack	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
Baxter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hn: Henshaw	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
La: Lawrence	Severe: floods, wetness.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
Ln: Lindside	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Me: Melvin	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness.
Ne: Newark	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: floods, wetness.	Moderate: wetness.
NhA: Nicholson	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly, wetness.	Slight.
NhB: Nicholson	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: slope, percs slowly, wetness.	Slight.
NhC: Nicholson	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
No: Nolin	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
PmA: Pembroke	Slight	Slight	Slight	Slight.
PmB: Pembroke	Slight	Slight	Moderate: slope.	Slight.
PmC: Pembroke	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Pt.*: Pits				
ReC: Riney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ReD: Riney	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
RmE3: Riney	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.
Ro: Robertsville	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
SaA: Sadler	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly, wetness.	Slight.
SaB: Sadler	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: slope, percs slowly, wetness.	Slight.
Sk: Skidmore	Severe: floods.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Ss: Steff	Severe: floods.	Moderate: floods, wetness.	Moderate: floods, wetness.	Slight.
St: Stendal	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: floods, wetness.	Moderate: wetness, floods.
Ud.*: Udorthents				
VeC: Vertrees	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
WeB: Wellston	Slight	Slight	Moderate: slope.	Slight.
WeC: Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WeD: Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
WlC3: Wellston	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
W1D3------------------ Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.
ZnB------------------- Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: slope, percs slowly.	Slight.
ZnC, ZnC3------------- Zanesville	Moderate: slope, percs slowly.	Moderate: slope, wetness.	Severe: slope.	Slight.
Zu*:				
Zanesville-----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.
Gullied land.				

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

TABLE 13.--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
BaD----------------- Baxter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BaE----------------- Baxter	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Bo------------------ Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
CaB----------------- Caneyville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaC,---------------- Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoD*, CnD3---------- Caneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CrA----------------- Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrB----------------- Crider	Fair	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.
Cu------------------ Cuba	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
DkF----------------- Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Du*----------------- Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ElA, ElB------------ Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC----------------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdC----------------- Fredonia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FnC----------------- Frondorf	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FwD*:										
Frondorf-----------	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Weikert------------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
FwF*:										
Frondorf-----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Weikert------------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 13.--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
HbB*:										
Hammack	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Baxter	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HbC*, HbC3*:										
Hammack	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Baxter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hn Henshaw	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
La Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ln Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Me Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ne Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NhA Nicholson	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
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.
PmA Pembroke	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PmB Pembroke	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PmC Pembroke	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pt.* Pits										
ReC Riney	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ReD, RmE3 Riney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ro Robertsville	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
SaA Sadler	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 13.--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
SaB: Sadler	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sk: Skidmore	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Ss: Steff	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
St: Stendal	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
Ud*. Udorthents										
VeC: Vertrees	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB: Wellston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeC: Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeD: Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WlC3: Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WlD3: Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ZnB: Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ZnC, ZnC3: Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Zu:* Zanesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gullied land.										

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

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
BaD, BaE----------- Baxter	0-5	Cherty silt loam	ML, GM, CL-ML, CL	A-4	0-10	60-85	55-80	45-70	45-70	25-35	4-10
	5-17	Silty clay loam, cherty silt loam.	CL, GM, GC, CL-ML	A-4, A-6	0-10	60-85	55-80	55-80	45-80	25-40	5-20
	17-75	Cherty silty clay, cherty clay.	CH, CL, GC	A-7	0-10	55-95	45-90	45-90	45-80	40-60	20-35
	75-96	Clay, cherty silty clay, silty clay.	GC, CH, CL	A-7	0-20	50-80	40-75	35-70	35-70	40-70	20-40
Bo----------------- Bonnie	0-8	Silt loam-------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	8-66	Silt loam-------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
CaB, CaC----------- Caneyville	0-5	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-25	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	25-34	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CnD3--------------- Caneyville	0-5	Silty clay------	CH, CL	A-7	0-3	90-100	85-100	80-100	75-100	45-65	25-45
	5-30	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CoD*--------------- Caneyville	0-5	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-25	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	25-34	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CrA, 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
	9-33	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
	33-99	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
Cu----------------- Cuba	0-66	Silt loam-------	CL, ML, CL-ML	A-4, A-6	0	100	98-100	90-100	70-90	25-35	3-12
DkF---------------- Dekalb	0-5	Channery sandy loam.	SM, GM, ML, CL	A-2, A-4	0-30	50-90	45-80	40-75	20-55	<32	NP-7
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML	A-2, A-4	5-40	50-85	40-80	40-75	20-55	<32	NP-7
	28-30	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4	10-50	45-85	35-75	25-65	15-40	<32	NP-9
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Du*----------------- Dunning	0-8	Silt loam, silty clay loam	ML, CL, CL-ML	A-6, A-4	0	100	95-100	90-100	85-100	25-35	2-11
	8-68	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
ElA, ElB, ElC------ Elk	0-9	Silt loam-------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	9-50	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	50-68	Silty clay loam, silt loam.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FdC----------------- Fredonia	0-8	Silt loam-------	ML, CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	8-30	Silty clay, clay	CH, MH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FnC----------------- Frondorf	0-18	Silt loam, silty clay loam	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-8
	18-30	Channery silty clay loam, channery silt loam, channery loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FwD*, FwF*:											
Frondorf----------	0-18	Silt loam, silty clay loam	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-8
	18-30	Channery silty clay loam, channery silt loam, channery loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Weikert-----------	0-5	Channery silt loam.	GM, ML, GC, GM-GC	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	5-19	Shaly loam, channery silt loam, channery loam.	GM, GC, GM-GC, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HbB*, HbC*:											
Hammack-----------	0-8	Silt loam-------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	25-35	4-10
	8-28	Silt loam, silty clay loam.	ML, CL	A-6, A-7, A-4	0	100	95-100	90-100	85-95	30-45	6-20
	28-42	Very cherty silt loam, very cherty silty clay loam, cherty silty clay loam.	GM, GC, ML, CL	A-6, A-7, A-4, A-2	15-35	25-80	22-75	22-75	18-70	30-45	6-20
	42-99	Cherty silty clay, very cherty clay, cherty clay.	GC, CL, CH	A-7, A-2-7	10-40	40-75	30-75	30-70	25-70	45-70	20-40

