SOIL SURVEY

Jefferson County Kentucky

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
KENTUCKY AGRICULTURAL EXPERIMENT STATION

HOW TO USE THIS SOIL SURVEY REPORT

THIS SOIL SURVEY of Jefferson County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide favorable yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid managers of forests and woodland; add to soil scientists' knowledge of soils; and help bankers, prospective buyers, and others in appraising a farm or other tract.

Locating the Soils

At the back of this report is an index map and a soil map consisting of many sheets. On the index map are rectangles numbered to correspond to the sheets of the soil map so that the sheet showing any area can be located easily. On each map sheet, the soil boundaries are outlined and there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where it belongs. For example, an area on the map has the symbol Pd. The legend for the set of maps shows that this symbol identifies Purdy silt loam. That soil and all others mapped in the county are described in the section "Descriptions of the Soils."

Finding Information

In the "Guide to Mapping Units," at the back of this report, each soil is listed in the alphabetic order of its map symbol. This guide gives the page where each soil is described, and the page of the capability unit, woodland suitability group, and wildlife group in which the soil has been placed. It also shows where to find the acreage of each soil, the yields that can be expected, and information about engineering uses of the soils.

Farmers and those who work with farmers can learn about the soils on a farm by reading the description of each soil and of its capability unit and other groupings. A convenient way of doing this is to turn to the soil map and list the soil symbols of a farm and then to use the "Guide to Mapping Units" in finding the pages where each soil and its groupings are described.

Foresters and others interested in woodland can refer to the section "Use of the Soils for Woodland." In that section the soils in the county are placed in groups according to their suitability for trees, and the management of each group is discussed.

Game managers, sportsmen, and others concerned with wildlife will find information about the main kinds of wildlife and their food and cover in the section "Management of the Soils for Wildlife."

Engineers and builders will find in the section "Engineering Applications" tables that give engineering descriptions of the soils in the county; name soil features that affect engineering practices and structures; and rate the soils according to their suitability for several kinds of work.

Community planners and others concerned with suburban development can learn about the soil characteristics that affect the choice of homesites, industrial sites, schools, and parks in the section "Nonagricultural Uses of the Soils."

Scientists and others who are interested can read about how the soils were formed and how they were classified in the section "Formation, Morphology, and Classification of the Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Newcomers in Jefferson County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information about the county.

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Fieldwork for this survey was completed in 1962. Unless otherwise indicated, all statements in the report refer to conditions in the county at the time the survey was in progress. The soil survey of Jefferson County was made as part of the technical assistance furnished by the Soil Conservation Service to the Jefferson County Soil Conservation District.

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Contents

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SOIL SURVEY OF JEFFERSON COUNTY, KENTUCKY

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UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

JEFFERSON COUNTY is on the north-central edge of Kentucky next to the Ohio River (fig. 1). The county occupies an area of 240,000 acres. Some of the urban areas in the county are Louisville, Middletown, Jeffersontown, Shively, Okolona, Valley Station, Anchorage, and Buechel.

How This Soil Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Jefferson County, where they are located, and how they can be used. They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; 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 that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

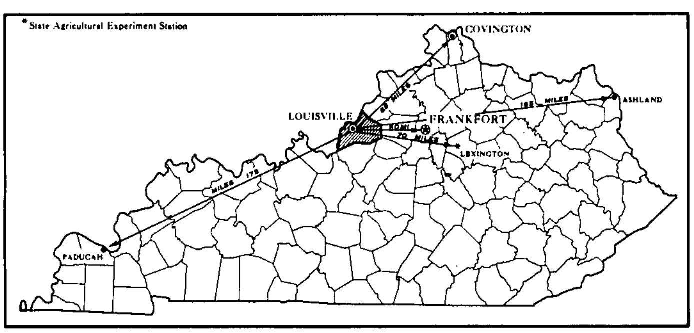

Figure 1.—Location of Jefferson County in Kentucky.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important distinguishing characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Crider and Huntington, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in natural characteristics.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Huntington fine sandy loam and Huntington silt loam are two soil types in the Huntington series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Crider silt loam, 2 to 6 percent slopes, is one of several phases of Crider silt loam, a soil type that ranges from level and nearly level to moderately steep.

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

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where two or more kinds of soils occur in such an intricate pattern and in individual areas so small in size that they cannot be shown separately on the soil map. Therefore, such areas are shown as one mapping unit and are called a complex. Ordinarily, a complex is named for the major kinds of soil in it, for example, Westmoreland-Litz-Muskingum complex. Also, on most soil maps, areas are shown that are so rocky, so shallow, so frequently worked by wind and water, or so disturbed by man that they are not identifiable as soils. These areas are given descriptive names, such as Gullied land or Rock land. This kind of mapping unit is called a land type.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil survey reports. On basis of the yield and practice tables and other data, the soil scientists set up trial groups, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of soils and their behavior under present methods of use and management.

General Soil Map

Obvious differences in the landscape can be seen as one travels across the county. One notes that the steepness of slopes varies from place to place, as does the width of ridges and of valleys. Also, one sees related differences in the proportions of cultivated crops, pasture, and woodland.

After observing and studying these differences in the landscape, it is possible to make a general soil map that shows several patterns of soils, or soil associations. A group of geographically related soils that form a fairly definite pattern is called a soil association. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns consisting of several different kinds of soil. Each soil association, as a rule, contains a few major soils and several minor soils. It is named for the major soils. The major soils of one association may be present in other associations, but in a different pattern.

The two or three major soils in any one association are likely to differ from each other in slope, depth, stoniness, natural drainage, or in other respects. For example, in the Beasley-Fairmount-Russellville association of this county, the Beasley soils are deep and generally occur on moderately wide, gently sloping ridges; the Fairmount soils are shallow and occur on the adjacent steeper side slopes; and the Russellville soils are shallow and are on gently sloping or sloping ridges.

The general soil map is useful to people who want general information of the soils in the county, who want to compare different parts of the county, or who want to locate large areas suitable for a certain kind of farming or other land use.

Described in the pages following, and shown on the colored map at the back of this report, are the seven soil associations in Jefferson County.

1. *Wheeling-Weinbach-Huntington association*

Level to sloping soils on terraces and bottoms along the Ohio River

This association is in the Ohio Valley. It consists of very broad, nearly level ridges that have narrow side slopes running down to the bottoms along small branches. These branches are mostly parallel to the Ohio River and form a dominant drainage pattern. This association thus consists of long narrow strips that are parallel to the drainage system. Most of the gently sloping or sloping areas are well drained, and the level or nearly level areas are mostly moderately well drained or somewhat poorly drained. This association ranges from half a mile wide along the northern edge of the county to more than 4 miles wide on the western side. The total acreage is about 14 percent of the county.

Wheeling, Weinbach, and Huntington soils each cover about 25 percent of this association. Newark soils cover 10 percent, and the other minor soils about 15 percent. Wheeling soils are deep, well-drained soils on terraces. Normally they have a surface layer of brown, friable silt loam and a subsoil of yellowish-brown silty clay loam. Weinbach soils are moderately deep, somewhat poorly drained soils on terraces. Generally they have a surface layer of grayish-brown silt loam and a subsoil of brown silty clay loam mottled with gray. Huntington soils are deep, well-drained soils on bottoms. Generally they have both a surface layer and a subsoil of dark-brown silt loam. All of these soils developed in mixed alluvium that washed from the upper part of the Ohio River drainage basin. All are underlain by stratified sand, silt, and clay, in places mixed with gravel below a depth of 4 to 8 feet.

Minor soils in this association are the moderately well drained Sciotoville soils on terraces, the poorly drained Ginat soils, also on terraces, and the moderately well drained to poorly drained Lindside, Newark, and Melvin soils on bottoms. Also in this association is the very deep Lakin loamy fine sand, which is the principal sandy soil in the area. This soil occurs mainly in hummocky places near the base of hills on the eastern edge of the valley.

Much of this association is productive cropland (fig. 2). There are a few small woodlots, mostly on the poorly drained soils. Dairy farms include considerable pasture. Suburban developments are rapidly spreading in this association. Already, subdivisions made up of a few hundred to several hundred houses are scattered throughout this area. Idle fields are intermingled with the subdivisions. These fields are farmed occasionally, but for the most part they are overgrown with weeds and are held by investors.

Figure 2.—**Air view of the Ohio Valley southwest of Louisville. Soils here generally are cropped intensively, especially the well-drained Wheeling and Huntington soils. (Courtesy of Billy Davis, Louisville Times.)**

Many part-time farmers live on small acreages. Most of their income comes from employment in the city. The full-time farmers are engaged in dairying, truck gardening, or general farming. The main crops are corn, soybeans, hay, and vegetable crops.

More than half of Louisville is in this association. Among the urban developments in the valley section are schools, churches, drive-in theaters, trailer courts, and shopping centers. Dixie Highway, U.S. No. 31W, runs through the western edge of the valley. Many businesses, especially motels, restaurants, and various types of stores, line this highway from Louisville to Valley Station. Urban expansion probably will continue. Parks, playgrounds, and other recreational areas will be in demand.

Several large industries are located in this association, most of them in the area just southwest of the Louisville city limits and along the Ohio River.

Salable soil materials, such as topsoil and sand, are obtained at several places in this association.

2. *Memphis-Loring-Zanesville association*

Sloping to steep soils on loess-capped hills of sandstone and shale

This association consists of sloping to steep, sandstone and shale hills that have narrow ridges. The valleys are narrow, and the streams are small. A silt mantle covers most of the area and is thickest on the gently sloping ridges. In places adjacent to the Ohio Valley the silt is 6 feet or more thick, and even on some of the steepest slopes it is 4 feet thick. The total acreage of this association is about 3 percent of the county.

Memphis soils cover about 35 percent of this association, Loring soils 25 percent, Zanesville soils 20 percent, and the minor soils 20 percent. Memphis soils, which are on the sloping to steep hillsides, are deep and well drained. Normally their surface layer is brown silt loam and their subsoil is reddish-brown silty clay loam. Loring soils are moderately well drained or well drained. They developed in deposits of loess more than 42 inches deep, on the gently sloping or sloping ridges. Zanesville soils are similar to Loring soils, except that they normally are on foot slopes and have sandstone and shale residuum at a depth of 30 to 42 inches. Both the Zanesville and Loring soils have a surface layer of brown, friable silt loam. The upper part of their subsoil is yellowish-brown to reddish-brown light silty clay loam, and the lower part is mottled yellowish-brown and grayish-brown, compact silty clay loam. Figure 3, p. 4, shows the Memphis, Loring, and Zanesville soils as they occur in this association.

Minor soils in this association are the shallow Rockcastle soils in the steep areas and the soils of the Huntington catena on bottom lands.

This association is mostly in hardwood forest. Generally, only the ridges and valleys are cleared. The northern part is within the city limits of Louisville. Houses and small lots line the roads that cross this area. Some small subdivisions extend into the steeper hillsides. There are some part-time farmers but only a few full-time farmers. The farms are either truck farms or small general farms. Both the city and the county own tracts of land in this association.

Much of this association is not suitable for cultivation. The wooded areas, for the most part, are best left in forest. Some parts of this association, especially the deeper loess areas, are suitable as homesites, and others are suitable as wooded parks, trails, or bridle paths, or could be used for other recreational purposes. The steep slopes limit industrial use.

3. *Zipp-Robertsville association*

Poorly drained soils of the slack-water flats

This association consists of broad, poorly drained flats in a slack-water area that is dissected by two large drainage ditches and several small ones. This association also includes a few gently sloping or sloping terraces. Most of the soils developed in alkaline silty clay or clay that originally settled from an old slack-water lake. A more recent overwash of silt loam rims the areas near the older streams and ditches. This association extends from Standiford Field to the foot slopes of the Knob Hills and from Newburg to Third Street Road. The northern edge is within the city limits of Louisville. The total acreage is about 11 percent of the county.

Zipp soils cover 55 percent of this association, Robertsville soils 20 percent, and the minor soils 25 percent. Zipp soils are deep and poorly drained. They are in the slack-water area. Normally they have a surface layer of dark-gray silty clay and a subsoil of mottled gray and brown, calcareous clay. Surface drainage and permeability are very slow. Robertsville soils also are deep and poorly drained. They are on terraces. Generally they have a surface layer of grayish-brown silt loam and a subsoil of mottled gray, brownish-gray, and yellowish-brown silty

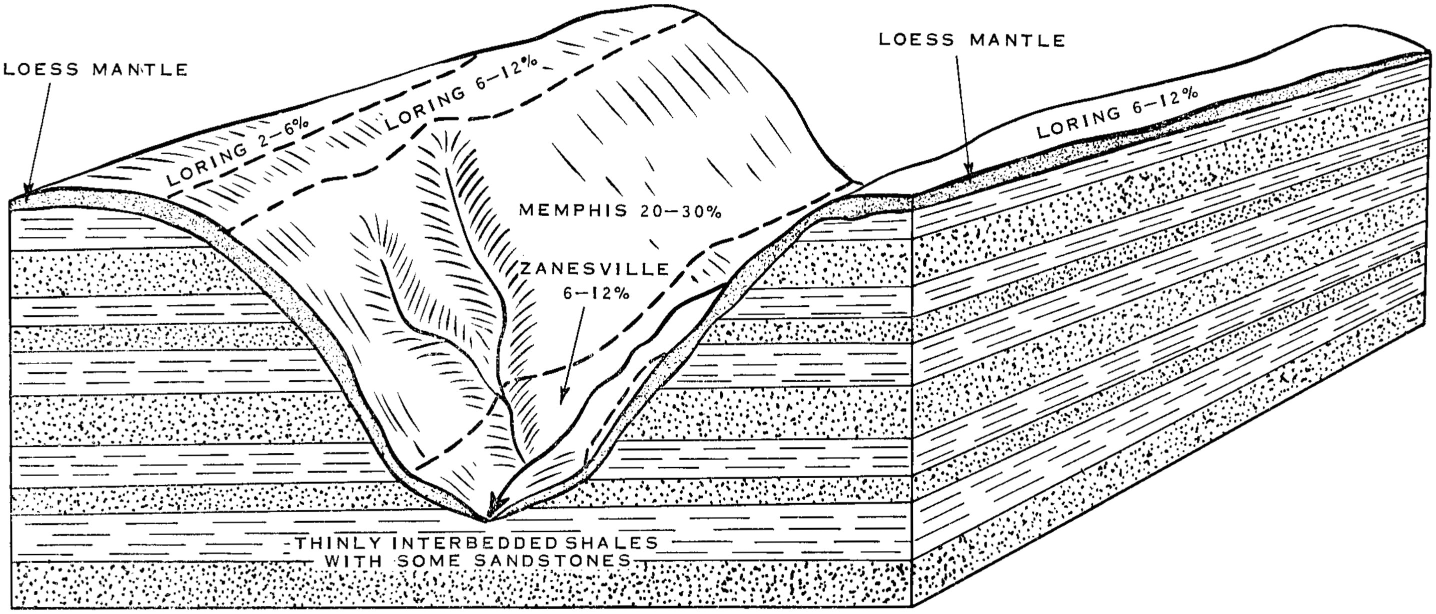

Figure 3.—Diagram showing general parent material, position, and pattern of dominant soils in the Memphis-Loring-Zanesville association.

clay loam. They have a compact fragipan at a depth of 16 to 18 inches.

Minor soils in this association are the poorly drained to moderately well drained McGary and Markland soils. These soils formed on terraces in heavy alkaline alluvium. Also in this association is an overwash phase of Zipp soils. These soils have a recent 8- to 20-inch deposit of silt loam over their normal profile.

This association generally is not well suited to suburban development; nevertheless, a considerable part is now occupied by small and large industries and by subdivisions. Private houses line all the county roads. Extending city sewage lines and extending and deepening drainage ditches would increase the potential for industrial use and for subdivision development.

Considerable acreage is in woods. The woodlots, which are between 100 and 300 acres in size, are in the wettest areas and are covered with water during much of the year.

A large acreage is idle, and most of this acreage is near subdivisions and industrial plants. Some idle areas are farmed occasionally.

Many part-time farmers and a few full-time farmers live in this association. Soybeans (fig. 4), hay, and some corn are grown. Cropping is risky because of the hazard of overflow and the poor drainage. Yields can be increased by installing a tile drainage system and constructing open ditches.

4. *Westmoreland-Litz-Muskingum association*

Steep, shallow soils on the Knob Hills and sloping, colluvial soils on foot slopes

This association consists of narrow gently sloping ridges, steep side slopes, and narrow valleys. It is a highly dissected area. Some ridges rise 350 to 400 feet above the valley floor. The long, steep slopes cross geologic formations of shale, sandstone, and limestone (fig. 5). Shale is dominant along the lower part of the slope, sandstone along the middle part, and limestone along the upper part. The soils that overlie these formations occur as parallel strips across the slopes. The total acreage of this association is 5 percent of the county.

Westmoreland, Litz, and Muskingum soils, which are mapped as a complex in Jefferson County, cover about 45 percent of this association. They are on the steep slopes and, for the most part, are shallow to bedrock. Zanesville soils cover 25 percent of this association, and the other minor soils cover about 30 percent.

Zanesville soils are on most of the foot slopes. Normally they have a surface layer of brown, friable silt loam and a subsoil of brown or yellowish-brown silty clay loam. They have a compact layer at a depth of 24 to 38 inches.

Among the other minor soils are Loring and Rockcastle soils. Loring soils are on some of the gently sloping

Figure 4.—View of the broad, flat area of slack-water deposits just west of Okolona. A field of soybeans is in the foreground. Zipp soils and other fine-textured, poorly drained soils in this area are well suited to soybeans.

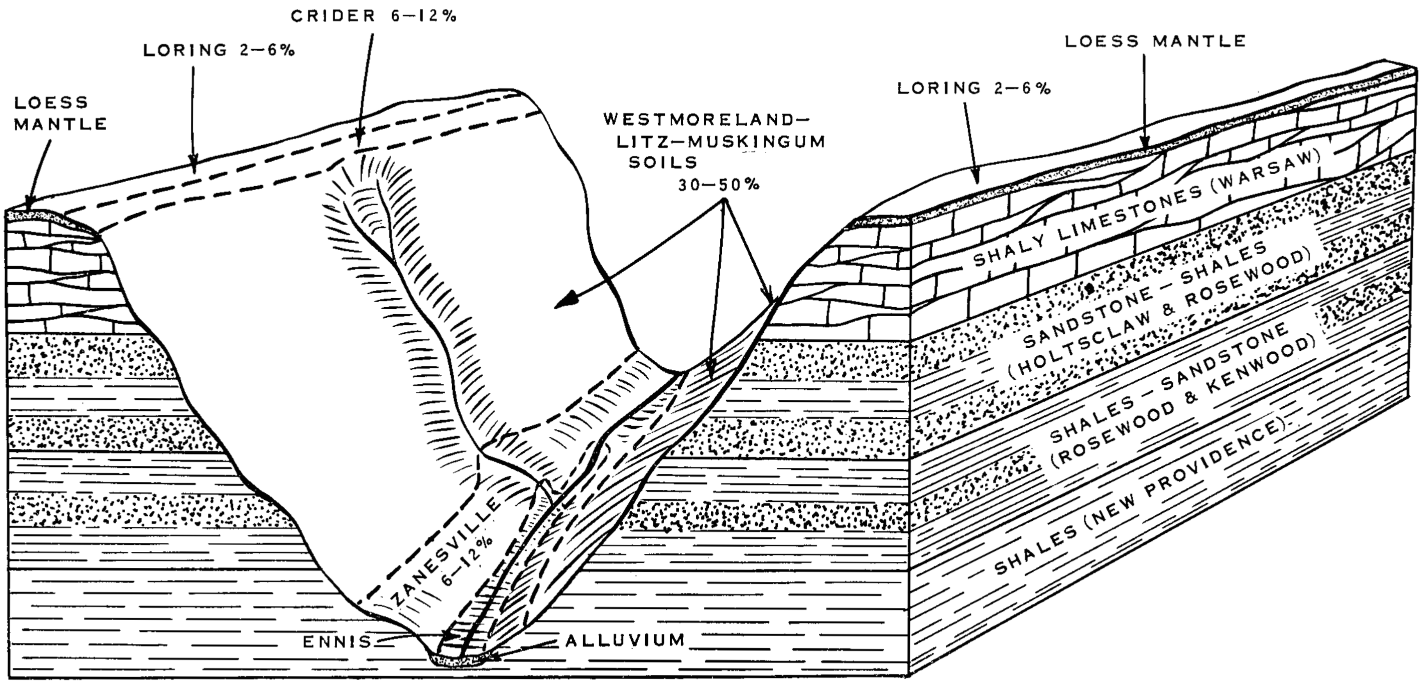

Figure 5.—**Diagram showing general parent material, position, and pattern of soils in the Westmoreland-Litz-Muskingum association.**

ridges. These moderately well drained or well drained soils have characteristics similar to those of Zanesville soils, but they developed in more than 42 inches of loess overlying cherty limestone residuum. Rockcastle soils are on a few of the steeper slopes. They have a surface layer of grayish-brown silt loam and a subsoil of variegated gray and olive-brown silty clay or clay. They developed in residuum derived from acid clay shale.

Nearly all of this association is forested with hardwoods and is under the control of the county (fig. 6). Some areas have been cleared, and most of these are used for pasture or hay. Houses, lots, and some small farms line the roads. Very few full-time farmers are in this association.

Areas that are suitable for cultivation are limited, but some of the ridges can be used for orchard crops. Wooded areas, for the most part, are best left in forest. Some gently sloping or sloping areas are suitable homesites. Other areas could be developed as wooded parks or picnic grounds, or could be used for other recreational purposes.

5. *Russellville-Crider-Dickson association*

Well drained or moderately well drained soils over limestone on uplands

This association consists of nearly level to sloping, wide ridges and strongly sloping, short side slopes (fig. 7, p. 6). There is an abundance of small, short streams and branches, most of which have only narrow bottoms. Nearly all of the streams flow southward. Small ponds dot the area. This association occupies the extreme south-central part of the county. It extends from Fern Creek to the Bullitt County line. The total acreage is about 10 percent of the county.

Russellville soils cover about 35 percent of this association, Crider soils 30 percent, Dickson soils 15 percent, and the minor soils 20 percent. Russellville soils are extensive on gently sloping ridges but also occur on nearly level ones. They are well drained or moderately well drained. Normally their surface layer is friable silt loam. The upper part of their subsoil is brown silty clay loam, and the lower part is mottled grayish-brown and brown silty clay loam. A compact fragipan is at a depth of 30 to 36 inches. Crider soils are on gently sloping ridges and on strongly sloping side slopes. They are well drained. Normally their surface layer is dark-brown silt loam and their subsoil is reddish-brown silty clay loam. Dickson soils are mostly on nearly level ridges. They are moderately well drained.

Figure 6.—**View of the Knob Hills area, which is at the extreme southwestern edge of the county. Nearly all of this area is forested. The houses and small farms are mostly on the foot slopes or ridges. Westmoreland, Litz, and Muskingum soils are dominant; they are shallow, and their slope range is 30 to 50 percent.**

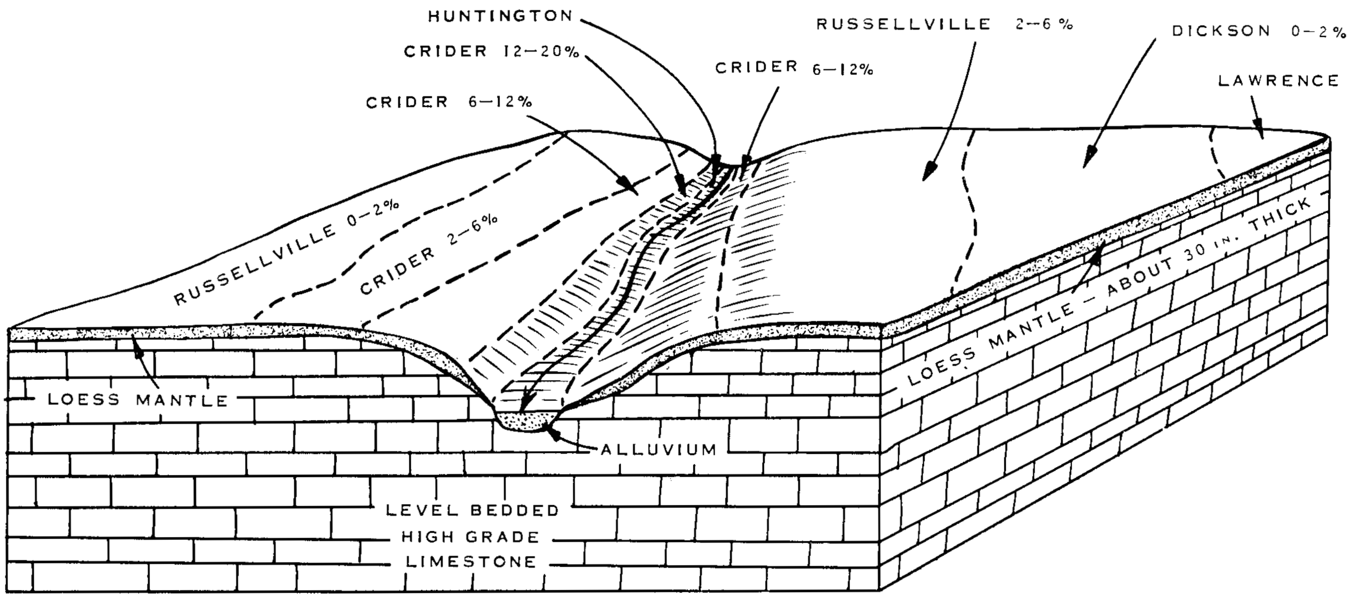

***Figure 7.*—Diagram showing the general parent material and the position and pattern of soils in the Russellville-Crider-Dickson association.**

Minor soils in this association are the somewhat poorly drained Lawrence soils and the poorly drained Guthrie soils on nearly level ridges and the well-drained Corydon soils on the most strongly sloping side slopes.

Most of this association has been cleared and is used for agriculture. There are small strips of woods on the stronger slopes along the streams and some wooded areas on the wettest soils of the broader ridges. Houses line all the major roads, and subdivisions are scattered throughout the area. Considerable acreage is idle, and most of this acreage is around residential areas. A few rock quarries are in this association, for the limestone bedrock is suitable for many uses.

A large number of part-time farmers are in this association. Farms, on the average, are between 40 and 50 acres in size, and most of the acreage is used for hay and pasture. Some of the acreage, mostly small fields, is used for corn, small grain, and soybeans.

The main limitations are erosion in the sloping and strongly sloping areas and wetness in the nearly level and gently sloping areas. The use of septic disposal units is limited on Russellville soils because the fragipan in these soils causes them to be slowly permeable. Some of the steeper wooded areas could be developed for recreational uses.

6. *Crider-Corydon association*

Level to sloping soils on broad ridges and steep, shallow soils over limestone on hillsides

This association consists of level to sloping, broad ridges and steep, short side slopes (fig. 8). The topography is irregular and is karstlike in many places. The side slopes occur mainly as bluffs in the northern part of this association; along Harrods Creek, Goose Creek, and Muddy Fork; and along the main tributaries of these streams. Nearly all of the streams flow northward to the Ohio River. This association extends from Louisville to Middletown and from Fern Creek to the Oldham County line. The total acreage is about 36 percent of the county.

Crider soils cover about 70 percent of this association, and Corydon soils 15 percent. The minor soils cover about 15 percent. Crider soils are deep, well drained, and productive. Normally they have a surface layer of dark-brown silt loam and a subsoil of reddish-brown silty clay loam. Corydon soils are shallow to limestone bedrock. Outcrops cover from 5 to 25 percent of their surface.

Russellville and Dickson soils are minor soils in this association. Generally they occur on the most nearly level parts of the widest ridges. Huntington soils also are minor soils. They occur as long strips on the narrow bottoms along the streams.

The largest farms in the county are in this association, which is made up of excellent agricultural soils. Many farms are between 200 and 300 acres in size. More full-time farmers live in this area than in any other in the county. General farming is most common, although there are several large beef-cattle farms and dairy farms. Nearly all of the level to sloping soils are cultivated or are in pasture (fig. 9). They produce high yields of corn, alfalfa, small grain, and tobacco. The steeper soils, especially those on shallow or rocky slopes, are wooded. Little of the acreage is idle.

Many estates and large residences are in the vicinity of Anchorage and on the bluffs near the Ohio Valley. Urban expansion has been rapid in the western part of this association. The extreme western edge lies within the city limits of Louisville.

Most of this association is suitable for residential development. The bluff area near the Ohio Valley is especially well suited to recreational and park development. Most of the underlying limestone is potential quarry rock. A large rock quarry is in the area.

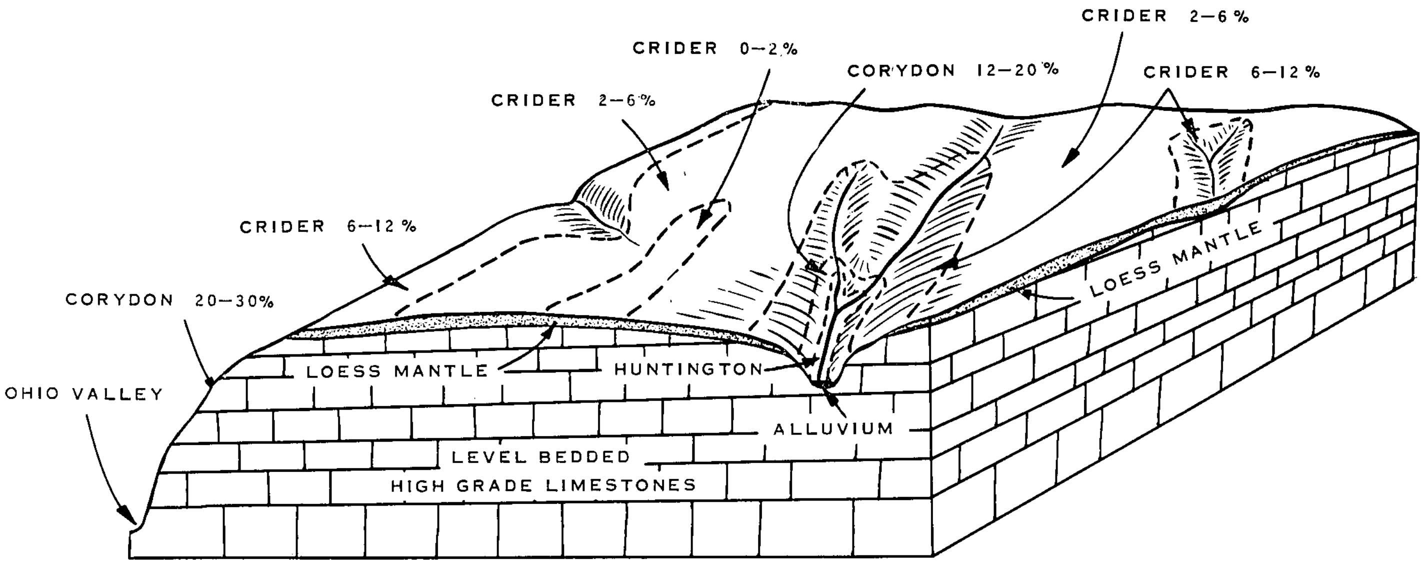

Figure 8.—**Diagram showing general parent material, position, and pattern of soils in the Crider-Corydon association.**

7. *Beasley-Fairmount-Russellville association*

Gently sloping or sloping soils on narrow ridges and strongly sloping or steep, shallow soils over limestone on hillsides

This association occupies the eastern fourth of the county. It is dissected by a complex of side branches and small creeks. Except for the valley along Floyds Fork, which traverses the area from north to south, the topography is one of gently sloping or sloping narrow ridges separated by narrow valleys that have strongly sloping or steep walls (fig. 10, p. 8). Bottoms and terraces along Floyds Fork are about half a mile wide, and most of them are intensively cultivated. The total acreage of this association is about 21 percent of the county.

Beasley soils cover about 45 percent of this association, Fairmount soils 35 percent, Russellville soils 10 percent, and minor soils 10 percent. Beasley soils are on gently sloping or sloping ridges, and they are deep and well drained. In most places they have a surface layer of brown silt loam and a subsoil of yellowish-brown silty clay. Fairmount soils occupy most of the steeper slopes.

Figure 9.—**Air view showing a part of the Crider-Corydon association. Crider soils are cleared; Corydon soils are wooded. (Courtesy of Billy Davis, Louisville Times.)**

772-184—65——2

Normally they have a surface layer of flaggy silty clay loam and a subsoil of calcareous silty clay or clay. Russellville soils also are on gently sloping or sloping ridges. They are moderately well drained or well drained. Normally they have a surface layer of dark-brown silt loam. Their subsoil is reddish brown in the upper part and mottled in the lower part. A compact fragipan is at a depth of about 30 inches.

Minor soils are the well-drained Huntington soils, some poorly drained soils on bottoms along small streams, and the Elk, Captina, Robertsville, and Taft soils in small areas along Floyds Fork.

Because some of the soils are shallow and the topography is irregular, most of this association is not cultivated, but pastures and woods are extensive. Farms are between 120 and 180 acres in size, and general farming is most common. Corn, tobacco, small grain, and hay are grown on the ridges and in the valleys. Although almost all the hillsides are shallow, they are capable of producing good yields of forage if properly managed. The steeper and most rocky slopes are best suited to woods. A considerable number of idle fields are scattered throughout this association.

Suburban development has been minor because of the distance from Louisville and the scarcity of suitable building sites. This association is suitable for recreational uses. Some areas could be used as natural parks.

Descriptions of the Soils

This section provides fairly detailed information about the soils in Jefferson County. General information about the soils can be found in the section "General Soil Map," where broad patterns of soils are described. Detailed technical information can be found in the section "Formation, Morphology, and Classification of the Soils."

First, this section describes the soil series. In the description of each soil series, a profile is included that is representative of all the soils of the series; the location

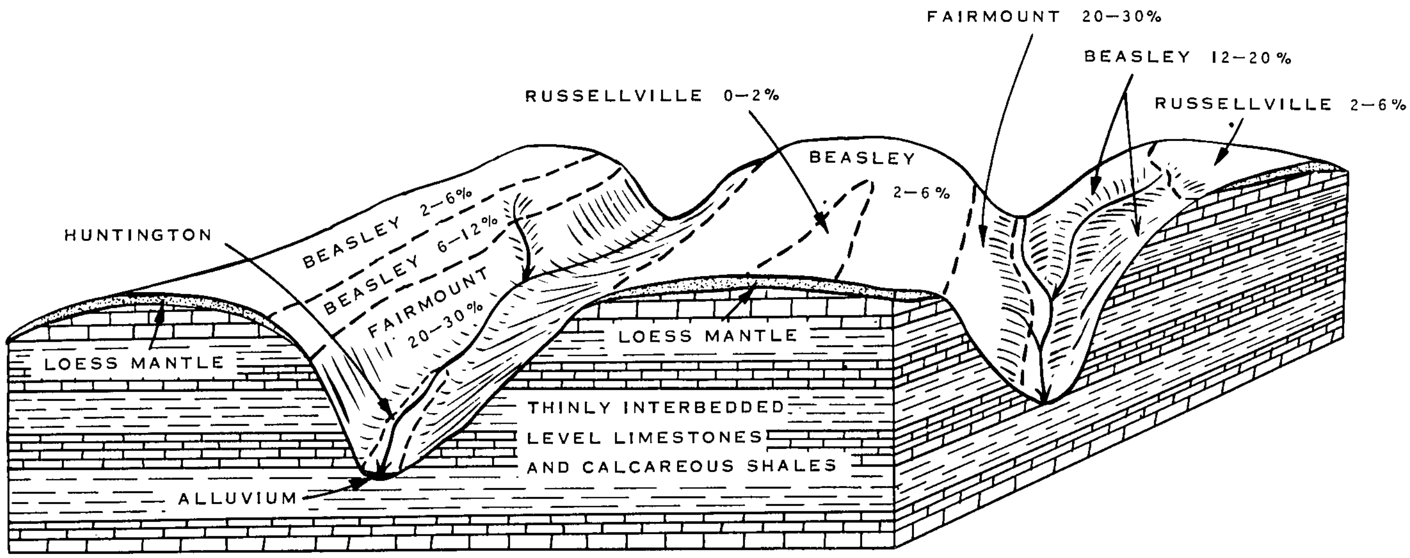

Figure 10.—**Diagram showing general parent material, position, and pattern of soils in the Beasley-Fairmount-Russellville association.**

of the soils and their position on the landscape are given; important features that apply to all the soils of the series are pointed out; some similar soils or nearby soils are mentioned; and use of the soils and their suitability for agriculture are discussed briefly.

Next, this section describes the individual soils, or mapping units, of the series. In parentheses following the name of each soil is the symbol that identifies the soil on the detailed soil map, which is in the back of this report. The descriptions give the characteristics of each soil that distinguish it from all other soils. The description of each soil ends with a reference to the capability unit, the woodland suitability group, and the wildlife productivity group in which the soil has been placed. These groups are discussed in other sections of this report.

This section includes a table (table 1) that gives the approximate acreage and proportionate extent of the individual soils. The soil map at the back of this report shows the location and distribution of the soils, and the Glossary defines many of the technical terms used in this section.

Ashton Series

The Ashton series consists of well-drained soils that are on low terraces and on foot slopes. These soils are of moderate acreage in the county, but they are widely scattered along large streams and along the Ohio River and in the high-grade limestone area. They formed mainly in alluvium that washed from soils of limestone origin. Representative profile:

0 to 8 inches, dark-brown, very friable silt loam.
8 to 33 inches, dark yellowish-brown to brown, friable silt loam; weak, blocky structure.
33 to 42 inches +, dark yellowish-brown, friable silt loam; few variegations; massive.

The soils on terraces are generally underlain by stratified silt and sand at a depth of more than 42 inches. Those on foot slopes are generally underlain by limestone at a depth between 6 and 8 feet.

Ashton soils are slightly acid or medium acid. They are moderately high in natural fertility.

Practically all of the acreage has been cleared and is now cultivated. Because most of the soils are nearly level, there is little or no erosion hazard, and consequently intensive cultivation is possible. Some of the lower lying areas are subject to occasional flooding.

These soils are especially well suited to corn. Most of the other general crops can be grown, and yields are favorable if high-level management is used.

Ashton silt loam, 0 to 2 percent slopes (AsA).—This is a deep, well-drained soil that formed in alluvium of limestone origin. This soil occurs mostly on low terraces along Floyds Fork and along the Ohio River. Normally the plow layer consists of dark-brown, friable silt loam and is about 8 inches thick. The subsoil is dark yellowish-brown to brown, friable silt loam.

The plow layer is in excellent tilth. It can be plowed or cultivated throughout a wide range of moisture content without clodding or crusting. It is medium in organic-matter content and high in natural fertility. The reaction is slightly acid or medium acid, and the response to lime is good. The moisture-supplying capacity is high; plants seldom are damaged during a normal period because of insufficient moisture. Permeability is moderate in the subsoil.