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
HbB,* HbC:*											
Baxter	0-5	Cherty silt loam	ML, GM, CL-ML, CL	A-4	0-10	60-85	55-80	45-70	45-70	25-35	4-10
	5-17	Silty clay loam, cherty silt loam.	CL, GM, GC, CL-ML	A-4, A-6	0-10	60-85	55-80	55-80	45-80	25-40	5-20
	17-75	Cherty silty clay, cherty clay.	CH, CL, GC	A-7	0-10	55-95	45-90	45-90	45-80	40-60	20-35
	75-96	Cherty clay, cherty silty clay, silty clay.	GC, CH, CL	A-7	0-20	50-80	40-75	35-70	35-70	40-70	20-40
HbC3:*											
Hammack	0-7	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	34-45	15-20
	7-24	Silt loam, silty clay loam.	ML, CL	A-6, A-7, A-4	0	100	95-100	90-100	85-95	30-45	6-20
	24-38	Very cherty silt loam, very cherty silty clay loam, cherty silty clay loam.	GM, GC, ML, CL	A-6, A-7, A-4, A-2	15-35	25-80	22-75	22-75	18-70	30-45	6-20
	38-95	Very cherty silty clay, very cherty clay, cherty clay.	GC, CL, CH	A-7, A-2-7	10-40	40-75	30-75	30-70	25-70	45-70	20-40
Baxter	0-10	Cherty silty clay loam.	CL	A-6	0-10	60-80	55-75	55-75	55-75	30-40	15-22
	10-68	Cherty silty clay, cherty clay.	CH, CL, GC	A-7	0-10	55-95	45-90	45-90	45-80	40-60	20-35
	68-96	Cherty clay, cherty silty clay.	GC, CH, CL	A-7	0-20	50-80	40-75	35-70	35-70	40-70	20-40
Hn------ Henshaw	0-8	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	80-100	25-35	3-10
	8-48	Silty clay loam, silt loam.	CL, ML	A-6, A-4	0	95-100	95-100	95-100	85-100	30-40	8-18
	48-68	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
La------ Lawrence	0-8	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	8-26	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	26-44	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	44-60	Silty clay, silty clay loam, silt loam.	ML, CL, MH, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-60	5-25
Ln------ Lindside	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	25-40	2-15
	8-60	Silty clay loam, silt loam, fine sandy loam.	CL, ML	A-4, A-6	0	100	95-100	80-100	55-95	25-40	2-20

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
Me----------------- Melvin	0-10	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	10-37	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
	37-66	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-95	25-40	5-20
Ne----------------- Newark	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<35	NP-10
	9-36	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	25-42	5-20
	36-76	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	25-42	5-20
NhA, NhB, NhC------ Nicholson	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	8-23	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	95-100	85-100	80-100	25-45	5-20
	23-60	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
	60-70	Silty clay, clay, channery clay.	CH, CL	A-7	0-10	80-100	70-100	60-100	55-95	34-70	16-40
No----------------- Nolin	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	9-63	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	100	95-100	85-100	75-100	25-40	5-18
PmA, PmB, PmC------ Pembroke	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	70-100	25-40	3-16
	8-31	Silty clay loam	CL	A-6, A-7	0	95-100	90-100	85-100	75-100	30-45	11-25
	31-93	Silty clay loam, silty clay.	CH, CL	A-7, A-6	0	90-100	75-100	75-100	65-100	35-65	20-45
Pt.* Pits											
ReC, ReD----------- Riney	0-9	Loam-------------	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	<30	NP-10
	9-48	Clay loam, sandy clay loam.	ML, CL, SC, SM	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-35	2-15
	48-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, ML, CL	A-4, A-6, A-2, A-1	0	80-100	70-100	40-80	15-55	<35	NP-15
RmE3--------------- Riney	0-6	Clay loam--------	ML, CL, SC, SM	A-4, A-6, A-2	0	80-100	70-100	70-85	25-75	20-35	2-15
	6-40	Clay loam, sandy clay loam.	ML, CL, SC, SM	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-35	2-15
	40-50	Sandy loam, sandy clay loam, loamy sand.	SC, SM, ML, CL	A-4, A-6, A-2, A-1	0	80-100	70-100	40-80	15-55	<35	NP-15

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
Ro------------------ Robertsville	0-10	Silt loam-------	ML	A-4	0	95-100	95-100	85-100	75-100	25-35	2-10
	10-16	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	16-45	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	45-66	Silty clay loam, silty clay, silt loam.	CL, CH, CL-ML	A-6, A-7, A-4	0-5	80-100	75-100	70-100	60-100	25-60	5-35
SaA, SaB----------- Sadler	0-8	Silt loam-------	ML, CL-ML	A-4	0	95-100	95-100	85-100	80-100	25-35	4-10
	8-24	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-25
	24-56	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0-10	85-100	80-100	70-100	55-95	20-40	2-20
	56-74	Loam, silty clay loam, gravelly loam.	ML, CL, SM, GM	A-4, A-6, A-7	0-20	65-100	60-95	50-95	35-90	20-50	2-30
Sk------------------ Skidmore	0-20	Gravelly loam---	GM, SM, GM-GC, ML	A-4, A-2	0-10	60-90	50-85	40-75	25-60	<30	NP-7
	20-45	Channery fine sandy loam, very channery clay loam, very channery loam.	GM, GP-GM, GM-GC	A-2, A-1	5-30	35-60	20-50	15-40	10-35	<30	NP-5
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ss------------------ Steff	0-15	Silt loam-------	ML	A-4	0	95-100	90-100	80-100	55-95	<35	NP-10
	15-39	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	95-100	90-100	85-100	70-95	25-40	5-20
	39-60	Silt loam, gravelly loam, very fine sandy loam.	ML, CL, SM, GM	A-4, A-2, A-1	0-10	50-100	40-100	35-95	20-90	<35	NP-10
St------------------ Stendal	0-8	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
	8-66	Silt loam, silty clay loam, fine sandy loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
Ud.* Udorthents											
VeC----------------- Vertrees	0-8	Silty clay loam	CL	A-6	0-10	60-90	60-90	50-90	50-90	30-40	12-20
	8-72	Clay, silty clay	CH, CL	A-7	0	85-100	70-100	70-100	65-96	41-70	25-45
WeB, WeC, WeD------ Wellston	0-7	Silt loam-------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	7-42	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	42-58	Silt loam, loam, gravelly loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WlC3, WlD3--------- Wellston	0-7	Silty clay loam	CL	A-6	0-5	95-100	90-100	85-100	75-95	30-40	10-20
	7-35	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	35-51	Silt loam, loam, gravelly loam, clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	51	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
ZnB, ZnC----------- Zanesville	0-7	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	7-26	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	26-40	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	40-68	Sandy clay loam, clay loam, channery sandy clay loam.	SC, CL, SM, GM	A-6, A-4, A-2	0-10	65-100	50-95	40-95	20-85	20-40	2-20
	68	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
ZnC3--------------- Zanesville	0-6	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	6-20	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	20-36	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	36-60	Sandy clay loam, clay loam, channery sandy clay loam.	SC, CL, SM, GM	A-6, A-4, A-2	0-10	65-100	50-95	40-95	20-85	20-40	2-20
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Zu*: Zanesville--------	0-6	Silt loam	CL, ML, CL-ML	A-6, A-4	0	95-100	95-100	90-100	80-100	25-40	4-15
	6-20	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	20-36	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	36-60	Sandy clay loam, clay loam, channery sandy clay loam.	SC, CL, SM, GM	A-6, A-4, A-2	0-10	65-100	50-95	40-95	20-85	20-40	2-20
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gullied land.											