This soil is suited to corn, alfalfa, tobacco, and other general crops and is excellent for truck, orchard, and other specialized crops. It is a productive soil but needs fertilizer for consistently favorable yields. Irrigation can be used to advantage on this soil. Erosion is not a limitation, so continuous cultivation under high-level management is possible. On a few areas use may be limited by occasional flooding. (Capability unit I–3; woodland suitability group 1; wildlife productivity group 1)

Ashton silt loam, 2 to 6 percent slopes (AsB).—This is a deep, well-drained soil that formed in alluvium of limestone origin. It occurs on foot slopes and on low terraces along Floyds Fork and along the Ohio River. Normally

TABLE 1.—*Approximate acreage and proportionate extent of soils*

Soil	Acres	Percent
Ashton silt loam, 0 to 2 percent slopes	563	0. 3
Ashton silt loam, 2 to 6 percent slopes	207	. 1
Beasley silt loam, 2 to 6 percent slopes	2, 848	1. 4
Beasley silt loam, 2 to 6 percent slopes, eroded	2, 674	1. 3
Beasley silt loam, 6 to 12 percent slopes, eroded	7, 757	3. 7
Beasley silt loam, 12 to 20 percent slopes, eroded	993	. 5
Beasley silty clay loam, 2 to 6 percent slopes, severely eroded	188	. 1
Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	8, 248	4. 0
Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	5, 583	2. 7
Breaks and Alluvial land	399	. 2
Captina silt loam, 0 to 2 percent slopes	433	. 2
Captina silt loam, 2 to 6 percent slopes	2, 906	1. 4
Captina silt loam, 6 to 12 percent slopes, eroded	335	. 2
Corydon silt loam, 2 to 6 percent slopes, eroded	510	. 2
Corydon silty clay loam, 6 to 12 percent slopes, severely eroded	205	. 1
Corydon very rocky silt loam, 6 to 12 percent slopes	217	. 1
Corydon very rocky silt loam, 12 to 20 percent slopes	518	. 2
Corydon very rocky silt loam, 20 to 30 percent slopes	390	. 2
Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded	933	. 4
Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded	2, 390	1. 2
Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded	1, 931	. 9
Crider silt loam, 0 to 2 percent slopes	3, 515	1. 7
Crider silt loam, 2 to 6 percent slopes	29, 378	14. 2
Crider silt loam, 2 to 6 percent slopes, eroded	4, 856	2. 3
Crider silt loam, 6 to 12 percent slopes	449	. 2
Crider silt loam, 6 to 12 percent slopes, eroded	10, 139	5. 0
Crider silt loam, 6 to 12 percent slopes, severely eroded	1, 333	. 6
Crider silt loam, 12 to 20 percent slopes, eroded	1, 324	. 6
Dickson silt loam, 0 to 2 percent slopes	1, 171	. 6
Dickson silt loam, 2 to 6 percent slopes	6, 348	3. 1
Dunning silty clay loam	172	. 1
Elk silt loam, 0 to 2 percent slopes	169	. 1
Elk silt loam, 2 to 6 percent slopes	332	. 2
Ennis cherty silt loam	316	. 2
Fairmount flaggy silty clay, 12 to 20 percent slopes	2, 444	1. 2
Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded	2, 040	1. 0
Fairmount flaggy silty clay, 20 to 30 percent slopes	1, 578	. 8
Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded	1, 193	. 6
Fairmount flaggy silty clay, 30 to 50 percent slopes	536	. 2
Ginat silt loam	2, 229	1. 1
Gullied land	555	. 3
Guthrie silt loam	1, 445	. 7
Holston gravelly silt loam, 12 to 20 percent slopes	248	. 1
Holston gravelly silt loam, 20 to 30 percent slopes	1, 452	. 7
Huntington fine sandy loam	432	. 2
Huntington silt loam	8, 530	4. 1
Lakin loamy fine sand, 2 to 6 percent slopes	407	. 2
Lakin loamy fine sand, 6 to 12 percent slopes	316	. 1
Lakin loamy fine sand, 12 to 25 percent slopes	261	. 1
Lawrence silt loam	3, 817	1. 8
Lindside silt loam	1, 906	. 9
Litz silt loam, 12 to 20 percent slopes	362	. 2
Litz-Muskingum silt loams, 20 to 30 percent slopes	587	. 3
Litz-Muskingum silt loams, 30 to 50 percent slopes	2, 247	1. 1
Loring silt loam, 2 to 6 percent slopes	890	. 4
Loring silt loam, 6 to 12 percent slopes, eroded	1, 403	0. 7
Loring-Crider silt loams, 6 to 12 percent slopes, eroded	414	. 2
Lowell silt loam, 6 to 12 percent slopes, eroded	394	. 2
Made land	1, 005	. 5
Markland silt loam, 2 to 6 percent slopes, eroded	251	. 1
Markland silt loam, 6 to 12 percent slopes, eroded	102	([1])
Markland silt loam, 12 to 30 percent slopes	98	([1])
McGary silt loam	767	. 4
Melvin silt loam	3, 110	1. 5
Melvin silty clay loam	285	. 1
Melvin silt loam, overwash	600	. 3
Memphis silt loam, 2 to 6 percent slopes	203	. 1
Memphis silt loam, 6 to 12 percent slopes, eroded	650	. 3
Memphis silt loam, 12 to 20 percent slopes, eroded	894	. 4
Memphis silt loam, 20 to 30 percent slopes, eroded	1, 191	. 6
Muskingum stony soils, 30 to 50 percent slopes	601	. 3
Newark silt loam	5, 665	2. 7
Otway silty clay, 12 to 20 percent slopes	200	. 1
Otway silty clay, 12 to 20 percent slopes, severely eroded	648	. 3
Purdy silt loam	299	. 1
Robertsville silt loam	6, 542	3. 2
Rockcastle silt loam, 15 to 30 percent slopes	2, 855	1. 4
Rock land	1, 071	. 5
Russellville silt loam, 0 to 2 percent slopes	263	. 1
Russellville silt loam, 2 to 6 percent slopes	8, 042	4. 0
Russellville silt loam, 2 to 6 percent slopes, eroded	1, 152	. 6
Russellville silt loam, 6 to 12 percent slopes, eroded	637	. 3
Sciotoville silt loam, 0 to 2 percent slopes	3, 617	1. 8
Sciotoville silt loam, 2 to 6 percent slopes	1, 791	. 9
Sciotoville silt loam, 6 to 12 percent slopes, eroded	282	. 1
Sequatchie fine sandy loam, 0 to 2 percent slopes	512	. 2
Sequatchie fine sandy loam, 2 to 6 percent slopes	920	. 4
Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded	383	. 2
Shelbyville silt loam, 2 to 6 percent slopes	368	. 2
Taft silt loam	1, 790	. 9
Tyler silt loam	966	. 5
Weinbach silt loam	5, 529	2. 7
Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes	1, 551	. 8
Wheeling silt loam, 0 to 2 percent slopes	4, 358	2. 1
Wheeling silt loam, 2 to 6 percent slopes	2, 840	1. 4
Wheeling silt loam, 6 to 12 percent slopes, eroded	807	. 4
Wheeling silt loam, 12 to 20 percent slopes, eroded	669	. 3
Wheeling silt loam, 20 to 30 percent slopes, eroded	423	. 2
Woolper silty clay loam, 2 to 6 percent slopes	405	. 2
Woolper silty clay loam, 6 to 12 percent slopes, eroded	354	. 2
Zanesville silt loam, 2 to 6 percent slopes	243	. 1
Zanesville silt loam, 6 to 12 percent slopes, eroded	832	. 4
Zanesville silt loam, 12 to 20 percent slopes, eroded	1, 172	. 6
Zipp silty clay	4, 024	2. 0
Survey area	206, 383	
Urban area	33, 617	
Total	240, 000	100. 0

[1] Less than 0.05 percent.

the plow layer is dark-brown, friable silt loam, and the subsoil is dark yellowish-brown to brown, friable silt loam.

Mapped with this soil are a few areas of sloping soils, as well as a few areas of soils that have lost part of their original surface layer and consequently have a plow layer that consists partly of subsoil material.

The plow layer is easy to till. It is medium in organic-matter content and high in natural fertility. The reaction is slightly acid or medium acid, and the response to lime is good. Permeability is moderate, and the moisture-supplying capacity is high. Plants seldom are damaged during a normal period because of insufficient moisture.

This soil is suited to all general crops and is especially well suited to alfalfa, tobacco, and corn. Some areas are excellent for truck, orchard, and nursery crops. This soil needs fertilizer and high-level management if it is to produce consistently favorable yields. Irrigation can be used to advantage. Erosion is a moderately low hazard. Nevertheless, if cultivated, this soil needs specific conservation practices that will effectively control runoff and erosion. Occasional flooding is a limitation in a few areas. (Capability unit IIe-1; woodland suitability group 2; wildlife productivity group 1)

Beasley Series

The Beasley series consists of well-drained soils on narrow, gently sloping ridgetops and on sloping to strongly sloping side slopes in the eastern fourth of the county. The surface layer and the upper part of the subsoil formed mostly in loess (windblown silt) and residuum derived from limestone. The lower part of the subsoil formed in residuum derived from calcareous shale (marl) and some soft limestone. Representative profile:

0 to 6 inches, brown, friable silt loam.
6 to 24 inches, yellowish-brown, firm silty clay loam; medium, blocky structure; medium acid.
24 to 42 inches, yellowish-brown to olive-brown silty clay; sticky and plastic; strong, blocky structure; alkaline to calcareous.

The depth to the silty clay ranges from 10 to 30 inches. The depth to the calcareous shale, or marl, ranges from 24 to 45 inches. The upper part of the subsoil is medium acid, and the lower part is mostly calcareous. The natural fertility is moderately high, and the response to fertilizer is good.

Nearly all of the acreage of Beasley soils in Jefferson County has been cleared and cultivated at some time. Considerable acreage has eroded; some of it very severely. Some of these eroded areas are idle, and others have reverted naturally to mixed stands of hardwoods and redcedar. Sinkholes are common on a few ridges. The gently sloping and sloping areas, if not severely eroded, are suited to general crops. The steeper areas are suited to pasture and woods.

Beasley silt loam, 2 to 6 percent slopes (BaB).—This is a well-drained soil on ridges in the eastern fourth of the county. The lower layers developed in calcareous shale. Normally the plow layer consists of brown, friable silt loam and is about 7 inches thick. The subsoil is yellowish-brown, firm silty clay loam in the upper part and grades to yellowish-brown to olive-brown, calcareous silty clay below a depth of about 24 inches.

The plow layer is easy to till. It is medium in organic-matter content and moderately high in natural fertility. Although the lower part of the subsoil is highly calcareous, the upper part generally is medium acid. The response to fertilizer and to lime is good. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. The moisture-supplying capacity is high, and plants receive sufficient water, except during an extended dry period. The depth of the root zone is limited to about 30 inches by the calcareous layer in the subsoil.

This soil is suited to most general crops and is especially well suited to alfalfa and clover. If cultivated, it needs good management and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderately low. (Capability unit IIe-2; woodland suitability group 7; wildlife productivity group 1)

Beasley silt loam, 2 to 6 percent slopes, eroded (BaB2).—This is a well-drained soil on narrow ridges in the eastern fourth of the county. The lower layers developed in calcareous shale. Normally the plow layer consists of brown silt loam and is about 6 inches thick. The subsoil is yellowish-brown, firm silty clay loam in the upper part and grades to yellowish-brown to olive-brown, calcareous silty clay below a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. The natural fertility is moderately high. Although the lower part of the subsoil is highly calcareous, the upper part generally is medium acid. The response to lime and to fertilizer is good. The moisture-supplying capacity is high, and plants receive sufficient water in normal years. Permeability is slow in the lower part of the subsoil. The depth of the root zone is limited to about 30 inches by the calcareous layer in the subsoil.

This soil is suited to most general crops and is especially well suited to alfalfa and clover. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderately low. (Capability unit IIe-2; woodland suitability group 7; wildlife productivity group 1)

Beasley silt loam, 6 to 12 percent slopes, eroded (BaC2).—This is a well-drained soil on narrow ridges and on the upper part of side slopes in the eastern fourth of the county. The lower layers developed in calcareous shale. Normally the plow layer consists of brown silt loam and is about 6 inches thick. The subsoil is yellowish-brown, firm silty clay loam in the upper part and grades to yellowish-brown to olive-brown, calcareous silty clay below a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. The natural fertility is moderate. Although the lower part of the subsoil is calcareous, the surface layer and the upper part of the subsoil are medium acid. The response to lime and to fertilizer is good. The moisture-supplying capacity is high, and most plants receive sufficient water during a normal period. Permeability is slow in the lower part of the subsoil. The depth of the root zone is limited to about 30 inches by the calcareous layer in the subsoil.

This soil is suited to most general crops and is especially well suitable to alfalfa and clover. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderate. (Capability unit IIIe-4; woodland suitability group 7; wildlife productivity group 1)

Beasley silt loam, 12 to 20 percent slopes, eroded (BaD2).—This is a well-drained soil on the lower part of hillsides in the eastern fourth of the county. The lower layers developed in calcareous shale. Normally the plow layer consists of brown silt loam and is about 6 inches thick. The subsoil is yellowish-brown, firm silty clay loam in the upper part and grades to yellowish-brown to olive-brown, calcareous silty clay below a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. The natural fertility is moderate. Although the lower part of the subsoil is calcareous, the surface layer and the upper part of the subsoil are medium acid. The response to lime and to fertilizer is good. The moisture-supplying capacity is high, and most plants receive sufficient water during a normal period. Permeability is slow in the lower part of the subsoil. The depth of the root zone is limited to about 30 inches by the calcareous layer in the subsoil.

This soil is especially well suited to alfalfa and to clover. It is suited to corn and other row crops, but it is susceptible to moderately severe erosion if cultivated. Consequently, if cultivated, it needs a cropping system that is dominated by meadow or sod crops (fig. 11), and it needs specific conservation practices that help to reduce runoff and thereby control erosion. (Capability unit IVe-3; woodland suitability group 7; wildlife productivity group 2)

Beasley silty clay loam, 2 to 6 percent slopes, severely eroded (BeB3).—This is a well-drained soil on ridges in the eastern fourth of the county. The lower layers developed in calcareous shale. All or nearly all of the original surface layer, which consisted of brown silt loam, has been removed by sheet erosion. The present surface layer consists of mixed yellowish-brown and brown silty clay loam. The subsoil is yellowish-brown to olive-brown, calcareous silty clay below a depth of about 16 inches. It is exposed in some places, and a few shallow gullies have formed.

The plow layer is low in organic-matter content but nevertheless is only slightly difficult to till. The natural fertility is moderate. Although the subsoil is calcareous, the surface layer is medium acid. The response to lime and to fertilizer is fair. The moisture-supplying capacity is moderate, and crop yields may be reduced during a dry period because of insufficient moisture. Permeability is slow in the subsoil. The depth of the root zone is limited to about 16 inches by the calcareous subsoil.

Most general crops will grow on this soil if high-level management is used. Moderate yields can be expected.

***Figure 11.*—In the foreground, an excellent stand of Kentucky 31 fescue on Beasley silt loam, 12 to 20 percent slopes, eroded. In the background, mixed hay crops on Captina silt loam, 0 to 2 percent slopes.**

If cultivated, this soil is susceptible to moderate erosion, and therefore it needs a suitable cropping system and specific conservation practices that will effectively control the erosion. A suitable cropping system consists of corn and small grain grown in rotation with meadow or sod crops. The meadow and sod crops should dominate the system. (Capability unit IIIe-14; woodland suitability group 11; wildlife productivity group 3)

Beasley silty clay loam, 6 to 12 percent slopes, severely eroded (BeC3).—This is a well-drained soil on ridges in the eastern fourth of the county. The lower layers developed in calcareous shale. All or nearly all of the original surface layer has been removed by sheet erosion. The present surface layer is mixed yellowish-brown and brown silty clay loam. The subsoil is yellowish-brown to olive-brown, calcareous silty clay below a depth of about 16 inches. It is exposed in some places. A few shallow gullies have formed.

The plow layer is low in organic-matter content and thus is generally difficult to till. The natural fertility is moderate, and the response to fertilizer is fair. Liming is beneficial, except where the neutral subsoil is exposed. The moisture-supplying capacity is moderate, and crop yields may be reduced because of insufficient moisture. Permeability is slow in the subsoil. The depth of the root zone is limited to about 16 inches by the calcareous subsoil.

This soil is best suited to hay crops, including alfalfa and clover. Yields are low to moderate because of a combination of limiting factors. If cultivated, this soil needs good management and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderately severe. (Capability unit IVe-11; woodland suitability group 11; wildlife productivity group 3)

Beasley silty clay loam, 12 to 20 percent slopes, severely eroded (BeD3).—This is a well-drained soil on the lower part of side slopes in the eastern fourth of the county. The lower layers developed in calcareous shale. All or nearly all of the original surface layer has been removed by sheet erosion. The present surface layer is mixed yellowish-brown and brown silty clay loam. The subsoil is yellowish-brown to olive-brown, calcareous silty clay below a depth of about 16 inches. It is exposed in some places. There are a few shallow gullies.

The plow layer is low in organic-matter content and thus is generally difficult to till. The natural fertility is moderate, and the response to fertilizer is fair. Liming is beneficial, except where the neutral subsoil is exposed. The moisture-supplying capacity is moderate, and crop yields may be reduced because of insufficient moisture. Permeability is slow in the subsoil. The depth of the root zone is limited to about 16 inches by the calcareous subsoil.

Because the erosion hazard is severe, this soil is not well suited to cultivated crops. It is best suited to pasture and wood crops. Kentucky 31 fescue and sericea lespedeza grow well. (Capability unit VIe-2; woodland suitability group 11; wildlife productivity group 3)

Breaks and Alluvial Land

This is a miscellaneous land type that consists of areas of unconsolidated alluvium. These areas are along the Ohio River. Most are strongly sloping or steep, and a few are nearly level. Some include an escarpment. The alluvium washed from the upper part of the Ohio River drainage basin. In places the deposits of alluvium are recent and are subject to yearly change, but in other places they have remained long enough to be distinguishable as weakly developed terrace soils. The soil material is mostly medium textured, but it is coarse textured in places and fine textured in others.

This land type is subject to flooding and consequently is not suitable for cultivation or for pasture. During the spring flood season, rapid river currents often severely scour the areas or leave new deposits of alluvium. Overflows of short duration are likely to occur at any time during the normal cropping season.

Breaks and Alluvial land (Br).—This miscellaneous land type is not suitable for agricultural use. Occasionally a small strip is planted to corn, but the crop is generally damaged or lost. (Capability unit VIIe-4; woodland suitability group 16; wildlife productivity group 3)

Captina Series

The Captina series consists of moderately well drained, level to gently sloping soils on low terraces along Floyds Fork and along large creeks in the limestone area. The acreage is moderate. These soils formed in old alluvium that washed from soils of limestone origin. They have a compact, brittle fragipan at a depth that ranges from 18 to 26 inches. Representative profile:

0 to 10 inches, dark-brown, friable silt loam.
10 to 21 inches, dark yellowish-brown, friable silty clay loam; blocky structure.
21 to 38 inches, mottled yellowish-brown and gray, firm silty clay loam; compact and brittle (fragipan).
38 to 48 inches, yellowish-brown and gray, firm silty clay; massive.

Captina soils are strongly acid. They are moderate in natural fertility but respond well to fertilizer. The depth of their root zone is limited by the fragipan.

These soils, for the most part, have been cleared and are presently cultivated or in pasture. They are suited to most crops that do not require good drainage and a deep root zone. Most areas are above the normal flood plain and, therefore, are only occasionally flooded.

Captina silt loam, 0 to 2 percent slopes (CaA).—This is a moderately well drained, alluvial soil that has a fragipan. Normally the plow layer consist of dark-brown, friable silt loam and is about 9 or 10 inches thick. The upper part of the subsoil is dark yellowish-brown silty clay loam, and the lower part, or fragipan, is mottled yellowish-brown and gray, firm, compact, brittle silty clay loam. The fragipan, which begins at a depth of about 21 inches, restricts the movement of water and limits the depth of the root zone.

The plow layer is medium in organic-matter content and is easy to till. It is moderate in natural fertility but benefits from fertilizer. It is strongly acid but responds well to lime. Surface runoff is slow, consequently some areas remain wet after a rainy period. Permeability is moderate in the upper part of the subsoil and very slow in the lower part. The moisture-supplying capacity is limited because of the fragipan.

This soil is well suited to Kentucky 31 fescue, redtop, alsike clover, red clover, Kobe lespedeza, and Korean lespedeza. It is not well suited to alfalfa and other deep-rooted crops. Corn and soybeans can be grown, but yields are moderate and high-level management must be used. Erosion is not a limitation, so intensive cultivation is not harmful. Crops in the lower lying areas may be damaged by occasional floods. Crop yields may be reduced during a dry period. (Capability unit IIw-1; woodland suitability group 5; wildlife productivity group 2)

Captina silt loam, 2 to 6 percent slopes (CaB).—This is a moderately well drained, alluvial soil that has a fragipan. Normally the plow layer consists of dark-brown, friable silt loam and is about 8 inches thick. The upper part of the subsoil is dark yellowish-brown, friable silty clay loam, and the lower part, which is the fragipan, is mottled yellowish-brown and gray, firm, compact silty clay loam. The fragipan, which begins at a depth of about 24 inches, limits the depth of the root zone and restricts the movement of water.

Mapped with this soil are a few spots of soils that have slopes stronger than 6 percent and a few areas of soils that are slightly eroded.

The plow layer is generally medium in organic-matter content and is easy to till. It is moderate in natural fertility but benefits from fertilizer. It is strongly acid, but it responds well to lime. The moisture-supplying capacity is limited because of the fragipan.

The erosion hazard is slight. Nevertheless, if cultivated, this soil needs specific conservation practices that will effectively control runoff and erosion. Crop yields may be reduced during a dry period. (Capability unit IIe-6; woodland suitability group 5; wildlife productivity group 2)

Captina silt loam, 6 to 12 percent slopes, eroded (CaC2).—This is a moderately well drained, alluvial soil that has a fragipan. Normally the plow layer consists of grayish-brown, friable silt loam and is about 6 inches thick. The subsoil is yellowish-brown silt loam in the upper part and grades to yellowish-brown, mottled gray and olive silty clay loam below a depth of 21 inches. This lower part of the subsoil is the fragipan; it is compact and brittle, and it limits the depth of the root zone and restricts the movement of water. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is generally in good tilth. It is moderate in natural fertility but benefits from fertilizer. It is strongly acid or very strongly acid, but it responds well to lime. The moisture-supplying capacity is moderate.

This soil is suited to corn, small grain, and most hay crops. It is not suited to alfalfa and other deep-rooted crops. The erosion hazard is moderate. Therefore, if cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Crop yields may be reduced during a dry period because of insufficient moisture. (Capability unit IIIe-8; woodland suitability group 5; wildlife productivity group 2)

Corydon Series

The Corydon series consists of well-drained, sloping to moderately steep soils on limestone hillsides. These soils are in the more dissected areas that cover a broad north-south belt across the center of the county. They are common along Goose Creek and Harrods Creek and on the Ohio River bluffs northeast of Louisville. Their acreage is moderate. Representative profile:

0 to 6 inches, dark-brown, friable silt loam.
6 to 12 inches, brown silty clay loam; slightly sticky; medium, blocky structure.
12 to 26 inches, reddish-brown silty clay; sticky and plastic; medium, blocky structure.
26 inches +, high-grade limestone.

The depth to the limestone ranges from 18 to 36 inches. Massive outcrops of limestone make up as much as 25 percent of some areas.

The natural vegetation on these soils consisted of hardwood trees. Most of the acreage is still wooded. Because of shallowness and the numerous outcrops, these soils are not generally suitable for cultivation. They are best suited to hay and pasture crops. Their potential for wood crops is fair.

Corydon silt loam, 2 to 6 percent slopes, eroded (CdB2).—This is a well-drained soil of the high-grade limestone uplands. Bedrock is at a depth of 20 to 30 inches throughout most of the area, but massive outcrops of limestone dot the landscape. Normally the plow layer consists of dark-brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil consists of brown silty clay loam and is nearly 6 inches thick. The silty clay loam grades to the reddish-brown, sticky, plastic silty clay that makes up the lower part of the subsoil. In plowing, material from the upper part of the subsoil has been mixed with the surface layer. Sheet erosion has removed nearly all of the original surface layer in a few places, and patches of subsoil are exposed.

The plow layer is generally low in organic-matter content but nevertheless is fairly easy to till. The natural fertility is moderate, and the response to fertilizer is fair. The reaction is slightly acid or medium acid, and the response to lime is fair. The root zone is shallow, and the moisture-supplying capacity is moderately low. Crop yields generally are reduced during a dry period.

This soil is suited to hay and grass crops, including Kentucky 31 fescue, Korean lespedeza, sericea lespedeza, bluegrass, and sweetclover. Corn, small grain, and other cultivated crops will grow if high-level management is used; moderate yields can be expected. If cultivated, this soil is susceptible to moderate erosion, and therefore it needs a suitable cropping system and specific conservation practices that will effectively control the erosion. The outcrops do not seriously hinder cultivation. (Capability unit IIIe-10; woodland suitability group 12; wildlife productivity group 2)

Corydon silty clay loam, 6 to 12 percent slopes, severely eroded (CmC3).—This is a well-drained soil of the high-grade limestone uplands. Bedrock is at a depth of only 12 to 24 inches throughout most of the area. Outcrops of limestone dot the landscape and are prominent in the gullies that have formed. The original surface layer has been removed by erosion. The present surface layer consists of brown silty clay loam and is about 6 inches thick. The subsoil consists of reddish-brown silty clay that is sticky and plastic.

This soil is moderate in natural fertility, and it responds poorly to fertilizer. It is slightly acid or medium acid and is little affected by lime. It has a shallow root zone, and its moisture-supplying capacity is low. Plant growth is slowed during much of the growing season because of insufficient moisture.

Because of the erosion hazard and unfavorable characteristics, this soil is not suited to cultivated crops. It is best suited to Kentucky 31 fescue and to sericea lespedeza. Under high-level management, a few other grasses and legumes can be grown. Trees are suitable, but the potential yield of wood crops is low. (Capability unit VIe-4; woodland suitability group 11; wildlife productivity group 3)

Corydon very rocky silt loam, 6 to 12 percent slopes (CnC).—This is a well-drained soil on hillsides in the high-grade limestone area. The depth to bedrock varies considerably but is generally 20 to 30 inches. Massive outcrops of limestone make up from 5 to 25 percent of the area. Normally the surface layer consists of dark-brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil consists of brown silty clay loam and is nearly 6 inches thick. The silty clay loam grades to the reddish-brown, sticky, plastic silty clay that makes up the lower part of the subsoil.

The surface layer is medium in organic-matter content and moderately high in natural fertility. It is slightly acid or medium acid. The response to fertilizer and to lime is fair. The moisture-supplying capacity is moderately low. The root zone is generally shallow but is deep in places.

This soil is best suited to pasture and to woods. The numerous outcrops make cultivation impractical. Furthermore, erosion is a severe hazard in plowed fields because runoff is rapid and the soil is shallow. Plants are damaged during a dry period because of insufficient moisture. (Capability unit VIs-1; woodland suitability group 12; wildlife productivity group 2)

Corydon very rocky silt loam, 12 to 20 percent slopes (CnD).—This is a well-drained soil on hillsides in the high-grade limestone area. The depth to bedrock varies considerably but is generally 16 to 24 inches. Massive outcrops of limestone make up from 5 to 25 percent of the area.

Normally the surface layer consists of dark-brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil consists of brown silty clay loam and is nearly 6 inches thick. The silty clay loam grades to the reddish-brown, sticky, plastic silty clay that makes up the lower part of the subsoil.

The surface layer is medium in organic-matter content and moderately high in natural fertility. It is slightly acid or medium acid. The response to fertilizer and to lime is fair. The moisture-supplying capacity is moderately low. The root zone is generally shallow but is deep in places.

This soil is best suited to pasture (fig. 12) and to woods. The numerous outcrops make cultivation impractical. Furthermore, erosion is a severe hazard in plowed fields because of rapid runoff and shallowness. Plants are damaged during a dry period. (Capability unit VIs–1; woodland suitability group 12; wildlife productivity group 2)

Corydon very rocky silt loam, 20 to 30 percent slopes (CnE).—This is a well-drained soil on hillsides in the high-grade limestone area. The depth to bedrock varies considerably but is generally 12 to 20 inches. Massive outcrops of limestone make up from 5 to 25 percent of the area. Normally the surface layer consists of dark-brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil consists of brown silty clay loam and is nearly 6 inches thick. The silty clay loam grades to the reddish-brown, sticky, plastic silty clay that makes up the lower part of the subsoil.

The surface layer is medium in organic-matter content and moderately high in natural fertility. It is slightly acid or medium acid. The response to fertilizer and to lime is fair. The moisture-supplying capacity is moderately low. The root zone is generally shallow but deep in places.

This soil is best suited to pasture and to woods. The numerous outcrops make cultivation impractical. Furthermore, erosion is a severe hazard in plowed fields because of rapid runoff and shallowness. Plants are damaged during a dry period because of insufficient moisture. (Capability unit VIIs–2; woodland suitability group 12; wildlife productivity group 2)

Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded (CrC3).—This is a well-drained soil on hillsides in the high-grade limestone area. The depth to bedrock varies considerably but is generally 15 to 25 inches. Massive outcrops of limestone make up as much as 25 percent of the area. They are more numerous in the most severely eroded spots and in gullies. The original surface layer has been removed by erosion, and the present surface layer consists mostly of material that formerly made up the upper part of the subsoil. At a depth of about 6 inches, the surface layer grades to the subsoil, which consists of reddish-brown silty clay that is sticky and plastic.

Figure 12.—**A good stand of Kentucky bluegrass on Corydon very rocky silt loam, 12 to 20 percent slopes. Limestone outcrops on this soil make cultivation impractical.**

This soil is moderate in natural fertility, and it responds poorly to fertilizer. It is slightly acid or medium acid and is little affected by lime. Its moisture-supplying capacity is low. In most places the root zone is shallow.

This soil is not suited to cultivated crops, because it is shallow, dotted with outcrops, and severely eroded. It is best suited to woods and to pasture, but its productivity is generally low. Plants are damaged, even in a normal year, because of insufficient moisture. (Capability unit VIs–2; woodland suitability group 11; wildlife productivity group 3)

Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded (CrD3).—This is a well-drained soil on hillsides in the high-grade limestone area. Bedrock is generally at a depth of only 12 to 20 inches, but massive outcrops of limestone make up as much as 25 percent of the area. They are more numerous in the most severely eroded spots and in gullies. The original surface layer has been removed by erosion, and the present surface layer consists mostly of material that formerly made up the upper part of the subsoil. At a depth of about 6 inches, the surface layer grades to the subsoil, which consists of reddish-brown silty clay that is sticky and plastic.

This soil is not suitable for cultivation, because it is shallow, severely eroded, and dotted with outcrops. It is suited to pasture, but potential productivity is normally low, and it is suited to redcedar, but production is seldom high. (Capability unit VIIs–2; woodland suitability group 11; wildlife productivity group 3)

Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded (CrE3).—This is a well-drained soil on hillsides in the high-grade limestone area. The depth to bedrock varies considerably but is generally 10 to 15 inches. Massive outcrops of limestone make up as much as 25 percent of the area. They are more numerous in the most severely eroded spots and in gullies. The original surface layer has been removed by erosion, and the present surface layer consists mainly of material that formerly made up the upper part of the subsoil. At a depth of about 6 inches, the surface layer grades to the subsoil, which consists of reddish-brown silty clay that is sticky and plastic.

This soil is not suitable for cultivation, because it is shallow, severely eroded, and dotted with outcrops. It is suited to pasture, but potential productivity is normally low, and it is suited to redcedar, but production is seldom high. (Capability unit VIIs–2; woodland suitability group 11; wildlife productivity group 3)

Crider Series

The Crider series consists of deep, well-drained soils on wide, nearly level ridges; on short, strongly sloping side slopes; and in sinks. These soils are extensive; they cover a broad north-south belt across the center of the county. The surface layer and the upper part of the subsoil formed primarily in loess (windblown silt), and the lower part of the subsoil formed primarily in residuum derived from high-grade limestone. Representative profile:

0 to 7 inches, dark-brown, very friable silt loam.
7 to 30 inches, brown to reddish-brown, friable light silty clay loam; medium, blocky structure.
30 to 48 inches +, yellowish-red to red silty clay loam to silty clay; slightly sticky; medium, blocky structure.

The depth to the limestone bedrock is normally 5 feet or more. The loess ranges from 26 to 42 inches in thickness but is 30 inches thick on the average.

Crider soils are medium acid or strongly acid, but they respond well to lime. They are among the most productive soils in the county. They are well suited to all the general crops, including corn, alfalfa, and tobacco, and to vegetable, fruit, nursery, and other specialized crops.

Almost all of the nearly level to sloping areas have been cleared and are cultivated or are in pasture. The steeper areas are in pasture, except for some scattered woods.

Crider silt loam, 0 to 2 percent slopes (CsA).—This is a deep, well-drained soil of the limestone uplands. Most of this soil is on broad ridges east and northeast of Louisville. Normally the plow layer consists of dark-brown, friable silt loam and is about 9 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam, and the lower part, below a depth of about 34 inches, is yellowish-red to red, firm silty clay loam to silty clay.

Mapped with this soil are small areas of soils in which the surface layer and the upper part of the subsoil are redder.

This soil is easy to till. It is medium in organic-matter content and high in natural fertility. It is medium acid or strongly acid. It responds well to lime and to fertilizer. Permeability is moderate, and the moisture-supplying capacity is high.

This is one of the most productive soils in the county. It is well suited to all the general crops, including alfalfa, corn, and tobacco, and is excellent for orchard, truck, and nursery crops. Erosion is not a limitation on this soil, so continuous cultivation is possible, but only under high-level management. (Capability unit I–3; woodland suitability group 4; wildlife productivity group 1)

Crider silt loam, 2 to 6 percent slopes (CsB).—This is a deep, well-drained soil on ridges that are underlain by high-grade limestone. Normally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam, and the lower part, below a depth of about 30 inches, is yellowish-red to red, firm silty clay loam to silty clay.

Mapped with this soil are small areas of soils in which the surface layer and the upper part of the subsoil are redder.

The plow layer is medium in organic-matter content. It is easy to till and seldom clods or crusts. The natural fertility is high, but fertilizer is needed to obtain consistently favorable yields. The reaction is medium acid or strongly acid, but the response to lime is good. Permeability is moderate. The moisture-supplying capacity is high; plants normally receive sufficient water, except during an extremely dry period.

This soil is well suited to alfalfa, tobacco, and corn and is excellent for orchard, truck, and nursery crops. Yields of all the general crops are favorable if the crops are grown under high-level management. The erosion hazard is moderately low. Nevertheless, if cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control erosion. (Capability unit IIe–1; woodland suitability group 4; wildlife productivity group 1)

Crider silt loam, 2 to 6 percent slopes, eroded (CsB2).—This is a deep, well-drained soil on ridges that are underlain by high-grade limestone. The plow layer consists of dark-brown silt loam and is about 7 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam, and the lower part, below a depth of about 28 inches, is yellowish-red to red silty clay loam to silty clay. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

Mapped with this soil are small areas of soils in which the upper part of the profile is redder. Also included are a few areas of soils that have lost all or nearly all of their surface layer.

The plow layer is generally low in organic-matter content but nevertheless is easy to till. The natural fertility is moderately high, and the response to fertilizer is good. This soil is medium acid or strongly acid, but it responds well to lime. It has a high moisture-supplying capacity. Permeability is moderate.

This soil is well suited to alfalfa, tobacco, corn, and pasture and is excellent for orchard, truck, and nursery crops. Yields of all the general crops are favorable if the crops are grown under high-level management. If cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control erosion. The erosion hazard is moderately low. (Capability unit IIe–1; woodland suitability group 4; wildlife productivity group 1)

Crider silt loam, 6 to 12 percent slopes (CsC).—This soil is deep and well drained. It is generally on short side slopes below gently sloping ridges in the high-grade limestone uplands. Normally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam, and the lower part, beginning at a depth of about 28 inches, is yellowish-red to red, firm silty clay loam to silty clay.

The plow layer is medium in organic-matter content. It is easy to till and seldom clods or crusts. The natural fertility is moderately high, and the response to fertilizer is good. The reaction is medium acid or strongly acid, but this soil responds favorably to lime. Permeability is moderate. The moisture-supplying capacity is high; plants receive sufficient water, except during an extremely dry period.

This soil is well suited to alfalfa, tobacco, and corn; and if properly managed, it is good for nursery, truck, and orchard crops. Yields of all the general crops are favorable if the crops are grown under high-level management. If cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control erosion. The erosion hazard is moderate. (Capability unit IIIe–1; woodland suitability group 4; wildlife productivity group 1)

Crider silt loam, 6 to 12 percent slopes, eroded (CsC2).—This soil is deep and well drained. It is mostly on short side slopes below gently sloping ridges in the high-grade limestone uplands. Normally the plow layer consists of dark-brown silt loam and is about 7 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam. The lower part, beginning at a depth of about 24 inches, is yellowish-red to red silty clay loam to silty clay. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in places, and patches of subsoil are exposed.

This soil can be cultivated throughout a wide range of moisture content without clodding or crusting. The plow layer is easy to till, though generally low in organic-matter content. It is moderately high in natural fertility and responds well to fertilizer. The reaction is medium acid or strongly acid, but the response to lime is good. Permeability is moderate. The moisture-supplying capacity is high; plants are damaged because of insufficient water only in an extremely dry year.

This soil is well suited to alfalfa, tobacco, corn, and pasture, and if properly managed, is good for nursery, truck, and orchard crops. Yields of all the general crops are favorable if the crops are grown under high-level management. If cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control erosion. The erosion hazard is moderate. (Capability unit IIIe–1; woodland suitability group 4; wildlife productivity group 1)

Crider silt loam, 6 to 12 percent slopes, severely eroded (CsC3).—This soil is deep and well drained. It is generally on short side slopes that are below gently sloping ridges in the high-grade limestone uplands. All or nearly all of the original surface layer has been removed by sheet erosion. The present plow layer is mixed reddish-brown and brown silt loam. It is underlain, at a depth of about 20 inches, by yellowish-red to red, firm silty clay loam to silty clay. Patches of subsoil are exposed in places, and a few shallow gullies are noticeable in the area.

Tilth is slightly unfavorable because of the silt loam texture. The organic-matter content is low. The natural fertility is moderately high, and the response to fertilizer is good. The reaction is medium acid or strongly acid, but the response to lime is good. Permeability is moderate, and the moisture-supplying capacity is high.

This soil is suited to most of the general crops, but it is only moderately productive. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control erosion, which is a moderate hazard on this soil. A cropping system that is dominated by meadow or pasture crops is suitable. (Capability unit IVe–9; woodland suitability group 11; wildlife productivity group 2)

Crider silt loam, 12 to 20 percent slopes, eroded (CsD2).—This soil is deep and well drained. It is mostly on side slopes that are below gently sloping or sloping ridges in the high-grade limestone uplands. Normally the plow layer consists of dark-brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil is brown to reddish-brown, friable light silty clay loam. The lower part, beginning at a depth of about 24 inches, is yellowish-red to red silty clay loam to silty clay. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in a few places, and patches of subsoil are exposed.

The plow layer is easy to till, though generally low in organic-matter content. It is moderately high in natural fertility and responds well to fertilizer. The reaction is medium acid or strongly acid, but the response to lime is good. Permeability is moderate, and the moisture-supplying capacity is high.