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

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
BaD, BaE: Baxter	0-5	0.6-2.0	0.14-0.18	4.5-7.3	Low	0.32	4
	5-22	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.24	
	22-75	0.6-2.0	0.10-0.14	4.5-5.5	Moderate	0.24	
	75-96	0.6-2.0	0.08-0.13	4.5-5.5	Moderate	0.24	
Bo: Bonnie	0-8	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	5
	8-66	0.06-2.0	0.20-0.22	4.5-5.5	Low	0.43	
CaB, CaC: Caneyville	0-5	0.6-2.0	0.15-0.22	4.5-6.0	Low	0.43	3
	5-25	0.2-0.6	0.12-0.18	4.5-6.0	Moderate	0.28	
	25-34	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28	
	34	---	---	---	---	---	
CnD3: Caneyville	0-5	0.2-0.6	0.13-0.18	4.5-6.0	Moderate	0.43	2
	5-30	0.2-0.6	0.12-0.18	4.5-7.8	Moderate	0.28	
	30	---	---	---	---	---	
CoD*: Caneyville	0-5	0.6-2.0	0.15-0.22	4.5-6.0	Low	0.43	3
	5-25	0.2-0.6	0.12-0.18	4.5-6.0	Moderate	0.28	
	25-34	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28	
	34	---	---	---	---	---	
CrA, CrB, CrC: Crider	0-9	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	4
	9-33	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28	
	33-99	0.6-2.0	0.12-0.18	5.1-6.0	Moderate	0.28	
Cu: Cuba	0-66	0.6-2.0	0.22-0.24	4.5-5.5	Low	0.43	5
DkF: Dekalb	0-5	6.0-20	0.08-0.12	4.5-6.5	Low	0.24	3
	5-28	6.0-20	0.06-0.12	4.5-5.5	Low	0.17	
	28-30	>6.0	0.05-0.10	4.5-5.5	Low	0.17	
	30	---	---	---	---	---	
Du*: Dunning	0-8	0.6-2.0	0.19-0.23	5.6-7.8	Low	0.37	5
	8-68	0.06-0.2	0.14-0.18	5.6-7.8	Moderate	0.28	
ElA, ElB, ElC: Elk	0-9	0.6-2.0	0.19-0.23	4.5-6.0	Low	0.32	4
	9-50	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.28	
	50-68	0.6-2.0	0.14-0.20	5.1-6.5	Low	0.28	
FdC: Fredonia	0-8	0.6-2.0	0.18-0.22	5.1-6.0	Low	0.37	3
	8-30	0.06-0.6	0.13-0.18	5.1-7.3	Moderate	0.28	
	30	---	---	---	---	---	
FnC: Frondorf	0-18	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.32	3
	18-30	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.17	
	30	---	---	---	---	---	
FwD*, FwF*:							
Frondorf	0-18	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.32	3
	18-30	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.17	
	30	---	---	---	---	---	
Weikert	0-5	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.28	2
	5-19	2.0-6.0	0.04-0.08	4.5-5.5	Low	0.28	
	19	---	---	---	---	---	
HbB*, HbC*:							
Hammack	0-8	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	4
	8-28	0.6-2.0	0.18-0.23	5.1-6.5	Low	0.32	
	28-42	0.6-2.0	0.05-0.10	4.5-6.0	Low	0.24	
	42-99	0.6-2.0	0.08-0.12	4.5-6.0	Moderate	0.24	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
HbB*, HbC*:							
Baxter----------	0-5	0.6-2.0	0.14-0.18	4.5-7.3	Low------------	0.32	4
	5-22	0.6-2.0	0.14-0.18	4.5-6.5	Moderate-------	0.24	
	22-75	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-------	0.24	
	75-96	0.6-2.0	0.08-0.13	4.5-5.5	Moderate-------	0.24	
HbC3*:							
Hammack---------	0-7	0.6-2.0	0.18-0.22	5.1-7.3	Low------------	0.32	4
	7-24	0.6-2.0	0.18-0.23	5.1-6.5	Low------------	0.32	
	24-38	0.6-2.0	0.05-0.10	4.5-6.0	Low------------	0.24	
	38-95	0.6-2.0	0.08-0.12	4.5-6.0	Moderate-------	0.24	
Baxter----------	0-10	0.6-2.0	0.12-0.18	4.5-6.5	Low------------	0.32	4
	10-68	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-------	0.24	
	68-96	0.6-2.0	0.08-0.13	4.5-5.5	Moderate-------	0.24	
Hn--------------- Henshaw	0-8	0.6-2.0	0.18-0.23	5.6-6.5	Low------------	0.43	4
	8-48	0.2-0.6	0.15-0.19	5.1-7.3	Low------------	0.43	
	48-68	0.2-0.6	0.17-0.22	6.6-8.4	Low------------	0.43	
La--------------- Lawrence	0-8	0.6-2.0	0.19-0.23	4.5-6.5	Low------------	0.43	3
	8-26	0.6-2.0	0.18-0.22	4.5-5.5	Low------------	0.37	
	26-44	0.06-0.2	0.08-0.12	4.5-5.5	Low------------	0.43	
	44-57	0.06-0.6	0.08-0.12	4.5-7.3	Low------------	0.37	
Ln--------------- Lindside	0-8	0.6-2.0	0.19-0.23	5.6-7.8	Low------------	0.43	5
	8-60	0.6-2.0	0.17-0.22	5.6-7.8	Low------------	0.43	
Me--------------- Melvin	0-10	0.6-2.0	0.18-0.23	6.1-7.8	Low------------	0.43	5
	10-37	0.6-2.0	0.18-0.23	6.1-7.8	Low------------	0.43	
	37-66	0.2-2.0	0.16-0.23	6.1-7.8	Low------------	0.43	
Ne--------------- Newark	0-9	0.6-2.0	0.15-0.23	5.6-7.8	Low------------	0.43	5
	9-36	0.6-2.0	0.18-0.23	5.6-7.8	Low------------	0.43	
	36-76	0.6-2.0	0.15-0.22	5.1-7.8	Low------------	0.43	
NhA, NhB, NhC---- Nicholson	0-8	0.6-2.0	0.19-0.23	4.5-6.5	Low------------	0.43	3
	8-23	0.6-2.0	0.18-0.22	4.5-6.0	Low------------	0.43	
	23-42	0.06-0.2	0.07-0.12	4.5-6.0	Low------------	0.43	
	42-70	0.06-0.6	0.07-0.12	5.1-7.8	Moderate-------	0.37	
No--------------- Nolin	0-9	0.6-2.0	0.18-0.23	5.1-7.8	Low------------	0.43	5
	9-63	0.6-2.0	0.18-0.23	5.1-7.8	Low------------	0.43	
PmA, PmB, PmC---- Pembroke	0-8	0.6-2.0	0.18-0.23	4.5-7.3	Low------------	0.32	4
	8-31	0.6-2.0	0.18-0.22	4.5-6.0	Low------------	0.28	
	31-93	0.6-2.0	0.13-0.19	4.5-6.0	Moderate-------	0.28	
Pt.* Pits							
ReC, ReD--------- Riney	0-9	2.0-6.0	0.12-0.18	4.5-7.3	Low------------	0.28	4
	9-48	2.0-6.0	0.13-0.17	4.5-5.5	Low------------	0.28	
	48-60	2.0-6.0	0.05-0.14	4.5-5.5	Low------------	0.28	
RmE3------------- Riney	0-6	2.0-6.0	0.13-0.18	4.5-7.3	Low------------	0.28	4
	6-40	2.0-6.0	0.13-0.17	4.5-5.5	Low------------	0.28	
	40-50	2.0-6.0	0.05-0.14	4.5-5.5	Low------------	0.28	
Ro--------------- Robertsville	0-10	0.6-2.0	0.19-0.23	3.6-5.5	Low------------	0.43	3
	10-16	0.6-2.0	0.18-0.22	3.6-5.5	Low------------	0.43	
	16-45	0.06-0.2	0.08-0.12	3.6-5.5	Low------------	0.43	
	45-66	0.2-0.6	0.08-0.12	4.5-7.3	Low------------	0.37	
SaA, SaB--------- Sadler	0-8	0.6-2.0	0.19-0.23	4.5-6.0	Low------------	0.43	3
	8-24	0.6-2.0	0.18-0.22	4.5-5.5	Low------------	0.43	
	24-56	0.06-0.2	0.07-0.12	4.5-5.5	Low------------	0.43	
	56-74	0.2-2.0	0.07-0.12	4.5-5.5	Low------------	0.43	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
Sk---------------- Skidmore	0-20	2.0-6.0	0.07-0.13	5.6-7.3	Low------------	0.17	5
	20-45	2.0-6.0	0.04-0.10	5.6-7.3	Low------------	0.17	
	45	---	---	---	---------------	---	
Ss---------------- Steff	0-15	0.6-2.0	0.15-0.23	4.5-7.3	Low------------	0.43	4
	15-39	0.6-2.0	0.18-0.23	4.5-5.5	Low------------	0.43	
	39-60	0.6-6.0	0.08-0.21	4.5-5.5	Low------------	0.43	
St---------------- Stendal	0-8	0.6-2.0	0.22-0.24	4.5-6.5	Low------------	0.37	5
	8-66	0.6-2.0	0.20-0.22	4.5-5.5	Low------------	0.37	
Ud.* Udorthents							
VeC--------------- Vertrees	0-8	0.6-2.0	0.14-0.22	4.5-7.3	Low------------	0.32	4
	8-72	0.2-0.6	0.14-0.18	4.5-6.0	Moderate--------	0.28	
WeB, WeC, WeD----- Wellston	0-7	0.6-2.0	0.18-0.22	5.1-6.5	Low------------	0.37	4
	7-42	0.6-2.0	0.17-0.21	3.6-6.0	Low------------	0.37	
	42-58	0.6-2.0	0.12-0.17	4.5-6.0	Low------------	0.37	
	58	---	---	---	---------------	---	
WlC3, WlD3-------- Wellston	0-7	0.6-2.0	0.17-0.21	5.1-6.5	Low------------	0.37	3
	7-35	0.6-2.0	0.17-0.21	3.6-6.0	Low------------	0.37	
	35-51	0.6-2.0	0.12-0.17	4.5-6.0	Low------------	0.37	
	51	---	---	---	---------------	---	
ZnB, ZnC---------- Zanesville	0-7	0.6-2.0	0.19-0.23	4.5-6.5	Low------------	0.37	3
	7-26	0.6-2.0	0.17-0.22	4.5-5.5	Low------------	0.37	
	26-40	0.06-0.6	0.08-0.12	4.5-5.5	Low------------	0.37	
	40-68	0.2-2.0	0.08-0.12	4.5-5.5	Low------------	0.28	
	68	---	---	---	---------------	---	
ZnC3-------------- Zanesville	0-6	0.6-2.0	0.19-0.23	4.5-5.5	Low------------	0.37	3
	6-20	0.6-2.0	0.17-0.22	4.5-5.5	Low------------	0.37	
	20-36	0.06-0.6	0.08-0.12	4.5-5.5	Low------------	0.37	
	36-60	0.2-2.0	0.08-0.12	4.5-5.5	Low------------	0.28	
	60	---	---	---	---------------	---	
Zu*: Zanesville-------	0-6	0.6-2.0	0.18-0.23	4.5-5.5	Low------------	0.37	3
	6-20	0.6-2.0	0.17-0.22	4.5-5.5	Low------------	0.37	
	20-36	0.06-0.6	0.08-0.12	4.5-5.5	Low------------	0.37	
	36-60	0.2-2.0	0.08-0.12	4.5-5.5	Low------------	0.28	
	60	---	---	---	---------------	---	
Gullied land.							