Yields of all the general crops are favorable if the crops are grown under high-level management. If cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control erosion, which is a moderately severe hazard. A suitable cropping system is one that consists primarily of meadow or pasture crops and includes a row crop only occasionally. (Capability unit IVe–1; woodland suitability group 4; wildlife productivity group 1)

Dickson Series

The Dickson series consists of moderately well drained, level to gently sloping soils on broad ridges. These soils are widely scattered throughout the uplands in the southeastern part of the county. Their acreage is moderately large. The surface layer and upper part of the subsoil formed primarily in loess (windblown silt). The lower part of the subsoil formed primarily in residuum derived from high-grade limestone. A compact, brittle fragipan is at a depth that ranges from 18 to 28 inches. Representative profile:

0 to 7 inches, dark grayish-brown, friable silt loam.
7 to 22 inches, yellowish-brown, friable silt loam to silty clay loam; medium, blocky structure.
22 to 42 inches, mottled brownish-gray and brown silty clay loam; compact and brittle (fragipan).

Dickson soils are medium acid or strongly acid, and they are moderate in natural fertility. Their fragipan restricts the movement of water and limits the depth of the root zone.

These soils, for the most part, have been cleared and are presently cultivated. They are well suited to corn, soybeans, and most hay crops, but they are not good for alfalfa and other deep-rooted crops.

Dickson silt loam, 0 to 2 percent slopes (DcA).—This moderately well drained soil of the limestone uplands has a fragipan at a depth of about 24 inches. Normally the plow layer consists of dark grayish-brown, friable silt loam and is about 8 inches thick. The upper part of the subsoil is yellowish-brown, friable silty clay loam, and the lower part—the fragipan—is mottled brownish-gray and brown, compact, brittle silty clay loam.

The plow layer can easily be kept in good tilth and can be worked throughout a fairly wide range of moisture content without clodding or crusting. This soil is medium in organic-matter content and moderate in natural fertility. It is medium acid or strongly acid and responds fairly well to fertilizer and to lime. Permeability is moderate in the upper part of the subsoil and slow in the lower part. The lower part, or fragipan, restricts the movement of water and limits the depth of the root zone. The moisture-supplying capacity is moderate; crop yields generally are reduced during a dry period.

This soil is well suited to corn, soybeans, and most hay crops, but not to alfalfa and other deep-rooted crops. It can be cultivated continuously, for erosion is not a limitation. High-level management, however, is necessary. Surface drainage may be needed in some areas. (Capability unit IIw–1; woodland suitability group 5; wildlife productivity group 2)

Dickson silt loam, 2 to 6 percent slopes (DcB).—This moderately well drained soil of the limestone uplands has a fragipan at a depth of about 22 inches. Normally the plow layer consists of dark grayish-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is yellowish-brown, friable silty clay loam, and the lower part—the fragipan—is mottled brownish-gray and brown, compact, brittle silty clay loam.

Mapped with this soil are small areas of soils that have part of their subsoil mixed with their plow layer.

The plow layer is easy to till. It is medium in organic-matter content and moderate in natural fertility. This soil is medium acid or strongly acid. It responds fairly well to fertilizer and to lime. Permeability is moderate in the upper part of the subsoil and slow in the lower part. The moisture-supplying capacity is moderate; crop yields generally are reduced during a dry period because of insufficient moisture. The depth of the root zone is limited to about 22 inches by the fragipan.

This soil is well suited to corn, soybeans, and most hay crops, but not to alfalfa and other deep-rooted crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control erosion, which is a moderately low hazard. (Capability unit IIe–6; woodland suitability group 5; wildlife productivity group 2)

Dunning Series

The Dunning series consists of dark, very poorly drained soils of the first bottoms. These soils are inextensive but are widely scattered along small creeks and along the Ohio River. Those along the creeks formed in sediment that washed principally from soils of limestone origin, and those along the Ohio River formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 15 inches, very dark gray or black silty clay loam; slightly sticky.
15 to 24 inches, very dark gray silty clay loam; many olive-gray mottles; sticky and plastic.
24 to 42 inches +, dark-gray silty clay loam; many olive-brown mottles; sticky and plastic.

The material below a depth of 15 inches is silty clay in places.

Most of the acreage of Dunning soils in the county is cultivated. If drained, these soils, which are generally neutral in reaction, are productive and may be cultivated continuously. They are best suited to crops that tolerate some wetness. Some areas are subject to occasional overflow, but floods usually occur before the normal cropping season. Wetness may delay plowing and planting in spring.

Dunning silty clay loam (Dn).—This is a nearly black, deep, very poorly drained soil of the bottom lands. It formed in recent alluvium that is principally of limestone origin. Generally the surface layer consists of very dark gray silty clay loam and is about 15 inches thick. The subsoil is mottled dark-gray and olive-brown silty clay loam.

Mapped with this soil are small areas of dark-colored soils on uplands and terraces.

Although this soil is high in natural fertility, fertilizer increases its productivity. For best results, the fertilizer should be applied after the soil has been properly drained. The reaction is nearly neutral, so little or no lime is needed. The moisture-supplying capacity is high; plants are seldom damaged because of insufficient moisture.

Because it is not subject to erosion, this soil can be cultivated continuously. It is suited to corn and soybeans but is best for crops that tolerate some wetness. This soil is generally waterlogged during winter and during rainy seasons. Flooding or wetness may delay plowing and planting, and flooding may damage crops in some years. Wetness can be corrected in most places by tile and surface drainage. Because of its silty clay loam texture, this soil needs management that will prevent clodding or crusting in the plow layer. (Capability unit IIIw–7; woodland suitability group 3; wildlife productivity group 3)

Elk Series

The Elk series consists of level to gently sloping, deep, well-drained soils on low terraces. These soils are inextensive but are widely scattered along Floyds Fork and along a few of the large creeks in the limestone area. They formed in alluvium that washed from soils of limestone origin. Representative profile:

0 to 7 inches, dark-brown, friable silt loam.
7 to 16 inches, brown, friable silt loam; weak, blocky structure.
16 to 42 inches, brown silty clay loam; medium, blocky structure. (Few, faint, grayish-brown mottles may be noticeable in the lower part.)

The depth to the limestone residuum is generally 4 feet or more.

Elk soils are medium acid or strongly acid. They are productive soils, and nearly all of their acreage is cultivated. The range of suitable crops is wide; it includes corn, tobacco, alfalfa, and small grain. Most areas are above the normal flood plain.

Elk silt loam, 0 to 2 percent slopes (EkA).—This deep, well-drained, silty soil formed in alluvium that washed from soils of limestone origin. It is mainly on low terraces along Floyds Fork. Normally the plow layer is dark-brown, friable silt loam. The subsoil is brown silt loam in the upper part and grades to silty clay loam below a depth of about 16 inches.

The plow layer is medium in organic-matter content and may be tilled throughout a wide range of moisture content without clodding or crusting. It is high in natural fertility but still needs fertilizer for consistently favorable yields. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high; plants receive sufficient water, except during an extremely dry period.

This soil is productive and is suited to a wide range of crops that includes corn, alfalfa, tobacco, small grain, and soybeans, as well as vegetable, fruit, nursery, and other specialized crops. Under high-level management, this soil can be cultivated continuously, for it is not subject to erosion. (Capability unit I–3; woodland suitability group 2; wildlife productivity group 1)

Elk silt loam, 2 to 6 percent slopes (EkB).—This is a deep, well-drained, silty soil that formed in alluvium washed from soils of limestone origin. It is mainly on low terraces along Floyds Fork. Normally the plow layer is dark-brown, friable silt loam. The subsoil is brown silt loam in the upper part but grades to silty clay loam below a depth of about 16 inches.

The plow layer is medium in organic-matter content and may be tilled throughout a wide range of moisture content without clodding or crusting. It is high in natural fertility but needs fertilizer for consistently favorable yields. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high; plants receive sufficient water, except during an extremely dry period.

This soil is productive and is well suited to a wide range of crops that includes corn, alfalfa, and tobacco, as well as vegetable, fruit, and nursery crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderately low. (Capability unit IIe–1; woodland suitability group 2; wildlife productivity group 1)

Ennis Series

The Ennis series consists of well-drained, gravelly soils of the narrow bottoms. These soils formed in sediment that washed from areas of cherty limestone, sandstone, and shale on the Knob Hills. Representative profile:

0 to 9 inches, dark grayish-brown, very friable gravelly silt loam.
9 to 36 inches, brown to grayish-brown gravelly silt loam; some gray mottles in the lower part.

The plow layer contains many small fragments of rock. The number of fragments increases with depth to the extent that gravel makes up 50 percent or more of the lower part of the subsoil. A gravel bed may occur below a depth of 20 to 26 inches.

The natural fertility is moderately low. The reaction is slightly acid or medium acid. The moisture-supplying capacity is moderate because of the high content of gravel.

These soils, for the most part, have been cleared and are cultivated. Their acreage is small, however, and they are of minor agricultural value, producing only medium yields of corn, soybeans, small grain, hay, and pasture crops. Some areas are subject to occasional floods of short duration.

Ennis cherty silt loam (En).—This is a well-drained soil that formed in sediment of mixed origin. Normally the plow layer is dark grayish-brown gravelly silt loam. The subsoil is brown to grayish-brown gravelly silt loam. It is progressively more gravelly with depth.

Mapped with this soil are a few areas of gravelly soils that are moderately well drained.

The plow layer is medium in organic-matter content and is easily kept in good tilth. The gravel, however, interferes with tillage. The natural fertility is moderately low, and the response to fertilizer is only fair because of the limited supply of moisture during dry periods. The reaction is slightly acid or medium acid. The moisture-supplying capacity is moderate; some crops are damaged during a dry period because of insufficient moisture. The root zone is about 24 to 42 inches deep, depending on the depth to the gravel bed.

This soil produces medium yields of corn, small grain, hay, and other crops. Under high-level management, it can be cultivated continuously. Erosion is not a limitation, but occasional floods of short duration may damage crops. (Capability unit IIs–1; woodland suitability group 1; wildlife productivity group 2)

Fairmount Series

This series is made up of somewhat excessively drained, strongly sloping or steep soils on limestone hillsides. These soils are scattered throughout the eastern third of the county. Their acreage is moderately large. Representative profile:

0 to 8 inches, very dark grayish-brown flaggy silty clay; sticky.
8 to 15 inches, brown flaggy silty clay to silty clay loam; sticky and plastic; medium, blocky structure.
15 to 24 inches, brown, variegated with olive, flaggy silty clay loam to silty clay; strong, blocky structure; calcareous.
24 inches +, thinly bedded limestone and some calcareous shale.

The depth to bedrock ranges from 12 to 40 inches, but thin fragments of limestone 3 to 10 inches in diameter are scattered over the surface and throughout the soil material.

Fairmount soils are moderately high in natural fertility, and they are mildly alkaline or neutral. Their root zone is shallow.

These soils are not suited to cultivation; pasture or woods are the best use. A large part of the acreage has been cleared and is used for pasture. Nearly all the woods have been cut over, and generally only fair stands of second-growth hardwoods remain.

Fairmount flaggy silty clay, 12 to 20 percent slopes (FaD).—This is a somewhat excessively drained soil on limestone hillsides. Thin fragments of limestone 3 to 10 inches in diameter are scattered over the surface (fig. 13) and throughout the soil material. Bedrock is at a depth of about 24 inches. Normally the plow layer consists of very dark grayish-brown silty clay and is about 8 inches thick. The upper part of the subsoil is brown silty clay. This silty clay grades to the silty clay loam that makes up the lower part of the subsoil. The color of the silty clay loam is brown, variegated with olive.

The plow layer is medium or high in organic-matter content. It is likely to clod or crust if plowed or cultivated when its moisture content is unfavorable. The coarse fragments interfere with tillage. The natural fertility is moderate, and the response to fertilizer is only fair. The reaction is mildly alkaline or neutral, and thus lime is not needed. The root zone is shallow, and the moisture-supplying capacity is moderately low. Plants generally are damaged during a dry period.

This soil is not suitable for cultivation, because of a severe erosion hazard caused by rapid runoff and unfavorable soil conditions. Its best use is for pasture or woods.

Figure 13.—**Unimproved pasture on Fairmount flaggy silty clay, 12 to 20 percent slopes. Rock fragments generally interfere with pasture maintenance.**

Suitable pasture plants are Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza. Orchardgrass, Kentucky bluegrass, red clover, and sweetclover require high-level management. (Capability unit VIe–1; woodland suitability group 11; wildlife productivity group 2)

Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded (FaD3).—This is a somewhat excessively drained soil on limestone hillsides. Fragments of limestone 3 to 10 inches in diameter are scattered over the surface and throughout the soil material. Bedrock is at a depth of about 16 inches. The original surface layer has been removed by erosion, and the present plow layer consists of brown flaggy silty clay and is about 6 inches thick. The subsoil consists of silty clay that grades to silty clay loam. The color of the silty clay is brown, variegated with olive.

The plow layer is low in organic-matter content. It is likely to clod or crust if plowed or cultivated when its moisture content is unfavorable. The coarse fragments interfere with tillage. The natural fertility is moderate, and the response to fertilizer is only fair because of other limiting characteristics of the soil. The reaction is neutral or mildly alkaline, and therefore liming is not necessary. The root zone is shallow, and the moisture-supplying capacity is low. Plants are damaged during a dry period because of insufficient moisture.

The combination of unfavorable soil characteristics and a severe erosion hazard make this soil unsuitable for cultivation. It is best for pasture or woods. Kentucky 31 fescue and sericea lespedeza are suitable pasture plants, but yields are low. (Capability unit VIe–4; woodland suitability group 11; wildlife productivity group 3)

Fairmount flaggy silty clay, 20 to 30 percent slopes (FaE).—This is a somewhat excessively drained soil on limestone hillsides. Thin fragments of limestone 3 to 10 inches in diameter are scattered over the surface and throughout the soil material. Bedrock is at a depth of about 20 inches. Normally the plow layer consists of very dark grayish-brown silty clay and is about 8 inches thick. The upper part of the subsoil is brown silty clay. This silty clay grades to the silty clay loam that makes up the lower part of the subsoil. The color of the silty clay loam is brown, variegated with olive.

The plow layer is medium or high in organic-matter content. It is likely to clod or crust if plowed or cultivated when its moisture content is unfavorable. Furthermore, the coarse fragments interfere with tillage. The natural fertility is moderate, and the response to fertilizer is only fair because of other limiting characteristics of the soil. The reaction is mildly alkaline or neutral, and therefore liming is not necessary. The root zone is shallow, and the moisture-supply capacity is moderately low. Plants generally are damaged during a dry period.

This soil is not suitable for cultivation, because of a severe erosion hazard caused by rapid runoff and unfavorable soil characteristics. Its best use is for pasture or woods. Suitable pasture plants are Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza. Orchardgrass, Kentucky bluegrass, red clover, and sweetclover require high-level management. (Capability unit VIe–1; woodland suitability group 11; wildlife productivity group 2)

Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded (FaE3).—This is a somewhat excessively drained soil on limestone hillsides. Fragments of limestone 3 to 10 inches in diameter are scattered over the surface and throughout the soil material. Bedrock is at a depth of about 12 inches, but it outcrops in a few places. The original surface layer has been removed by erosion, and the present plow layer consists of brown flaggy silty clay and is about 6 inches thick. The subsoil consists of silty clay that grades to silty clay loam. The color of the silty clay is brown, variegated with olive.

This soil is moderate in natural fertility, and it responds poorly to fertilizer because of other limiting characteristics. It is neutral or mildly alkaline and therefore does not need lime. It has a shallow root zone and a low moisture-supplying capacity. Plants are damaged considerably during a dry period because of insufficient moisture.

This soil is suited only to limited pasture or to woods. Kentucky 31 fescue and sericea lespedeza can be grown, but yields are low. Because of the very strong slopes, the use of most farm machines is limited and the control of weeds and bushes is difficult. (Capability unit VIIe–2; woodland suitability group 11; wildlife productivity group 3)

Fairmount flaggy silty clay, 30 to 50 percent slopes (FaF).—This is a somewhat excessively drained soil on limestone hillsides. Thin fragments of limestone 3 to 10 inches in diameter are scattered over the surface and throughout the soil material. Bedrock is at a depth of about 14 inches, but it outcrops in a few places. Normally the plow layer consists of very dark grayish-brown silty clay and is about 8 inches thick. The upper part of the subsoil is brown silty clay. This silty clay grades to the silty clay loam that makes up the lower part of the subsoil. The color of the silty clay loam is brown, variegated with olive.

Mapped with this soil are a few areas of soils that have lost all of their original surface layer.

The root zone of this soil is shallow, and the moisture-supplying capacity is low. Plants are considerably damaged late in summer and during other dry periods because of insufficient moisture.

This soil is best suited to Kentucky 31 fescue and sericea lespedeza, but its yield potential is low. Because of the steep slopes, the use of machinery for pasture maintenance is limited and the control of weeds and bushes is difficult.

Trees grow slowly on this soil. (Capability unit VIIe-1; woodland suitability group 11; wildlife productivity group 3)

Ginat Series

The Ginat series consists of poorly drained, alluvial soils that are widely scattered throughout the Ohio Valley. The acreage is moderate. These soils formed in mixed sediment that washed from the upper part of the Ohio River basin. They have a compact, brittle fragipan at a depth that ranges from 12 to 22 inches. Representative profile:

0 to 7 inches, mottled dark grayish-brown and gray, friable silt loam.
7 to 17 inches, gray, mottled with yellowish-brown, silty clay loam or silt loam; medium, blocky structure.
17 to 36 inches +, mottled gray, grayish brown, and reddish-brown silty clay loam; compact and brittle (fragipan).

These soils are slightly acid or medium acid. Their fragipan restricts the movement of water and limits the depth of the root zone.

Because of their wetness, some areas have been left wooded. Most areas, however, have been cleared and are used for pasture or hay. Crops that tolerate wetness are the most suitable. Yields are low because of unfavorable soil qualities.

Ginat silt loam (Gm).—This is a nearly level, poorly drained, alluvial soil of the Ohio Valley. It has a fragipan at a depth of about 17 inches. Normally the plow layer consists of mottled dark grayish-brown and gray, friable silt loam and is about 7 inches thick. The upper part of the subsoil is mottled gray and yellowish-brown silty clay loam. The lower part—the fragipan—is mottled gray, grayish-brown, and reddish-brown silty clay loam that is compact and brittle.

The plow layer is low in organic-matter content but nevertheless is easy to till. Plowing or cultivating may be delayed early in spring or after a heavy rain. The natural fertility is moderately low, and the response to fertilizer is only fair because of other limiting characteristics of the soil. The root zone is shallow because of the fragipan, and the moisture-supplying capacity is moderately low. Crop yields are reduced in a dry period.

This soil is best suited to crops that tolerate some wetness. Under high-level management, it can be cultivated continuously because it is not subject to erosion. (Capability unit IVw-1; woodland suitability group 3; wildlife productivity group 3)

Gullied Land

Gullied land consists of areas that are more than 20 percent moderately deep or deep gullies and of areas from which most of the solum has been removed by severe sheet erosion. A few patches of topsoil remain between gullies, but in most places erosion has destroyed the original soil. Since the soils cannot be identified, Gullied land is classified as a miscellaneous land type. It may occur on any slope but is most likely to occur on 6 to 20 percent slopes that have been improperly managed.