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

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
BaD, BaE---------- Baxter	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
Bo---------------- Bonnie	C/D	Frequent----	Long------	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	High.
CaB, CaC, CnD3, CoD*------------- Canyeyville	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
CrA, CrB, CrC----- Crider	B	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Moderate.
Cu---------------- Cuba	B	Frequent----	Brief-----	Dec-May	>6.0	---	---	>60	---	Low------	High.
DkF--------------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High.
Du*--------------- Dunning	D	Common------	Brief-----	Dec-May	0-0.5	Apparent	Dec-May	>60	---	High-----	Moderate.
ElA, ElB, ElC----- Elk	B	Rare--------	Brief-----	Jan-Apr	>6.0	---	---	>60	---	Moderate	Moderate.
FdC--------------- Fredonia	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
FnC--------------- Frondorf	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	High.
FwD*, FwF*:											
Frondorf---------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	High.
Weikert----------	C/D	None--------	---	---	>6.0	---	---	10-20	Rippable	Moderate	Moderate.
HbB*, HbC*, HbC3*:											
Hammack----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Baxter-----------	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
Hn---------------- Henshaw	C	None--------	---	---	1.0-2.0	Apparent	Dec-Apr	>60	---	High-----	Moderate.
La---------------- Lawrence	C	Common------	Very brief	Jan-Apr	1.0-2.0	Perched	Dec-Apr	>60	---	High-----	High.
Ln---------------- Lindside	C	Common------	Very brief	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
Me---------------- Melvin	D	Common------	Brief-----	Dec-May	0.0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
Ne---------------- Newark	C	Common------	Brief-----	Dec-May	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Low.
NhA, NhB, NhC----- Nicholson	C	None--------	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	High-----	Moderate.
No---------------- Nolin	B	Common------	Brief-----	Dec-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
PmA, PmB, PmC----- Pembroke	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Pt.* Pits											
ReC, ReD, RmE3---- Riney	B	None---------	---	---	>6.0	---	---	>48	Rip-pable	Moderate	High.
Ro----------------- Robertsville	D	Common-------	Brief-----	Jan-Apr	0-1.0	Perched	Dec-May	>60	---	High------	High.
SaA, SaB---------- Sadler	C	None---------	---	---	1.5-2.0	Perched	Dec-Apr	>50	Hard	Moderate	High.
Sk----------------- Skidmore	B	Common-------	Very brief	Dec-May	3.0-4.0	Apparent	Dec-Mar	>40	Hard	Low-------	Moderate.
Ss----------------- Steff	C	Common-------	Brief-----	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	High.
St----------------- Stendal	C	Frequent-----	Brief-----	Dec-May	1.0-3.0	Apparent	Dec-May	>60	---	High------	High.
Ud.* Udorthents											
VeC---------------- Vertrees	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
WeB, WeC, WeD, WlC3, WlD3-------- Wellston	B	None---------	---	---	>6.0	---	---	>40	Hard	Moderate	High.
ZnB, ZnC, ZnC3---- Zanesville	C	None---------	---	---	2.0-3.0	Perched	Dec-Apr	40-80	Hard	Moderate	High.
Zu*: Zanesville--------	C	None---------	---	---	2.0-3.0	Perched	Dec-Apr	40-80	Hard	Moderate	High.
Gullied land.											

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

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS

[A dash indicates material was not detected. An asterisk indicates the determination was not made. TR indicates trace]

Soil name, report number, horizon,[1] and depth in inches	Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Int. IV Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Pct <2 mm											Pct	Pct	Pct
Baxter cherty silt loam: (73KY-24-6)														
A1-------- 0-5	10.5	76.4	13.6	0.7	0.9	1.3	3.7	3.5	6.6	79.8	Silt loam.	6.4	6.4	---
A2-------- 5-17	17.1	68.9	14.0	1.6	2.2	2.3	5.4	5.5	11.6	74.4	Silt loam.	39.8	3.0	36.8
B21t------17-22	12.9	55.1	31.9	0.8	1.0	1.5	4.4	5.2	7.7	60.4	Silty clay.	22.1	5.3	16.8
B22t------22-34	14.2	45.1	40.6	0.4	0.9	1.9	5.2	5.8	8.5	50.9	Silty clay, silty clay loam.	26.9	1.2	25.7
B22t------34-47	24.0	38.9	37.1	0.3	1.7	4.7	9.3	8.0	16.0	46.9	Clay loam.	1.3	0.4	0.9
B22t------47-60	20.2	39.2	40.6	0.2	0.8	2.0	5.8	11.4	8.8	50.6	Clay, clay loam.	8.4	3.3	5.1
B22t------60-75	14.6	39.4	46.1	0.2	0.7	1.6	5.0	7.1	7.5	46.4	Clay, silty clay.	29.9	2.4	27.5
B23t------75-86	5.0	59.3	35.6	0.1	0.9	0.5	1.7	2.6	2.5	61.9	Silty clay loam.	---	---	---
B24t------86-96	14.3	41.0	44.7	0.1	0.5	1.0	3.8	8.9	5.4	49.9	Silty clay, clay.	12.6	1.0	1.7
Caneyville silt loam: (73KY-24-1)														
Ap-------- 0-5	3.7	70.4	25.8	---	0.2	0.3	1.7	2.0	1.7	72.5	Silt loam.	---	---	---
B21t------ 5-11	2.3	51.0	46.7	0.1	0.2	0.1	0.6	1.4	1.0	52.4	Silty clay.	---	---	---
B21t------11-16	3.6	40.8	55.5	0.5	0.4	0.2	0.8	1.7	1.9	42.6	Silty clay, clay.	4.9	4.6	0.4
B22t------16-20	4.3	41.9	53.8	0.4	0.5	0.3	1.0	2.0	2.3	43.8	Silty clay, clay.	0.6	0.6	---
B22t------20-25	4.3	39.6	56.1	0.4	0.5	0.3	1.0	2.0	2.2	41.7	Clay, silty clay.	---	---	---
B23t------25-34	6.4	30.3	63.3	0.6	1.2	0.8	1.6	2.2	4.2	32.4	Clay.	---	---	---

See footnote at end of table.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Int. IV Clay (< 0.002)	Size class and particle diameter (mm): Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Pct <2 mm											Pct	Pct	Pct
Caneyville silt loam: (73KY-24-3)														
Ap-------- 0-6	9.2	68.2	22.6	0.1	0.2	0.4	4.4	4.2	5.0	72.3	Silt loam.	---	---	---
B21t------ 6-14	9.4	41.6	49.0	0.1	0.4	0.5	4.2	4.2	5.1	45.9	Silty clay, clay.	0.7	0.2	0.5
B22t------14-21	10.3	30.1	59.6	0.2	0.6	0.6	4.5	4.5	5.9	34.5	Clay.	0.5	0.5	---
B23t------21-28	10.4	33.1	56.4	0.3	1.1	0.8	4.0	4.2	6.2	37.4	Clay.	21.8	8.4	13.3
B3--------28-35	12.5	29.8	57.6	0.0	0.2	0.5	5.7	6.2	6.4	36.0	Clay.	0.8	---	0.8
Crider silt loam: (70KY-24-55)														
Ap-------- 0-11	6.3	76.3	17.4	TR	0.5	1.0	3.0	1.8	4.5	78.1	Silt loam.	*	*	*
B21t------11-16	3.6	69.1	27.3	TR	0.3	0.5	1.7	0.9	2.5	70.0	Silty clay loam.	*	*	*
B22t------16-23	4.4	68.5	27.1	0.1	0.4	0.7	2.1	1.1	3.3	69.6	Silty clay loam.	*	*	*
B23t------23-30	5.5	66.5	28.0	0.1	0.6	0.8	2.6	1.4	4.1	67.9	Silty clay loam.	*	*	*
												*	*	*
B24t------30-35	7.6	63.8	28.6	0.1	0.8	1.1	3.7	1.9	5.7	65.7	Silty clay loam.	*	*	*
B24t------35-42	10.0	59.8	30.2	0.1	1.2	1.5	4.8	2.4	7.6	62.2	Silty clay loam.	*	*	*
IIB25t----42-52	12.7	53.2	34.1	0.2	1.5	2.0	6.1	2.9	9.8	56.1	Silty clay loam.	*	*	*
IIB25t----52-62	13.2	49.0	37.8	0.2	1.6	1.9	6.5	3.0	10.2	52.0	Silty clay loam.	*	*	*
IIB26t----62-69	11.2	49.7	39.1	0.2	1.3	1.6	5.5	2.6	8.6	52.3	Silty clay loam.	*	*	*
IIB26t----69-85	11.1	40.4	48.5	0.5	2.2	1.9	4.3	2.2	8.9	42.6	Silty clay.	*	*	*

See footnote at end of table.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Int. IV Clay (<0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Pct <2 mm											Pct	Pct	Pct
Newark silt loam: (71KY-24-52)														
Ap-------- 0-9	1.7	76.7	21.5	TR	0.1	0.1	0.5	1.0	0.7	77.7	Silt loam.	*	*	*
B21------- 9-17	1.9	77.5	20.6	TR	0.1	0.1	0.4	1.3	0.6	78.8	Silt loam.	*	*	*
B22g------17-23	5.6	74.5	19.9	TR	0.1	0.3	1.1	4.1	1.5	78.6	Silt loam.	*	*	*
C1g-------23-36	3.6	75.2	21.2	TR	0.2	0.3	1.1	2.0	1.6	77.2	Silt loam.	*	*	*
C1g-------36-45	3.2	72.2	24.6	TR	0.2	0.2	1.0	1.8	1.4	74.0	Silt loam.	*	*	*
C1g-------45-55	2.6	71.4	26.3	---	0.1	0.2	0.6	1.4	0.9	72.8	Silt loam.	*	*	*
C2--------55-76	1.9	65.8	32.3	---	0.1	0.2	0.6	1.0	0.9	66.8	Silty clay loam.	*	*	*
Nolin silt loam: (71KY-24-50)														
Ap-------- 0-9	2.7	81.0	16.3	---	0.1	0.1	0.5	2.0	0.7	83.0	Silt loam.	*	*	*
B1-------- 9-16	4.7	75.6	19.7	TR	TR	0.1	0.9	3.7	1.0	79.3	Silt loam.	*	*	*
B21-------16-27	5.4	74.7	19.9	TR	TR	0.1	1.0	4.3	1.1	79.0	Silt loam.	*	*	*
B21-------27-36	8.2	71.4	20.4	---	TR	0.1	1.7	6.4	1.8	77.8	Silt loam.	*	*	*
B22-------36-45	11.3	69.3	19.4	---	0.1	0.2	2.8	8.2	3.1	77.5	Silt loam.	*	*	*
B22-------45-54	9.7	71.6	18.7	0.1	0.2	0.3	2.9	6.2	3.5	77.8	Silt loam.	*	*	*
B22-------54-63	11.0	69.3	19.7	0.1	0.2	0.6	4.2	5.9	5.1	75.2	Silt loam.	*	*	*

See footnote at end of table.