Gullied land (Gn).—This miscellaneous land type occurs mainly in the eastern fourth of the county, especially in areas of Beasley soils. Generally the soil material is poor and supports only wild grasses, weeds, bushes, and scrubby trees. Most areas have been abandoned for agricultural use. Some areas have reverted to trees. Others could be reclaimed and used to a limited extent for pasture, but reclamation is very difficult and often too costly to be economical. (Capability unit VIIe-4; woodland suitability group 16; wildlife productivity group 3)

Guthrie Series

This series consists of level or slightly depressed, poorly drained soils of the limestone uplands in the eastern half of the county. These soils are mostly near the center of the broadest ridges. Their acreage is small. Their surface layer and upper part of their subsoil formed primarily in loess (windblown silt) that averages 30 inches in thickness. The lower part of their subsoil formed primarily in residuum derived from high-grade limestone. These soils have a compact, brittle fragipan. Representative profile:

0 to 8 inches, mottled grayish-brown and brownish-gray, friable silt loam.
8 to 18 inches, mottled light-gray and yellowish-brown, friable silt loam; medium, blocky structure.
18 to 36 inches +, mottled gray, yellowish-brown, and brownish-gray silty clay loam; compact and brittle (fragipan).

The depth to the fragipan ranges from 12 to 22 inches, and the depth to the limestone bedrock ranges from 5 to 9 feet.

These soils are moderately low in natural fertility. They are strongly acid or very strongly acid. Their fragipan restricts the movement of water and limits the depth of the root zone.

The natural vegetation consisted of mixed stands of hardwoods. Many areas have been left wooded. The cleared areas are generally in hay or pasture. Wetness in spring is the most limiting factor, so these soils are best suited to soybeans, hay, and other crops that are least affected by wetness.

Guthrie silt loam (Gu).—This is a nearly level, poorly drained soil of the limestone uplands. It has a fragipan at a depth of about 18 inches. Normally the plow layer consists of mottled grayish-brown and brownish-gray, friable silt loam and is about 8 inches thick. The upper part of the subsoil is mottled light-gray and yellowish-brown, friable silt loam. The lower part—the fragipan—is mottled gray, yellowish-brown, and brownish-gray silty clay loam that is compact and brittle.

This soil is low in organic-matter content but nevertheless is easy to till. Natural wetness, however, shortens the time during which it can be plowed and cultivated. The natural fertility is moderately low, and the response to fertilizer is only fair because of other limiting characteristics of the soil. The reaction is generally strongly acid, but the response to lime is fairly good. Permeability is moderate in the upper part of the subsoil and very slow in the lower part. The moisture-supplying capacity is moderately low, and consequently crop yields are reduced in a dry period. The depth of the root zone is limited by the fragipan.

This soil is not subject to erosion. Wetness is the main limitation, and though it can be reduced in some areas by surface drainage, it affects the selection of crops. The most suitable crops are soybeans, Korean lespedeza, Kobe lespedeza, white clover, ladino clover, reed canarygrass, Kentucky 31 fescue, and other crops that tolerate wetness. (Capability unit IVw–1; woodland suitability group 3; wildlife productivity group 3)

Holston Series

This series consists of strongly sloping to moderately steep, well-drained, deep soils of the Knob Hills. These soils are on the foot slopes below the sandstone and shale hillsides. Their acreage is moderate. Representative profile:

0 to 2 inches, very dark grayish-brown, very friable gravelly silt loam.
2 to 12 inches, pale-brown, friable gravelly silt loam.
12 to 36 inches, yellowish-brown, friable silt loam; medium, blocky structure; many small fragments of rocks.
36 to 42 inches, variegated yellowish-brown, strong-brown, and brownish-gray silt loam; abundant small fragments of rock.

The number of rock fragments in the subsoil increases with depth. In places, sand is noticeable in the subsoil.

Holston soils are generally extremely acid. They are important mainly for pasture or wood crops. A few areas are cleared, but most are wooded.

Holston gravelly silt loam, 12 to 20 percent slopes (HgD).—This is a deep, well-drained soil that occurs on foot slopes. Generally a 2-inch layer of very dark grayish-brown gravelly silt loam is underlain by a 10-inch layer of pale-brown gravelly silt loam, and below that is the subsoil. The subsoil consists of yellowish-brown gravelly silt loam that is progressively more gravelly with depth.

The surface layer, when plowed, is medium in organic-matter content. It is easily kept in good tilth and can be worked throughout a wide range of moisture content without clodding. It is moderate in natural fertility but responds well to fertilizer. The reaction is extremely acid, but the response to lime is good. The moisture-supplying capacity is high, and consequently plants are damaged only during a dry period. Permeability is generally moderately rapid.

Most of this soil is wooded and therefore uneroded. In cultivated fields, however, erosion is a moderately severe hazard. If cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. A long cropping system that includes a row crop only occasionally is the most suitable. Cultivating on the contour and terracing or strip-cropping generally are effective erosion control practices. The most suitable hay and pasture plants are Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza. Corn, small grain, and tobacco can be grown, but yields are moderate. (Capability unit IVe–2; woodland suitability group 13; wildlife productivity group 2)

Holston gravelly silt loam, 20 to 30 percent slopes (HgE).—This is a deep, well-drained soil that occurs on foot slopes. Generally a 2-inch layer of very dark grayish-brown gravelly silt loam is underlain by a 10-inch layer of pale-brown gravelly silt loam, and below that is the subsoil. The subsoil consists of yellowish-brown gravelly silt loam that is progressively more gravelly with depth.

The surface layer, when plowed, is medium in organic-matter content. It is easily kept in good tilth and can be worked throughout a wide range of moisture content without clodding. It is moderate in natural fertility but responds well to fertilizer. The reaction is extremely acid, but the response to lime is good. The moisture-supplying capacity is high, and consequently plants are damaged only during a dry period because of insufficient moisture. Permeability is generally moderately rapid.

This soil, for the most part, is wooded and therefore uneroded. It is not suitable for cultivation, because erosion is a severe hazard in cultivated fields. It is best suited to pasture and hay crops and to woods. The most suitable pasture and hay crops are Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza. Because of the very strong slopes, the use of farm machines is limited and the control of weeds and brush is difficult. (Capability unit VIe–7; woodland suitability group 13; wildlife productivity group 2)

Huntington Series

The Huntington series consists of deep, well-drained soils that are on first bottoms along rivers and small creeks. The acreage is moderately large. Those soils along the Ohio River formed in mixed sediment that washed from the upper part of the Ohio River basin. Those along the creeks formed in sediment that washed mostly from soils of limestone origin. Representative profile:

0 to 11 inches, dark-brown, very friable silt loam.
11 to 34 inches, brown, friable silt loam.
34 to 48 inches, brown or dark grayish-brown silt loam; few mottles in lower part.

In places the material below a depth of 34 inches—but more likely below a depth of 42 inches—is loam, fine sandy loam, or silty clay loam.

These soils are generally neutral or slightly acid. They have a high moisture-supplying capacity, a deep root zone, and other qualities that promote plant growth.

These soils, for the most part, have been cleared and are cultivated. They can be cultivated continuously; they are suited to a wide range of crops; and they are productive. Those in the lower lying areas are subject to flooding, but overflows generally are of short duration and do not occur during the normal growing season.

Huntington fine sandy loam (0 to 4 percent slopes) (Hn).—This is a deep, well-drained, slightly sandy soil of the first bottoms in the Ohio Valley. It formed in recent alluvium that washed from the upper part of the Ohio River basin. Normally the surface layer consists of dark-brown, very friable fine sandy loam and is about 10 inches thick. The subsoil is brown, very friable fine sandy loam or loam.

The plow layer is medium in organic-matter content and can be worked throughout an extremely wide range of moisture content without clodding or crusting. The natural fertility is high, and the response to fertilizer is good. Small amounts of fertilizer applied frequently work best. Generally the reaction is nearly neutral, so little or no lime is needed. The moisture-supplying capacity is high and consequently plants are damaged only during an extremely dry period.

This soil is well suited to all general crops and to early vegetable crops, especially melons. Under high-level management, it can be cultivated continuously because it is not subject to erosion. The lower lying areas are flooded occasionally, but floods generally occur before the crop season begins. (Capability unit I–1; woodland suitability group 1; wildlife productivity group 1)

Huntington silt loam (Hs).—This is a deep, well-drained, silty soil of the first bottoms. It formed in recent alluvium that is principally of limestone origin. The surface layer normally consists of dark-brown, very friable silt loam and is about 11 inches thick. The subsoil is brown, friable silt loam and may be faintly mottled below a depth of 36 inches.

Mapped with this soil are a few areas of a soil that has a brown surface layer. An insignificant area of a soil that is less than 30 inches deep to limestone is included also.

The plow layer is medium in organic-matter content and can be worked throughout a wide range of moisture content without crusting or clodding. The natural fertility is high, and the response to fertilizer is good. Generally the reaction is nearly neutral, so only small amounts of lime are needed. The moisture-supplying capacity is high.

This soil is well suited to all general crops. Under high-level management, it can be cultivated continuously because it is not subject to erosion. Occasional flooding, principally in the lowest lying areas, may damage crops in some years. (Capability unit I–1; woodland suitability group 1; wildlife productivity group 1)

Lakin Series

The Lakin series consists of deep, gently sloping to moderately steep, excessively drained soils on terraces. These soils are inextensive and are widely scattered throughout the Ohio Valley. Several areas are near Valley Station. In many places the relief is hummocky. Lakin soils are sandy. They formed in both water-deposited and windblown material of mixed origin. Representative profile:

0 to 7 inches, dark-brown, very friable or loose loamy fine sand.
7 to 12 inches, brown, very friable or loose loamy fine sand.
12 to 42 inches, yellowish-brown, very friable or loose very fine sandy loam; many stratified bands of loamy fine sand.

The stratified bands range from a half inch to 3 inches or more in thickness. In places they make up 50 percent of the horizon, or layer.

The reaction of these soils is strongly acid. Permeability and infiltration are rapid.

Corn, small grain, and tobacco will grow on these soils, but yields are low because of insufficient moisture. Kentucky 31 fescue, sericea lespedeza, and other drought-resistant grasses and legumes are the most suitable crops.

Lakin loamy fine sand, 2 to 6 percent slopes (LaB).—This is a deep, excessively drained soil on terraces along the Ohio River. The plow layer is normally dark-brown, very friable loamy fine sand. The subsoil is brown to yellowish-brown, very friable or loose fine sandy loam stratified with bands of loamy fine sand.

The plow layer is low in organic-matter content but nevertheless is in excellent tilth. It can be plowed or cultivated extremely early in spring or soon after a heavy rain without clodding or crusting. The natural fertility is only moderate, so fertilizer is needed. Split applications of fertilizer generally are more beneficial than a single application. The reaction is strongly acid, but the response to lime is good. The moisture-supplying capacity is moderately low, and insufficient moisture is one of the main limitations of this soil. A dry period, even one of short duration, affects crop yields.

This soil is suited to corn, small grain, hay, and pasture, but yields are low because moisture is not sufficient. Erosion is a slight hazard in cultivated fields. Consequently, contour cultivation is needed on the short slopes to help control erosion, and terracing or stripcropping is needed on the long slopes. (Capability unit IIIs–1; woodland suitability group 14; wildlife productivity group 3)

Lakin loamy fine sand, 6 to 12 percent slopes (LaC).—This is a deep, excessively drained soil on terraces along the Ohio River. The plow layer is normally dark-brown, very friable loamy fine sand. The subsoil is brown to yellowish-brown, very friable or loose fine sandy loam stratified with bands of loamy fine sand.

The plow layer is low in organic-matter content but nevertheless is in excellent tilth. It can be plowed or cultivated extremely early in spring or soon after a heavy rain without clodding or crusting. This soil is moderate in natural fertility and needs fertilizer. Split applications generally are more beneficial than a single application. The reaction is strongly acid, but the response to lime is good. The moisture-supplying capacity is moderately low, and insufficient moisture is one of the main limitations of this soil. A dry period, even one of short duration, affects crop yields.

This soil is suited to corn, soybeans, hay, and pasture, but yields are low because of insufficient moisture. Erosion is a moderate hazard in cultivated fields. But contour cultivation and a long cropping system that only occasionally includes a row crop help to control erosion. Terracing or stripcropping also are helpful, especially on the long slopes. (Capability unit IVs–2; woodland suitability group 14; wildlife productivity group 3)

Lakin loamy fine sand, 12 to 25 percent slopes (LaD).—This is a deep, excessively drained soil on terraces along the Ohio River. The plow layer is normally dark-brown, very friable loamy fine sand. The subsoil is brown to yellowish-brown, very friable or loose fine sandy loam stratified with bands of loamy fine sand.

The plow layer is low in organic-matter content but nevertheless is in excellent tilth. It can be plowed or cultivated extremely early in spring or soon after a heavy rain wilthout clodding or crusting. Natural fertility is moderate, so fertilizer is needed. Split applications generally are more beneficial than a single application. The reaction is strongly acid, but the response to lime is good. The moisture-supplying capacity is moderately low. Insufficient moisture is one of the main limitations of this soil. A dry period, even one of short duration, affects crop yields.

This soil is not suitable for cultivation, because moisture is insufficient for plant growth and erosion is a moderately severe hazard in cultivated fields. Drought-resistant grasses and legumes can be grown, but even in a normal year yields will be low. (Capability unit VIs–3; woodland suitability group 14; wildlife productivity group 3)

Lawrence Series

The Lawrence series consists of level or nearly level, somewhat poorly drained soils that are on broad ridges. These soils are widely scattered throughout the limestone uplands in the eastern half of the county. Their acreage is moderate. The surface layer and the upper part of the subsoil formed mostly in loess (windblown silt) that averages 30 inches in thickness. The lower part of the subsoil formed mostly in residuum derived from high-grade limestone. These soils have a compact, brittle fragipan. Representative profile:

0 to 7 inches, dark grayish-brown, friable silt loam.
7 to 16 inches, mottled yellowish-brown and grayish-brown, friable silt loam; medium, blocky structure.
16 to 35 inches, mottled gray, yellow, and olive silty clay loam; compact and brittle (fragipan).

The depth to the fragipan ranges from 14 to 30 inches, and the depth to the limestone bedrock ranges from 5 to 9 feet.

These soils are moderate in natural fertility. They are strongly acid or very strongly acid. The moisture-supplying capacity is moderately low, and consequently crop yields may be reduced during a dry period because of insufficient moisture. The fragipan restricts the movement of water and limits the depth of the root zone.

The natural vegetation consisted of mixed stands of hardwoods, and many areas have been left wooded. Most of the acreage, however, has been cleared and is cultivated or is in pasture. Wetness in spring is the most limiting factor, so these soils are best suited to soybeans, hay, and other crops that are least affected by wetness.

Lawrence silt loam (Lb).—This is a somewhat poorly drained soil of the limestone uplands. It has a fragipan at a depth of about 16 inches. Normally the plow layer consists of grayish-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is mottled yellowish-brown and grayish-brown silt loam. The lower part—the fragipan—is mottled gray, yellow, and olive silty clay loam that is compact and brittle.

This soil is low in organic-matter content but nevertheless is easy to till. Natural wetness, however, shortens the time during which it can be plowed and cultivated. The natural fertility is moderate, and the response to fertilizer is only fair because of wetness. The reaction is generally strongly acid, but the response to lime is fairly good. Permeability is moderate in the upper part of the subsoil and very slow in the lower part. The moisture-supplying capacity is moderately low, and consequently crop yields are reduced in a dry period. The depth of the root zone is limited by the fragipan.

This soil is not subject to erosion. Wetness is the main limitation, and though it can be reduced in many areas by surface drainage, it affects the selection of crops. Soybeans, Korean lespedeza, Kobe lespedeza, white clover, ladino clover, reed canarygrass, Kentucky 31 fescue, and other crops that tolerate some wetness are the most suitable. (Capability unit IIIw–1; woodland suitability group 6; wildlife productivity group 2)

Lindside Series

The Linside series consists of deep, moderately well drained soils of the first bottoms. These soils are of moderate extent in the county; they are widely scattered along rivers and small creeks. Those soils along the creeks formed in sediment that washed mostly from soils of limestone origin, and those along the Ohio River formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 10 inches, brown, friable silt loam.
10 to 23 inches, brown, friable silt loam; few grayish-brown mottles in lower part; massive.
23 to 42 inches +, grayish-brown, friable silt loam; yellowish-brown and some light-gray mottles; massive.

In places the material below a depth of 23 inches is stratified silty clay loam or loam.

Lindside soils are generally neutral or slightly acid. They have a high moisture-supplying capacity, a deep root zone, and other qualities that promote plant growth.

These soils, for the most part, are cultivated. They can be cultivated continuously, and they are suited to nearly all the general crops. Those in the lower lying areas are subject to flooding, but overflows generally are of short duration and do not occur during the normal growing season. In some areas, draining the soils helps to increase yields.

Lindside silt loam (Ld).—This is a deep, moderately well drained soil of the first bottoms. This soil formed in recent alluvium that is mostly of limestone origin. The surface layer normally consists of brown, friable silt loam and is about 10 inches thick. The upper part of the subsoil is brown silt loam; it has a few grayish-brown mottles in the lowermost few inches. The lower part of the subsoil, which begins at a depth of about 23 inches, is grayish-brown silt loam; it has yellowish-brown mottles.

The plow layer is medium in organic-matter content and is easy to till. Occasionally late in spring it is too wet to plow. The wetness is a result of floods. Although the natural fertility is high, fertilizer increases productivity. The reaction is neutral or slightly acid, but the soil responds to lime. The moisture-supplying capacity is high; plants generally receive sufficient moisture.

This soil is suited to corn, soybeans, and other general crops. Under high-level management, it can be cultivated continuously because it is not subject to erosion. Some low-lying areas are flooded occasionally, and plants growing there are damaged. Wetness in some areas can be reduced by surface and tile drainage. (Capability unit I–2; woodland suitability group 1; wildlife productivity group 1)

Litz Series

The Litz series consists of shallow, somewhat excessively drained, strongly sloping or steep soils on the sides of the Knob Hills. The acreage is moderate. These soils are underlain by siltstone, shale, and some sandstone. The upper layers formed in loess (windblown silt) that varies in thickness and is as much as 20 inches thick. These layers are silty and generally contain few or no fragments. Representative profile:

0 to 2 inches, dark grayish-brown, very friable silt loam.
2 to 5 inches, grayish-brown, very friable silt loam.
5 to 12 inches, yellowish-brown, friable light silty clay loam; very strongly acid.
12 to 16 inches, yellowish-brown silt loam; some olive-brown and light-gray variegations; very strongly acid.
16 to 28 inches, weathered siltstone and shale and yellowish-brown silt loam.
28 inches +, hard shale and siltstone.

Because they are shallow and steep, Litz soils are best for trees.

Litz silt loam, 12 to 20 percent slopes (LeD).—This is a somewhat excessively drained, shallow soil that formed in residuum derived from siltstone, shale, and some sandstone. The depth to bedrock is ordinarily about 28 inches. Normally the surface layer consists of grayish-brown, very friable silt loam and is about 5 inches thick. The subsoil is yellowish-brown to light olive-brown, friable light silty clay loam.

This soil can be cultivated throughout a wide range of moisture content without clodding or crusting. It is medium or low in organic-matter content. The natural fertility is moderate, and because of other limiting characteristics of the soil, the response to fertilizer is only fair. The reaction is very strongly acid, but the response to lime is good. Permeability is moderately rapid or rapid. The moisture-supplying capacity is moderate; plants are damaged in a dry period because of insufficient moisture. The root zone is shallow.

Erosion is a moderately severe hazard in cultivated fields because surface runoff is rapid. Consequently, if this soil is cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. The most suitable cropping system for this soil is a long one that includes a row crop only occasionally. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under a medium level of management. (Capability unit VIe–7; woodland suitability group 9; wildlife productivity group 2)

Litz-Muskingum silt loams, 20 to 30 percent slopes (LmE).—This is a complex made up of somewhat excessively drained, shallow soils that formed in residuum derived from siltstone, shale, and sandstone. Muskingum silt loam is described under the Muskingum series. The description that follows is of Litz silt loam.

Normally the surface layer consists of grayish-brown, very friable silt loam and is about 5 inches thick. (Mapped with this complex are a few areas of soils that have lost nearly all of their original surface layer.) The subsoil is yellowish-brown to light olive-brown, friable silt loam or light silty clay loam. The depth to bedrock is ordinarily about 22 inches.

This soil can be cultivated throughout a wide range of moisture content without clodding or crusting. It is medium or low in organic-matter content. The natural fertility is moderate, and because of other limiting characteristics of the soil, the response to fertilizer is only fair. The reaction is very strongly acid, but the response to lime is good. Permeability is moderately rapid or rapid. The moisture-supplying capacity is moderate; plants are damaged in a dry period because of insufficient moisture. The root zone is shallow.

Erosion is a severe hazard on this soil because surface runoff is rapid. Consequently, this soil is not suitable for cultivation. It is suitable for pasture and woods. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Other grasses and legumes require high-level management. The operation of machinery on this soil is limited, and the control of weeds and brush is difficult. (Capability unit VIe–7; woodland suitability groups 8 and 9; wildlife productivity group 3)

Litz-Muskingum silt loams, 30 to 50 percent slopes (LmF).—This is a complex made up of somewhat excessively drained, shallow soils that formed in residuum derived from siltstone, shale, and sandstone. Muskingum silt loam is described under the Muskingum series. The description that follows is of Litz silt loam.

Normally the surface layer consists of grayish-brown, very friable silt loam and is about 5 inches thick. The subsoil is yellowish-brown to light olive-brown, friable silt loam or light silty clay loam. The depth to bedrock is ordinarily about 16 inches.

The natural fertility is moderate, and the response to fertilizer is only fair because of other limiting characteristics of the soil. The reaction is very strongly acid, but the response to lime is good. The moisture-supplying capacity is low. The root zone is shallow.

Droughtiness is a limitation on this soil, and erosion is a severe hazard because surface runoff is rapid. Consequently, this soil is not suitable for cultivation and has only a low potential for pasture. It is best suited to woods. The use of machinery is extremely limited because of the steep slopes. (Capability unit VIIe–1; woodland suitability groups 8 and 9; wildlife productivity group 3)

Loring Series

The Loring series consists of well drained or moderately well drained, silty soils on gently sloping or sloping ridges in the western part of the Knob Hills. The acreage is moderate. These soils formed in loess (windblown silt) underlain by residuum derived from sandstone and shale or limestone. They have a compact, brittle fragipan at a depth of about 34 inches. Representative profile:

0 to 6 inches, brown, very friable silt loam.
6 to 34 inches, brown to strong-brown, friable silt loam; few grayish mottles in lower part; medium, blocky structure.
34 to 45 inches, yellowish-brown silt loam; grayish-brown mottles; compact and brittle (fragipan).

The loess ranges from 42 to 60 inches in thickness. The depth to the sandstone and shale bedrock is generally 6 feet or more.

Loring soils are moderate in natural fertility, and they are medium acid. Their fragipan restricts the movement of water and limits the depth of the root zone.

These soils, for the most part, are cultivated or are in pasture. They are suited to nearly all the general crops, including corn, tobacco, small grain, pasture, and hay crops. They are not suited to alfalfa or to other deep-rooted crops.

Loring silt loam, 2 to 6 percent slopes (LnB).—This is a well drained or moderately well drained soil on ridges of the Knob Hills. Normally the plow layer consists of brown, very friable silt loam and is about 6 inches thick. The subsoil is brown or strong-brown, friable silt loam in the upper part. At a depth of about 34 inches it grades to yellowish-brown silty clay loam that has gray mottles. This lower part is a compact, brittle fragipan that restricts the movement of water and limits the penetration of roots.

This soil is medium in organic-matter content and can be tilled throughout a wide range of moisture content without clodding or crusting. It is moderate in natural fertility but benefits from fertilizer. It is medium acid or strongly acid but responds well to lime. The moisture-supplying capacity is high, and plants generally receive sufficient water, except in an extremely dry period.

Erosion is a moderately low hazard in cultivated fields. Nevertheless, if cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Corn, small grain, soybeans, tobacco, hay, and pasture crops can be grown on this soil. Alfalfa is short lived. (Capability unit IIe–10; woodland suitability group 10; wildlife productivity group 1)

Loring silt loam, 6 to 12 percent slopes, eroded (LnC2).—This is a well drained and moderately well drained soil on ridges of the Knob Hills. Normally the plow layer consists of brown, friable silt loam and is about 6 inches thick. The upper part of the subsoil is brown or strong-brown, friable silt loam and extends to a depth of about 28 inches. The lower part is yellowish-brown silty clay loam that has gray mottles. This lower part of the subsoil is a compact, brittle fragipan that restricts the movement of water and limits the penetration of roots. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

This soil is low in organic-matter content but nevertheless is easy to till. It is moderate in natural fertility but benefits from fertilizer. It is medium acid or strongly acid but responds well to lime. The moisture-supplying capacity is high, and plants generally receive sufficient water, except in an extremely dry period.

Erosion is a moderate hazard in cultivated fields. Thus, if cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Corn, small grain, soybeans, tobacco, hay, and pasture crops can be grown on this soil. Alfalfa is short lived. (Capability unit IIIe–2; woodland suitability group 10; wildlife productivity group 1)

Loring-Crider silt loams, 6 to 12 percent slopes, eroded (LoC2).—This is a complex made up of well drained and moderately well drained, silty soils on the eastern ridges of the Knob Hills. Loring silt loam makes up about 60 percent of this complex, and Crider silt loam about 40 percent. Mapping these soils separately would have been impractical, for they occur as narrow strips—Loring silt loam on the more nearly level upper part of the strip, and Crider silt loam on the lower part. Both soils formed in loess underlain by residuum derived from cherty limestone. The Crider soil formed in 24 to 42 inches of loess, and the Loring soil in more than 42 inches of loess. The description of Loring silt loam, 6 to 12 percent slopes, eroded (LnC2), fits the Loring soil in this complex. Following is a description of a representative profile of Crider silt loam as it occurs in this complex.

0 to 8 inches, brown, very friable silt loam.
8 to 15 inches, yellowish-brown to brown silty clay loam; medium, blocky structure.
15 to 32 inches, strong-brown to yellowish-red silty clay loam; medium, blocky structure.
32 to 40 inches, variegated yellowish-brown, reddish-brown, and brown silty clay loam. (Chert fragments in lower part in some places.)

Both the Loring soil and the Crider soil have a plow layer that is low in organic-matter content but nevertheless is generally easy to till. These soils are moderate in natural fertility, but they benefit from fertilizer. They are medium acid or strongly acid, but they respond well to lime. Their moisture-supplying capacity is high. Crops obtain sufficient water from these soils, except during an extended dry period.

Corn, small grain, soybeans, tobacco, hay, and pasture crops can be grown on these soils, but alfalfa is short lived. Erosion is a moderate hazard in cultivated fields. Thus, if cultivated, these soils need a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. (Capability unit IIIe–2; woodland suitability groups 4 (Crider) and 10 (Loring); wildlife productivity group 1)

Lowell Series

This series consists of deep, well-drained, sloping soils on hillsides. These soils are widely scattered in the extreme eastern part of the county, but their acreage is small. They formed in residuum derived from thin-bedded, argillaceous limestone. Representative profile:

0 to 6 inches, brown, very friable silt loam.
6 to 20 inches, yellowish-brown to brown silty clay loam; slightly sticky; medium, blocky structure.
20 to 40 inches +, yellowish-brown silty clay; sticky and slightly plastic; strong, blocky structure.

The depth to bedrock is normally 4 feet or more.

Lowell soils are high in natural fertility, and they are slightly acid or medium acid. They have a deep root zone, but permeability is generally moderately slow in the lower part of the subsoil.

These soils are suited to all the general crops, including corn, tobacco, and alfalfa, and they are productive.

Lowell silt loam, 6 to 12 percent slopes, eroded (LsC2).—This is a deep, well-drained soil on short, limestone hillsides. Normally the plow layer consists of brown, very friable silt loam and is about 6 inches thick. The upper part of the subsoil is yellowish-brown silty clay loam and extends to a depth of about 20 inches. The lower part is silty clay that is sticky and slightly plastic. In plowing, material from the upper part of the subsoil has been mixed with the plow layer.

A small acreage of soils that have lost all of their original surface layer was mapped with this soil. Also included are a few areas of soils that slope more than 12 percent.

This soil is low in organic-matter content but nevertheless is generally easy to till. It is moderately high in natural fertility but still benefits from fertilizer. It is slightly acid or medium acid but responds well to lime. The moisture-supplying capacity is high; a shortage of moisture seldom occurs, except in an unusually dry period.

Corn, alfalfa, small grain, hay, and pasture crops can be grown on this soil. Erosion is a moderate hazard in cultivated fields. Thus, if cultivated, this soil needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. (Capability unit IIIe–2; woodland suitability group 7; wildlife productivity group 1)

Made Land

This is a miscellaneous land type that consists of areas where the soil material has been moved, reworked, or graded by man. Examples of Made land include graded areas surrounding highway cloverleaves, deep fills and cuts, borrow pits, and earth levees. Most areas are gently sloping to strongly sloping, and a few are nearly level; some include a short escarpment. The soil material is mostly silt loam or silty clay loam. It is clay in a few places in the Knob Hills and sand in some places in the Ohio Valley.

Made land (Ma).—This miscellaneous land type varies from place to place in drainage, in natural fertility, and in nearly all characteristics. Consequently, each individual area has to be appraised separately for various uses. For the most part, however, this land type is not suitable for agricultural use. (Capability unit VIIe-4; woodland suitability group 16; wildlife productivity group 3)

Markland Series

The Markland series consists of well drained or moderately well drained soils on sloping to moderately steep terrace breaks and in narrow, gently sloping areas adjacent to the breaks. These soils are widely scattered throughout the slack-water area south of Louisville. Their acreage is small, and their agricultural importance is minor. Markland soils formed in calcareous sediment that has a high content of clay. Representative profile:

0 to 8 inches, brown, friable silt loam.
8 to 12 inches, yellowish-brown silty clay loam; few pale-brown mottles; medium, blocky structure; medium acid.
12 to 22 inches, brown silty clay or clay; common pale-brown mottles; strong, blocky structure; sticky and plastic; slightly acid.
22 to 40 inches +, yellowish-brown clay; many grayish-brown and brown mottles; strong, blocky structure; sticky and very plastic; mildly alkaline.

Generally the upper part of the subsoil is slightly acid or medium acid, and the lower part is neutral or mildly alkaline. The lower part is at a depth that ranges from about 22 to 36 inches.

The gentle slopes have been cleared and ordinarily are cultivated. The steeper slopes generally are in pasture or in woods. Yields of most crops are moderate.

Markland silt loam, 2 to 6 percent slopes, eroded (MdB2).—This is a well drained or moderately well drained, slack-water soil. Normally the plow layer is brown, friable silt loam. The upper part of the subsoil is yellowish-brown silty clay loam and extends to a depth of about 12 inches. The lower part is yellowish-brown silty clay or clay that is mottled with brown and grayish brown. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content, and it clods or crusts if cultivated or plowed when moisture conditions are not favorable. The natural fertility is moderate, but the response to fertilizer is fairly good. The surface layer and the upper part of the subsoil are medium acid but are readily neutralized by lime. The lower part of the subsoil is ordinarily alkaline. The moisture-supplying capacity is high, and plants receive sufficient water, except during an extremely dry period. Permeability is slow in the lower part of the subsoil. Consequently, this soil stays wet during periods of heavy rainfall.

Soybeans, corn, and most hay crops can be grown on this soil. Tilth can be improved by growing a cover crop and by utilizing residues properly. Erosion is a moderate hazard in cultivated fields. Therefore, if cultivated, this soil needs a suitable cropping system and some conservation practices that will effectively control erosion. (Capability unit IIIe-14; woodland suitability group 7; wildlife productivity group 2)

Markland silt loam, 6 to 12 percent slopes, eroded (MdC2).—This is a well drained or moderately well drained, slack-water soil. Normally the plow layer is brown, friable silt loam. The upper part of the subsoil is yellowish-brown silty clay loam and extends to a depth of about 12 inches. The lower part is yellowish-brown silty clay or clay that is mottled with brown and grayish brown. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content, and it clods or crusts if cultivated or plowed when moisture conditions are not favorable. The natural fertility is moderate, but the response to fertilizer is fairly good. The surface layer and the upper part of the subsoil are medium acid but are readily neutralized by lime. The lower part of the subsoil ordinarily is alkaline. The moisture-supplying capacity is high, and plants receive sufficient water, except during an extremely dry period. Permeability is slow in the lower part of the subsoil. Consequently, this soil stays wet during periods of heavy rainfall.

Erosion is a moderately severe hazard on this soil because of the moderately strong slopes and the poor soil conditions. If cultivated, this soil needs a suitable cropping system and conservation practices that will effectively control erosion. Corn, soybeans, and small grain can be grown occasionally in rotation with a close-growing crop. Tilth can be improved by growing a cover crop and by utilizing residues properly. (Capability unit IVe-8; woodland suitability group 7; wildlife productivity group 2)

Markland silt loam, 12 to 30 percent slopes (MdE).—This is a well drained or moderately well drained soil that occurs on strongly sloping to moderately steep, short slopes below broad terraces in the slack-water area. Normally the surface layer consists of dark grayish-brown, friable silt loam and is about 4 inches thick. It is underlain by a layer of pale-brown silt loam. The upper part of the subsoil is yellowish-brown silty clay loam and extends to a depth of about 12 inches. The lower part of the subsoil is yellowish-brown silty clay or clay; it has grayish-brown and brown mottles.

The plow layer is medium in organic-matter content and is generally easy to till. The natural fertility is moderate, but the response to fertilizer is fairly good. The surface layer and the upper part of the subsoil are medium acid but are generally benefited by lime. The lower part of the subsoil is alkaline. The moisture-supplying capacity is high.

Erosion is a severe hazard in cultivated fields. Consequently, this soil is best suited to hay and pasture crops. The potential yield of wood crops is medium. Kentucky 31 fescue, red clover, Korean lespedeza, and sericea lespedeza are among the most suitable grasses and legumes. (Capability unit VIe-1; woodland suitability group 7; wildlife productivity group 2)

McGary Series

The McGary series consists of somewhat poorly drained, level or nearly level soils that are widely scattered throughout the old slack-water area south of Louisville. The individual areas generally are fairly large, but the total acreage is small. McGary soils formed in calcareous sediment that has a high content of clay. Representative profile:

0 to 7 inches, dark grayish-brown, friable silt loam.
7 to 14 inches, dark grayish-brown silty clay loam; many pale-brown and brown mottles; medium, blocky structure; slightly acid.
14 to 34 inches, light olive-brown silty clay or clay; many yellowish-brown and grayish-brown mottles; strong, blocky structure; neutral or mildly alkaline.
34 to 48 inches +, mottled grayish-brown and yellowish-brown silty clay or clay; massive; mildly alkaline.

The surface layer and the upper part of the subsoil generally are slightly acid. The lower part of the subsoil is neutral to a depth of 22 to 36 inches; below that it is mildly alkaline. Permeability is slow, especially in the lower part of the subsoil.

These soils are of minor agricultural importance. Most of their acreage has been cleared, but some areas in slight depressions have been left wooded because they are excessively wet. Crops that tolerate wetness are the most suitable, but only moderately low yields can be expected.

McGary silt loam (Mg).—This is a somewhat poorly drained, slack-water soil that formed in fine-textured, calcareous sediment. Normally the plow layer consists of dark grayish-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is dark grayish-brown silty clay loam; it has pale-brown and brown mottles. The lower part of the subsoil, which begins at a depth of about 14 inches, is light olive-brown silty clay or clay; it has many brown and grayish-brown mottles.

The plow layer is low in organic-matter content but nevertheless is fairly easy to till. It is wet most of the time, however, and is likely to clod or crust if plowed or cultivated when moisture conditions are unfavorable. The natural fertility is moderately low, and fertilizer generally has little effect on the soil because of other unfavorable characteristics. The surface layer and the upper part of the subsoil are slightly acid or medium acid, but ordinarily they are benefited by lime. The lower part of the subsoil is alkaline. The moisture-supplying capacity is moderately high. Nevertheless, plants may not receive sufficient water during an extended dry period. Permeability is slow in the lower part of the subsoil—a characteristic that is largely responsible for the natural wetness of this soil.

This soil is not subject to erosion and thus can be cultivated continuously, but only under high-level management. It is best suited to soybeans and to other water-tolerant crops. It is not well suited to alfalfa and other deep-rooted crops. (Capability unit IIIw–1; woodland suitability group 15; wildlife productivity group 2)

Melvin Series

The Melvin series consists of deep, poorly drained soils of the first bottoms. These soils are widely scattered throughout the creek and river valleys. Their acreage is moderate. Those soils along small creeks formed in sediment that washed mainly from soils of limestone origin, and those in the Ohio Valley formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 8 inches, dark grayish-brown, friable silt loam.
8 to 40 inches +, mottled grayish-brown and gray silt loam.

The surface layer is mottled in places. The material below the surface layer gets grayer with depth. It is silty clay loam in some areas.

These soils, which are neutral or slightly acid, are best suited to crops that tolerate some wetness. If drained, they are moderately productive and can be cultivated continuously. The lower lying areas are subject to flooding, but floods usually occur before the normal cropping season. A few areas are wooded.

Melvin silt loam (Mm).—This is a deep, poorly drained soil of the first bottoms. It formed in recent alluvium that is principally of limestone origin. The surface layer ordinarily consists of dark grayish-brown, friable silt loam and is about 8 inches thick. In some areas it is mottled. The subsoil is mottled grayish-brown and gray silt loam; it gets grayer with depth.

Generally this soil is low in organic-matter content. It is moderately low in natural fertility, but if properly drained it responds well to fertilizer. It is slightly acid or neutral so needs little or no lime. The moisture-supplying capacity is high.

This soil is not subject to erosion and, therefore, can be cultivated continuously. It is suited to corn and soybeans but is best suited to crops that tolerate some wetness. Generally it is waterlogged in winter and during rainy periods. In spring, flooding or wetness may delay plowing or cultivating. In some years, flooding may damage crops. Wetness can be reduced by tile and surface drainage. (Capability unit IIIw–5; woodland suitability group 3; wildlife productivity group 3)

Melvin silty clay loam (Mn).—This is a deep, poorly drained soil of the first bottoms. It formed in recent alluvium that is principally of limestone origin. Generally the surface layer is dark grayish-brown silty clay loam that is mottled with gray. The subsoil is mottled gray and grayish-brown silty clay loam; in many places it gets grayer and finer textured with depth.

Ordinarily this soil is low in organic-matter content. It is moderately low in natural fertility, and if not drained it responds poorly to fertilizer. It is slightly acid or neutral so needs little or no lime. The moisture-supplying capacity is high; plants seldom are damaged because of insufficient moisture.

This soil is not subject to erosion, and therefore it can be cultivated continuously, though only under high-level management. It is suited to corn and soybeans but is best suited to crops that tolerate wetness. Generally it is waterlogged in winter and during rainy periods. Flooding or wetness may delay plowing or cultivating in spring, and flooding in some low-lying areas may damage crops in some years. Wetness can be reduced in places by tile and surface drainage. (Capability unit IIIw–5; woodland suitability group 3; wildlife productivity group 3)

Melvin silt loam, overwash (Mo).—This is a deep, somewhat poorly drained or poorly drained soil of the first bottoms. It formed in recent alluvium that is principally of limestone origin. The surface layer consists of brown, friable silt loam and is about 10 inches thick. The upper part of the subsoil is gray silty clay loam that has dark-brown mottles. The lower part, which begins at a depth of about 22 inches, is mottled gray and grayish-brown silty clay loam.