TABLE 17.--PHYSICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Int. IV Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	Coarse fragments: >2 mm	Coarse fragments: 2-19 mm	Coarse fragments: 19-76 mm
	Pct <2 mm											Pct	Pct	Pct
Zanesville silt loam: (70KY-24-57)														
Ap-------- 0-7	7.9	78.7	13.4	0.1	0.3	0.7	4.4	2.4	5.5	81.1	Silt loam.	*	*	*
B21t------ 7-11	5.4	72.3	22.3	TR	0.2	0.5	3.0	1.7	3.7	74.0	Silt loam.	*	*	*
B22t------11-19	6.2	67.6	26.2	TR	0.2	0.3	3.7	2.0	4.2	69.6	Silt loam.	*	*	*
B23t------19-24	9.5	64.1	26.4	---	0.2	0.4	5.8	3.1	6.4	67.2	Silt loam.	*	*	*
Bx--------24-30	11.8	55.9	32.3	0.2	0.2	0.6	6.7	4.1	7.7	60.0	Silty clay loam.	*	*	*
Bx--------30-36	18.4	57.9	23.7	0.2	0.4	0.8	11.5	5.5	12.9	63.4	Silt loam.	*	*	*
Bx--------36-42	15.6	52.2	32.2	0.1	0.2	0.6	10.2	4.5	11.1	56.7	Silty clay loam.	*	*	*
IIB24t----42-48	29.8	36.0	34.2	0.2	0.4	0.9	14.4	5.8	15.9	41.8	Clay.	*	*	*
IIB24t----48-59	31.2	39.2	29.6	0.2	0.3	1.0	20.9	8.8	22.4	48.0	Clay.	*	*	*
C---------59-75	36.6	34.0	29.4	0.1	0.3	1.1	25.5	9.6	27.0	43.6	Clay.	*	*	*
Zanesville silt loam: (70KY-24-58)														
Ap1------- 0-2	11.1	75.1	13.8	TR	0.2	1.0	6.1	3.8	7.3	78.9	Silt loam.	*	*	*
Ap2------- 2-7	10.9	74.6	14.5	0.1	0.2	1.0	5.8	3.8	6.0	78.7	Silt loam.	*	*	*
B21t------ 7-11	7.4	69.4	23.2	TR	0.2	0.7	3.8	2.7	6.1	72.1	Silt loam.	*	*	*
B22t------11-20	10.0	64.4	25.6	---	0.1	0.7	5.2	4.0	6.0	68.4	Silt loam.	*	*	*
Bx--------20-25	16.0	58.8	25.2	TR	0.1	1.0	8.5	6.4	9.6	65.2	Silt loam.	*	*	*
Bx--------25-35	25.4	52.2	22.4	0.1	0.1	1.7	13.3	10.2	15.2	62.4	Silt loam.	*	*	*
IIB23t----35-39	34.9	40.7	24.4	0.1	0.3	2.1	18.3	14.1	20.8	54.8	Loam.	*	*	*
IIB3t-----39-47	31.3	17.1	51.6	TR	0.2	2.7	14.7	13.7	17.6	30.8	Clay.	*	*	*
C&R-------47-55	19.2	13.2	67.6	TR	0.1	0.7	5.5	12.9	6.3	26.1	Clay.	*	*	*

[1] Some horizons, such as the B22t horizon in Baxter cherty silt loam, have been subdivided for sampling purposes.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOILS

[A dash indicates the element was not detected. An asterisk indicates the determination was not made. The symbol < means less than]

Soil name, report number, horizon,[1] and depth in inches	Reaction: H_2O (1:1)	Reaction: KCl 1N (1:1)	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable cations: TEC	Cation exchange capacity: Ammonium acetate	Cation exchange capacity: Sum of cations	Extractable acidity	Aluminum	Base saturation: Ammonium acetate	Base saturation: Sum of cations	Organic matter	Calcium carbonate equivalent	Phosphorus
	pH	pH	Milliequivalents per 100 grams of soil									Pct	Pct	Pct	Pct	ppm
Baxter cherty silt loam: (73KY-24-6)																
A1---------------- 0-5	6.5	6.3	8.3	2.5	0.4	0.5	11.6	15.4	27.0	15.4	---	75.6	43.1	7.0	0.2	67.5
A2---------------- 5-17	6.0	5.1	1.4	0.7	0.2	0.5	2.8	3.8	14.2	11.4	---	73.8	19.8	0.5	0.1	17.0
B21t-------------- 17-22	5.7	4.9	3.0	2.9	0.4	1.0	7.4	9.5	20.1	13.4	0.3	77.7	35.5	0.5	0.1	2.0
B22t-------------- 22-34	5.2	4.5	2.6	4.0	0.4	1.0	8.0	12.3	23.4	15.4	1.0	65.2	34.4	0.2	0.1	0.5
B22t-------------- 34-47	4.8	4.1	0.9	2.7	0.3	1.0	4.9	9.6	22.0	17.1	3.9	51.6	22.4	0.1	0.1	0.5
B22t-------------- 47-60	4.7	4.0	1.0	1.0	0.2	1.0	3.2	10.5	21.4	18.2	5.1	30.4	14.9	0.1	0.2	1.0
B22t-------------- 60-75	4.7	4.0	1.0	1.0	0.2	1.1	3.4	13.0	22.7	19.4	5.4	25.8	14.8	0.1	0.2	1.5
B23t-------------- 75-86	4.8	4.7	1.2	0.9	0.1	1.0	3.2	8.4	19.5	16.2	3.5	38.7	16.6	0.1	0.1	3.5
B3t--------------- 86-96	4.7	4.0	2.4	1.9	0.3	1.1	5.7	16.1	27.4	21.6	7.8	35.5	20.9	0.1	0.2	3.5
Caneyville silt loam: (73KY-24-1)																
Ap---------------- 0-5	5.0	4.5	7.2	2.0	0.7	0.6	10.4	16.1	26.7	16.2	---	64.8	39.1	3.2	0.7	19.0
B21t-------------- 5-11	5.6	4.8	13.2	3.8	1.0	1.2	19.2	26.3	35.2	15.9	---	73.2	54.7	0.9	0.2	3.5
B21t-------------- 11-16	5.0	3.7	13.6	3.7	1.2	1.1	19.6	34.0	42.7	23.1	2.8	57.8	46.0	0.6	0.2	0.5
B22t-------------- 16-20	4.8	3.6	14.1	3.4	1.0	1.2	19.7	34.4	41.6	21.9	2.7	57.2	47.3	0.5	0.2	<0.5
B22t-------------- 20-25	5.1	3.8	17.0	3.3	0.9	1.2	22.3	35.0	40.8	18.5	0.9	63.8	54.6	0.4	0.2	<0.5
B23t-------------- 25-34	6.1	5.5	28.9	3.7	0.7	1.3	34.6	42.7	48.8	14.2	---	81.0	70.8	0.6	0.3	<0.5

See footnote at end of table.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Reaction		Extractable cations					Cation exchange capacity		Extractable acidity	Aluminum	Base saturation		Organic matter	Calcium carbonate equivalent	Phosphorus
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	TEC	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations			
	pH	pH	Milliequivalents per 100 grams of soil									Pct	Pct	Pct	Pct	ppm
Caneyville silt loam: (73KY-24-3)																
Ap---------------- 0-6	5.2	4.2	5.2	1.1	0.2	0.5	7.1	11.2	22.2	15.1	0.7	63.9	32.1	1.5	0.2	2.0
B21t-------------- 6-14	5.2	3.8	11.2	2.6	0.3	1.1	15.2	24.7	37.2	21.9	2.5	61.7	41.0	0.7	0.2	<0.5
B22t-------------- 14-21	5.3	3.9	14.6	2.8	0.4	1.2	18.9	32.8	27.2	8.2	1.2	57.7	69.7	0.6	0.2	<0.5
B23t-------------- 21-28	7.2	6.2	23.2	3.5	0.4	1.2	28.2	33.5	39.9	11.6	---	84.2	70.8	0.7	1.9	<0.5
B3---------------- 28-35	7.5	6.5	13.5	3.4	0.4	1.2	18.4	31.3	28.3	9.9	---	58.7	65.0	0.3	1.1	<0.5
Crider silt loam: (70KY-24-55)																
Ap---------------- 0-11	6.3	5.3	5.5	0.9	0.4	0.0	6.8	9.5	7.9	1.1	*	71	86.4	2.3	*	24.0
B21t-------------- 11-16	6.9	5.9	5.5	0.6	0.2	0.1	6.4	9.4	10.4	4.0	*	67	61.5	0.8	*	4.0
B22t-------------- 16-23	6.9	6.0	6.2	0.7	0.3	0.1	7.2	11.2	11.0	3.7	*	64	66.1	0.5	*	2.0
B23t-------------- 23-30	7.0	6.0	6.0	0.5	0.2	0.1	6.8	11.7	11.4	4.6	*	58	59.9	0.4	*	3.0
B24t-------------- 30-35	7.0	5.9	6.2	0.9	0.2	0.1	7.5	12.1	12.3	4.8	*	61	60.7	0.4	*	3.0
B24t-------------- 35-42	5.9	4.6	5.0	1.6	0.2	0.1	6.8	12.0	*	*	*	56	*	0.3	*	3.0
IIB25t------------ 42-52	5.4	4.1	4.6	1.5	0.2	0.1	6.4	13.4	15.3	8.8	*	47	42.1	0.2	*	2.0
IIB25t------------ 52-62	5.2	4.0	4.2	1.1	0.2	0.1	5.7	14.2	15.4	9.7	*	40	36.9	0.2	*	2.0
IIB26t------------ 62-69	5.2	3.8	4.4	1.2	0.2	0.1	5.9	14.7	16.2	10.3	*	40	36.5	0.2	*	2.0
IIB26t------------ 69-85	5.2	3.9	6.2	1.8	0.3	0.1	8.5	18.8	20.5	12.0	*	45	41.4	0.3	*	1.0

See footnote at end of table.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Reaction		Extractable cations					Cation exchange capacity		Extractable acidity	Aluminum	Base saturation		Organic matter	Calcium carbonate equivalent	Phosphorus
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	TEC	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations			
	pH	pH	-----------Milliequivalents per 100 grams of soil----									Pct	Pct	Pct	Pct	ppm
Newark silt loam: (71KY-24-52)																
Ap---------------- 0-9	6.2	5.2	16.0	1.0	0.8	0.0	17.8	16.7	*	*	*	106	*	1.6	0.1	3.0
B21--------------- 9-17	5.8	4.7	15.5	0.9	0.9	0.0	17.3	15.2	*	*	*	114	*	1.1	0.1	2.0
B22g-------------- 17-23	5.5	4.3	16.0	0.7	0.9	0.0	17.6	16.7	*	*	*	106	*	1.0	0.1	2.0
B22g-------------- 23-36	5.5	4.1	15.6	0.7	0.8	0.0	17.1	11.9	*	*	*	143	*	0.8	0.2	3.0
C1g--------------- 36-45	5.4	4.0	10.5	1.3	0.8	0.0	12.6	12.0	*	*	*	105	*	0.6	0.2	2.5
C1g--------------- 45-55	5.3	3.8	13.4	1.2	0.9	0.0	15.5	14.2	*	*	*	109	*	0.6	0.1	3.5
C2---------------- 55-76	5.3	3.9	17.0	1.0	1.2	0.0	19.2	17.0	*	*	*	113	*	0.6	0.1	3.5
Nolin silt loam: (71KY-24-50)																
Ap---------------- 0-9	6.1	5.0	10.6	0.5	0.8	TR	11.9	8.1	*	*	*	147	*	1.6	0.2	3.0
B1---------------- 9-16	5.6	4.3	7.4	0.5	0.5	TR	8.5	7.3	*	*	*	116	*	0.7	0.1	2.5
B21--------------- 16-27	5.3	4.0	6.1	0.4	0.5	TR	7.0	7.0	*	*	*	100	*	0.5	0.2	3.0
B21--------------- 27-36	5.2	3.9	6.8	0.6	0.5	TR	7.9	7.0	*	*	*	112	*	0.3	0.1	2.0
B22--------------- 36-45	5.3	4.0	7.9	0.6	0.6	TR	9.0	7.2	*	*	*	126	*	0.2	0.2	12.5
B22--------------- 45-54	5.5	4.1	10.2	0.6	0.6	TR	11.4	9.0	*	*	*	128	*	0.2	0.1	17.5
B22--------------- 54-63	5.5	4.0	12.0	1.2	1.0	TR	14.3	11.1	*	*	*	129	*	0.2	0.2	22.0

See footnote at end of table.

TABLE 18.--CHEMICAL ANALYSIS OF SELECTED SOILS--Continued

Soil name, report number, horizon,[1] and depth in inches	Reaction		Extractable cations					Cation exchange capacity		Extractable acidity	Aluminum	Base saturation		Organic matter	Calcium carbonate equivalent	Phosphorus
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	TEC	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations			
	pH	pH	-----------Milliequivalents per 100 grams of soil----									Pct	Pct	Pct	Pct	ppm
Zanesville silt loam: (70KY-24-57)																
Ap----------------- 0-7	6.9	5.8	5.2	0.4	0.1	0.0	5.9	7.4	9.0	3.2	*	80	65.1	1.9	*	*
B21t--------------- 7-11	5.2	3.9	3.5	1.7	0.2	0.0	5.4	9.4	12.6	7.2	*	57	43.1	0.7	*	*
B22t--------------- 11-19	5.2	3.9	2.0	3.3	0.2	0.0	5.5	12.5	17.2	11.7	*	43	31.9	0.6	*	*
B23t--------------- 19-24	5.2	3.9	1.0	3.8	0.2	0.0	5.0	13.6	18.1	13.1	*	36	27.5	0.3	*	*
Bx----------------- 24-30	5.3	3.6	1.5	6.7	0.2	0.2	8.6	17.8	23.4	14.8	*	48	36.7	0.3	*	*
Bx----------------- 30-36	5.1	3.5	0.3	4.2	0.1	0.2	4.8	13.1	16.3	11.4	*	46	29.7	0.1	*	*
Bx----------------- 36-42	5.0	3.4	0.6	7.0	0.1	0.3	8.1	17.4	22.4	14.3	*	46	36.1	0.1	*	*
IIB24t------------- 42-48	5.3	3.5	0.8	6.6	0.1	0.4	7.8	17.6	21.3	13.4	*	44	36.8	0.1	*	*
IIB24t------------- 48-59	5.5	3.5	0.8	6.0	0.1	0.3	7.2	13.7	16.9	9.7	*	52	42.6	0.1	*	*
IIC---------------- 59-75	5.7	3.6	0.8	6.6	0.1	0.3	7.7	13.1	16.9	9.1	*	59	45.9	0.1	*	*
Zanesville silt loam: (70KY-24-58)																
Ap1---------------- 0-2	5.8	4.6	3.0	0.9	0.5	0.0	4.4	8.0	8.7	4.3	*	55	51.0	2.9	*	9.0
Ap2---------------- 2-7	6.2	5.0	4.1	0.8	0.2	0.0	5.2	7.0	11.8	6.6	*	74	44.3	1.4	*	9.0
B21t--------------- 7-11	6.2	4.8	1.5	1.3	0.2	0.0	3.0	9.7	8.4	5.4	*	30	35.6	0.6	*	3.0
B22t--------------- 11-20	5.2	3.8	1.5	3.0	0.2	0.0	4.8	12.5	16.8	12.0	*	38	28.6	0.3	*	5.0
Bx----------------- 20-25	5.4	3.6	0.8	5.5	0.2	0.2	6.6	14.6	18.9	12.3	*	45	35.0	0.2	*	2.0
Bx----------------- 25-35	5.4	3.6	0.8	5.5	0.1	0.3	6.6	13.0	16.6	10.0	*	50	39.8	0.1	*	2.0
IIB23t------------- 35-39	5.3	3.6	1.2	6.6	0.1	0.4	8.3	14.2	18.9	10.6	*	58	44.0	0.1	*	2.0
IIB3t-------------- 39-47	5.0	3.4	3.0	19.6	0.3	1.0	23.9	30.6	41.0	17.1	*	78	58.2	0.2	*	2.0
C&R---------------- 47-55	5.1	3.2	4.0	25.7	0.4	1.3	31.4	42.6	52.0	20.6	*	73	60.4	0.2	*	5.0

[1]Some horizons, such as the B22t horizon in Baxter cherty silt loam were subdivided for sampling.

TABLE 19.--ENGINEERING TEST DATA

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution: Percentage passing sieve--				Percentage smaller than--			Liquid limit	Plasticity index	Moisture density		California bearing ratio		Specific gravity
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Maximum dry density	Optimum moisture	Soaked	Unsoaked	
										Pct		Lb/ft^3	Pct			
Baxter cherty silt loam: (68KY-24-1)																
B21t---------11-27	A-7-6(18)	CL	*95	85	84	74	63	51	46	44	26	99	23	17	9	2.70
B22t---------27-35	A-7-6(18)	CL	**95	88	86	69	54	46	40	45	29	102	21	13	11	2.70
B23t---------35-103	A-7-6(16)	CL	*93	74	72	66	37	59	53	49	23	98	24	10	7	2.71
Crider silt loam: (68KY-24-5)																
IIB22t-------31-61	A-6(20)	CL	100	100	99	97	73	40	35	36	21	110	17	35	18	2.64
IIB23t-------61-102	A-7-6(26)	CL	100	100	100	96	74	45	40	42	26	107	18	33	15	2.70
Lawrence silt loam: (68KY-24-8)																
B2t---------- 8-16	A-6(11)	CL	100	100	98	96	71	31	23	29	13	112	17			2.73
Bx2----------28-61	A-7-6(22)	CL	100	100	98	96	73	41	34	42	20	109	18	16	7	2.69
Nicholson silt loam: (68KY-24-2)																
B21t---------14-23	A-6(21)	CL	100	100	99	96	74	39	31	39	18	104	17	30	15	2.70
B22t---------23-60	A-6(14)	CL	100	100	99	92	70	36	29	34	16	106	18	15	13	2.69
IIB23t-------60-70	A-6(16)	CL	100	100	99	92	70	37	29	34	18	110	17	23	17	2.68
Pembroke silt loam: (68KY-24-3)																
B22t---------21-31	A-7-6(23)	CL	100	100	99	96	75	42	34	42	23	105	18	17	12	2.59
B24t---------55-93	A-6(20)	CL	100	100	99	90	73	45	40	40	22	105	19	16	11	2.66

See footnotes at end of table.

TABLE 19.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification: AASHTO	Classification: Unified	Grain size distribution, Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: .02 mm	.005 mm	.002 mm	Liquid limit	Plasticity index	Moisture density: Maximum dry density	Optimum moisture	California bearing ratio: Soaked	Un-soaked	Specific gravity
										Pct		Lb/ft^3	Pct			
Sadler silt loam: (69KY-24-9)																
B2t---------- 8-20	A-6(18)	CL	100	100	99	96	76	36	23	36	21	105	18	36	23	2.66
IIBx---------24-56	A-6(7)	CL	100	100	100	84	55	28	23	27	16	105	14	40	16	2.63
Vertrees silt (68KY-24-6)																
B21t--------- 8-19	A-7-6(27)	CL	100	100	99	96	72	48	40	46	26	106	19	18	9	2.83
B22t---------19-72	A-7-6(28)	CL	100	100	99	94	74	51	42	47	28	109	19	22	13	2.74

* Ninty-seven percent of material passed the 1 1/2 inch sieve.
** Ninty-eight percent of material passed the 1 1/2 inch sieve.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Baxter	Fine, mixed, mesic Typic Paleudalfs
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
Cuba	Fine-silty, mixed, mesic Fluventic Dystrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Dunning	Fine, mixed, mesic Fluvaquentic Haplaquolls
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Fredonia	Fine, mixed, mesic Typic Hapludalfs
Frondorf*	Fine-loamy, mixed, mesic Ultic Hapludalfs
Hammack	Fine-silty, mixed, mesic Glossic Paleudalfs
Henshaw	Fine-silty, mixed, mesic Aquic Hapludalfs
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Pembroke	Fine-silty, mixed, mesic Mollic Paleudalfs
Riney	Fine-loamy, siliceous, mesic Typic Hapludults
Robertsville	Fine-silty, mixed, mesic Typic Fragiaqualfs
Sadler	Fine-silty, mixed, mesic Glossic Fragiudalfs
Skidmore	Loamy-skeletal, mixed, mesic Dystric Fluventic Eutrochrepts
Steff	Fine-silty, mixed, mesic Fluvaquentic Dystrochrepts
Stendal	Fine-silty, mixed, acid, mesic Aeric Fluvaquents
Vertrees	Fine, mixed, mesic Typic Paleudalfs
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs

*The Frondorf soils in Christian County are taxadjuncts. See the description of the Frondorf series for an explanation of characteristics that are outside the range of the series.

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