Generally this soil is low in organic-matter content. It is moderately low in natural fertility, and if not drained it responds poorly to fertilizer. It is slightly acid or neutral so needs little or no lime. The moisture-supplying capacity is high.

This soil is not subject to erosion and, therefore, can be cultivated continuously, though only under high-level management. It is suited to corn and soybeans but is best suited to crops that tolerate wetness. It is waterlogged for short periods in winter and early in spring. Occasional flooding or wetness late in spring may delay plowing or cultivating. In some years, flooding in some low-lying areas may damage crops. Wetness can be reduced in most places by tile and surface drainage. (Capability unit IIw–4; woodland suitability group 3; wildlife productivity group 2)

Memphis Series

The Memphis series consists of gently sloping to moderately steep, silty soils that are deep and well drained. These soils are in the western part of the county, mostly on west-facing slopes of the Knob Hills. Their acreage is moderate. Memphis soils formed in loess (windblown silt) that is more than 42 inches thick. They are underlain by sandstone and shale at a depth of about 6 feet. Representative profile:

0 to 6 inches, brown, very friable silt loam.
6 to 40 inches, brown to reddish-brown, friable silt loam to silty clay loam; medium, blocky structure.
40 to 50 inches, brown, friable silt loam or silt.

These soils are moderate in natural fertility, and they are medium acid. Their moisture-supplying capacity is high, and their root zone is deep.

The moderately steep areas have been left wooded, and the gently sloping and sloping areas have been cleared. The cleared areas are suited to pasture and have a high potential for wood crops.

Memphis silt loam, 2 to 6 percent slopes (MpB).—This is a well-drained soil on ridges of the Knob Hills in the extreme western part of the county. Normally the plow layer consists of brown, very friable silt loam and is about 8 inches thick. The subsoil is brown to reddish-brown, friable silty clay loam.

Mapped with this soil are a few areas that are eroded. In these areas, material from the subsoil has been mixed with the plow layer as a result of plowing.

This soil is medium in organic-matter content and is easy to till. It seldom clods or crusts. Natural fertility is moderately high, and the response to fertilizer is good The reaction is medium acid, but the acidity is checked by lime. The moisture-supplying capacity is high, and the root zone is deep. Permeability is moderate in the subsoil.

This soil is suited to all the general crops but is only moderately productive. If cultivated, it needs good management, including specific conservation practices that will effectively control runoff and erosion. Erosion is a moderately low hazard on this soil. (Capability unit IIe–1; woodland suitability group 10; wildlife productivity group 1)

Memphis silt loam, 6 to 12 percent slopes, eroded (MpC2).—This is a well-drained soil on ridges of the Knob Hills in the extreme western part of the county. The plow layer consists of brown, friable silt loam and is about 6 inches thick. The subsoil is brown to reddish-brown, friable silty clay loam. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

Mapped with this soil are a few areas that are not eroded.

This soil is easy to till, although it is low or medium in organic-matter content. It is moderate in natural fertility. The reaction is medium acid. The root zone is deep, and the moisture-supplying capacity is high; plants receive sufficient moisture in a normal year. Permeability is moderate in the subsoil.

This soil is suited to all the general crops but is only moderately productive. If cultivated, it needs good management, including specific conservation practices that will effectively control runoff and erosion. Erosion is a moderate hazard. (Capability unit IIIe–2; woodland suitability group 10; wildlife productivity group 1)

Memphis silt loam, 12 to 20 percent slopes, eroded (MpD2).—This is a well-drained soil that generally occurs in the extreme western part of the county in the Knob Hills. The plow layer consists of brown, friable silt loam and is about 6 inches thick. The subsoil is brown to reddish-brown, friable silty clay loam. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

Mapped with this soil are a few areas that are severely eroded.

This soil is low or medium in organic-matter content but nevertheless is easy to till. It is moderate in natural fertility. The reaction is medium acid. The root zone is deep, and the moisture-supplying capacity is high. Permeability is moderate in the subsoil.

This soil is subject to severe erosion and consequently is not suited to cultivated crops. It is well suited to pasture and hay crops and is excellent for trees. Under good management, all the local grasses and legumes grow well. (Capability unit VIe–7; woodland suitability group 10; wildlife productivity group 2)

Memphis silt loam, 20 to 30 percent slopes, eroded (MpE2).—This is a well-drained soil that occurs mostly on western slopes of the Knob Hills in the extreme western part of the county. The plow layer consists of brown, friable silt loam and is about 6 inches thick. The subsoil is brown to reddish-brown, friable silty clay loam. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Nearly all of the original surface layer has been removed in a few spots, and patches of subsoil are exposed.

Mapped with this soil are a few areas that are not eroded, a few that are severely eroded, and a few where slopes are steeper than 30 percent.

The natural fertility of this soil is moderate, and the reaction is medium acid. The root zone is deep, and the moisture-supplying capacity is high. Permeability is moderate in the subsoil.

This soil is subject to severe erosion and consequently is not suited to cultivated crops. It is well suited to pasture and has a high potential for wood crops. Under good management, all the local grasses and legumes grow well. The operation of machinery on this soil is restricted, and the control of weeds and brush is difficult. (Capability unit VIe-7; woodland suitability group 10; wildlife productivity group 2)

Muskingum Series

This series consists of shallow, somewhat excessively drained soils on moderately steep or steep slopes of the Knob Hills. These soils are of moderate extent. They formed principally in residuum derived from shale, siltstone, and some sandstone, but in some areas the upper layers formed in loess (windblown silt) that is as much as 20 inches thick. The deeper soils generally have a thicker mantle of loess. Representative profile:

0 to 3 inches, dark-gray, very friable silt loam.
3 to 6 inches, grayish-brown, very friable silt loam.
6 to 18 inches, yellowish-brown, friable silt loam; very strongly acid.
18 to 25 inches, light olive-brown to yellowish-brown silt loam; few variegations in lower part; abundant small fragments of shale and siltstone; very strongly acid.
25 inches +, siltstone and shale bedrock.

The shale and siltstone fragments on the surface and throughout the soil material vary in number from place to place. The depth to bedrock ranges from about 20 to 36 inches.

Muskingum soils are moderate in natural fertility, and they are very strongly acid. Because they are steep and shallow, they are best suited to woods and to pasture. Only a small part of their acreage, however, has been cleared for pasture.

Muskingum stony soils, 30 to 50 percent slopes (MuF).—These are somewhat excessively drained, shallow soils that formed in residuum derived from siltstone, sandstone, and shale. Very fine grained sandstone and siltstone, 10 to 36 inches in diameter, are common on the surface and throughout the soil material. Larger stones and outcrops are scattered throughout the area. Generally the surface layer and the subsoil consist of silt loam, but in a few areas the lower part of the subsoil ranges from silt loam to silty clay loam. Normally the surface layer is brown and the subsoil is yellowish brown. The depth to bedrock ranges from 20 to 36 inches.

These soils are moderate in natural fertility, and they are strongly acid. Their moisture-supplying capacity is low, and they are limited in use by droughtiness. The depth of the root zone is limited by loose stones in the soil material.

These soils are not suitable for cultivation and ordinarily are not suitable for pasture. Their potential for wood crops is only fair, but generally trees are the best use. The steep slopes preclude the use of machinery in most places. (Capability unit VIIs-2; woodland suitability groups 8 and 9; wildlife productivity group 3)

Newark Series

The Newark series consists of deep, somewhat poorly drained soils of the first bottoms. These soils are widely scattered throughout the creek and river valleys. Their acreage is moderate. Those soils along small creeks formed in sediment that washed mostly from soils of limestone origin, and those in the Ohio Valley formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 9 inches, dark grayish-brown, friable silt loam.
9 to 17 inches, dark grayish-brown, friable silt loam; few olive-brown mottles; massive.
17 to 48 inches +, dark grayish-brown silt loam; many olive and gray mottles; massive.

In some areas the material below the surface layer is silty clay loam or loam; in places it is stratified.

Generally these soils are slightly acid. They have a high moisture-supplying capacity, a deep root zone, and other qualities that promote plant growth.

These soils, for the most part, are cultivated. If drained they can be cultivated continuously, and they are productive. Nearly all of the locally grown crops are suitable. The lower lying areas are subject to flooding, but floods are of short duration and usually occur before the normal crop season.

Newark silt loam (Ne).—This is a deep, somewhat poorly drained soil of the first bottoms. It formed in recent alluvium that is principally of limestone origin. The surface layer normally consists of dark grayish-brown, friable silt loam and is about 9 inches thick. The upper part of the subsoil is dark grayish-brown silt loam that has a few olive mottles. The lower part, which begins at a depth of about 17 inches, is mottled grayish-brown and olive silt loam.

Mapped with this soil is a small acreage of soils that have a surface layer of silty clay loam.

The plow layer of this soil is medium in organic-matter content and is easy to till. The natural fertility is moderately high, and generally fertilizer increases productivity. The reaction is slightly acid, but the response to lime is good. The moisture-supplying capacity is high, and plants seldom are damaged because of insufficient water.

This soil is suited to corn, soybeans, and other general crops. It is not subject to erosion and it can be cultivated continuously under high-level management. Occasionally, floods late in spring may delay plowing and planting, and in some years floods may damage growing crops in low-lying areas. Wetness can be reduced in most places by tile and surface drainage. (Capability unit IIw-4; woodland suitability group 3; wildlife productivity group 2)

Otway Series

This series consists of shallow, somewhat excessively drained, strongly sloping soils. These soils are not extensive but are widely scattered throughout the eastern third of the county. They formed in residuum derived from soft, calcareous shale (marl) and from some thinly interbedded limestone. Representative profile:

0 to 4 inches, very dark grayish-brown silty clay; slightly sticky.
4 to 10 inches, olive silty clay or clay; sticky and plastic; strong, blocky structure.

10 to 15 inches, olive-gray clay variegated with olive brown and olive; very plastic; massive; calcareous.
15 inches +, weathered, calcareous shale (marl).

These soils are low in natural fertility. They are mildly alkaline to strongly alkaline. The heavy, calcareous clay limits the depth of their root zone, and thus their moisture-supplying capacity is low. Plants do not receive sufficient moisture, especially during a dry period.

These soils are susceptible to severe erosion and consequently are not suitable for cultivation. They are suited to pasture and to woods, but their yield potential is low. About half of the acreage has been left wooded. The wooded areas, for the most part, have been cut over and contain low-quality trees. Some idle fields are going back to woods.

Otway silty clay, 12 to 20 percent slopes (OcD).—This is a shallow soil that formed in residuum derived from calcareous shale (marl). It is on strongly sloping hillsides in the eastern third of the county. Normally the surface layer consists of very dark grayish-brown silty clay and is about 4 inches thick. The subsoil is olive, plastic silty clay in the upper part and grades to calcareous clay at a depth of about 12 to 14 inches.

A few areas where slopes are stronger than 20 percent are mapped with this soil.

The root zone of this soil is shallow; its depth is limited by the heavy, calcareous clay. The moisture-supplying capacity is low, and plant growth is affected in a dry period. The natural fertility is moderately low, and the response to fertilizer is poor because of other limiting characteristics of the soil. This soil is mildly alkaline, or it is calcareous. It is medium in organic-matter content and is generally difficult to till. If plowed when too moist, it is likely to clod.

Erosion is a severe hazard on this soil, and consequently cultivation is not practical. The soil is suitable for pasture and woods, but its yield potential is low. (Capability unit VIe–1; woodland suitability group 11; wildlife productivity group 3)

Otway silty clay, 12 to 20 percent slopes, severely eroded (OcD3).—This is a shallow soil that formed in residuum derived from calcareous shale (marl). In most places the original surface layer has been removed, and the present plow layer consists of grayish-brown and olive, plastic clay. It is about 4 inches thick. The subsoil is olive-gray and gray, plastic, calcareous clay.

A small area where slopes are stronger than 20 percent is mapped with this soil.

The root zone of this soil is shallow; its depth is limited by the calcareous clay. The moisture-supplying capacity is low. The natural fertility also is low.

This soil, because of unfavorable characteristics, is not suitable for cultivation. Under high-level management it produces only limited pasture from Kentucky 31 fescue or from sericea lespedeza. Its potential for wood crops is low. Redcedar is the most suitable kind of tree for this soil. (Capability unit VIIs–3; woodland suitability group 11; wildlife productivity group 3)

Purdy Series

The Purdy series consists of level, poorly drained soils on low terraces along small creeks in the Knob Hills. The acreage is small. These soils formed in old alluvium that washed principally from soils of sandstone and shale origin. They have a brittle, compact fragipan at a depth of 14 to 26 inches. Representative profile:

0 to 8 inches, dark grayish-brown, friable silt loam; many gray mottles.
8 to 18 inches, pale-brown silty clay loam; many gray mottles.
18 to 36 inches, mottled gray, grayish-brown, and yellowish-brown silty clay loam; compact and brittle (fragipan).

These soils are medium acid or strongly acid. Their potential for most row crops is moderately low, so they are used mostly for pasture and hay. Some areas have been left wooded, mainly because the soils there are too wet for any other use. Most areas are flooded occasionally.

Purdy silt loam (Pd).—This is a level, poorly drained soil on low terraces along creeks. Normally the plow layer consists of dark grayish-brown, friable silt loam and is about 8 inches thick. The subsoil, to a depth of about 18 inches, is pale-brown silty clay loam that has many gray mottles. It grades to mottled gray, grayish-brown, and yellowish-brown silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan. It limits the depth of the root zone and restricts the movement of water.

The plow layer is low in organic-matter content but nevertheless is easy to till. The natural fertility is moderately low, and the response to fertilizer is only fair because of other unfavorable characteristics of the soil. The reaction is strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is moderately low, and plants are generally damaged in a dry period because of insufficient moisture.

This soil is not subject to erosion, so it can be cultivated continuously but under high-level management. It is best suited to soybeans, alsike clover, Korean lespedeza, and crops that tolerate some wetness. Wetness in spring and after heavy rains often delays plowing and cultivation. (Capability unit IVw–1; woodland suitability group 3; wildlife productivity group 3)

Robertsville Series

The Robertsville series consists of poorly drained alluvial soils on low terraces along Floyds Fork and along large creeks in the limestone area. The acreage is moderately large. These soils formed in old alluvium that washed from soils of limestone origin. They have a brittle, compact fragipan at a depth of 12 to 20 inches. Representative profile:

0 to 6 inches, grayish-brown, friable silt loam; few gray mottles.
6 to 15 inches, gray silt loam; many brown mottles; weak blocky structure.
15 to 38 inches, mottled gray and yellowish-brown silty clay loam; compact and brittle (fragipan).

The fragipan is weakly developed in some areas.

Generally these soils are very strongly acid. Their potential for most row crops is low, mainly because they are wet and have a fragipan. Thus, they are used mostly for hay and pasture crops that tolerate wetness. Some excessively wet areas have been left wooded.

Robertsville silt loam (Rb).—This is a nearly level, poorly drained, alluvial soil on low terraces along creeks. Normally the plow layer is grayish-brown, friable silt loam that has a few gray mottles. The subsoil, to a depth of about 15 inches, is gray silt loam that has many brown mottles. It grades to mottled gray and yellowish-brown silty clay loam that is brittle and compact. This lower part of the subsoil is a fragipan; it limits the depth of the root zone and is responsible for other unfavorable characteristics of the soil.

The plow layer is low in organic-matter content but nevertheless is easy to till. The natural fertility is moderately low, and the response to fertilizer is only fair because of other unfavorable characteristics. The reaction is strongly acid, but lime generally helps to correct the acidity. The moisture-supplying capacity is moderately low, and plant growth generally is affected during a dry period.

This soil is not subject to erosion, so it can be cultivated continuously under a high level of management. It is best suited to soybeans, alsike clover, Korean lespedeza, and crops that tolerate some wetness. Wetness in spring and after heavy rains often delays plowing and cultivation. (Capability unit IVw-1; woodland suitability group 3; wildlife productivity group 2)

Rockcastle Series

This series consists of steep, shallow, somewhat excessively drained soils on shale hillsides. These soils are concentrated in the Knob Hills, in the southwestern part of the county. Their acreage is moderate. In places the upper layers developed in a mantle of loess (windblown silt) that is as much as 16 inches thick. Representative profile:

0 to 2 inches, dark grayish-brown, friable silt loam.
2 to 8 inches, grayish-brown silt loam; medium, blocky structure.
8 to 19 inches, variegated olive-gray, grayish-brown, and gray silty clay; sticky and plastic; massive.
19 to 26 inches, gray silty clay or clay with grayish-brown variegations; very plastic; massive.
26 inches +, shale bedrock.

The depth to bedrock ranges from 8 to 36 inches, but shale fragments may occur throughout the subsoil and even throughout the surface layer.

The natural fertility of these soils is low, and the reaction is very strongly acid. The root zone is shallow, and the moisture-supplying capacity is low.

Rockcastle soils are not suitable for cultivation, and their potential for pasture and wood crops is low. Only a few areas have been cleared. Many of these are gradually reverting to woods, some are in pasture, and others are idle. Nearly all of the trees have been cut over, and the present stands of second-growth hardwood trees are of low quality.

Rockcastle silt loam, 15 to 30 percent slopes (RcE).—This is a shallow soil of the Knob Hills. Shale bedrock is at a depth of about 26 inches. In wooded areas a thin, dark grayish-brown layer is underlain by a lighter colored silt loam layer that is about 6 inches thick. The subsoil is variegated olive-gray and grayish-brown silty clay that gets grayer and finer textured with depth.

Mapped with this soil are scattered areas of steep soils and a few areas of soils that have lost all of their original surface layer.

The depth of the root zone is limited by the heavy, acid clay. The moisture-supplying capacity is low, and consequently plant growth is slowed during a dry period. The reaction is very strongly acid, and the response to lime is fair. The natural fertility is low, and fertilizer does little good because of other unfavorable characteristics of this soil.

This soil is not suitable for cultivation. It is suited to pasture and woods, but its yield potential is low. Kentucky 31 fescue and sericea lespedeza are the most suitable crops. (Capability unit VIIs-3; woodland suitability group 9; wildlife productivity group 3)

Rock Land

This is a miscellaneous land type that consists of areas in which rock outcrops cover 25 to 90 percent of the surface. The slope range is most commonly 20 to 50 percent, though Rock land may occur on any slope. The soil material between the outcrops has characteristics similar to those of Corydon soils.

Rock land (Rd).—Because it is shallow and rocky, this miscellaneous land type is not suitable for cultivation. Some areas, where outcrops are fewest, can be used for pasture, but most areas are suitable only for trees. (Capability unit VIIs-5; woodland suitability group 16; wildlife productivity group 3)

Russellville Series

The Russellville series consists of well drained or moderately well drained, nearly level to sloping soils on wide ridges of the limestone uplands. These soils form a broad, north-south belt across the center of the county. They have a compact, brittle fragipan at a depth of 26 to 32 inches. Their surface layer and the upper part of their subsoil formed mainly in loess (windblown silt). The lower part of their subsoil formed mainly in residuum derived from high-grade limestone. Representative profile:

0 to 7 inches, dark-brown, very friable silt loam.
7 to 30 inches, brown, friable light silty clay loam; medium, blocky structure.
30 to 42 inches, mottled brown, yellowish-brown, and grayish-brown silty clay loam; compact and brittle (fragipan).

These soils are medium acid or strongly acid, but they respond well to lime. Although moderately high in natural fertility, they benefit from fertilizer. Their fragipan restricts the movement of water and limits the depth of the root zone.

These soils are well suited to all general crops, including corn, tobacco, and small grain, and to most specialized crops, including vegetables and fruits. Most of the acreage is cultivated.

Russellville silt loam, 0 to 2 percent slopes (RuA).—This is a well drained or moderately well drained soil on ridges of high-grade limestone. Normally the plow layer consists of dark-brown, very friable silt loam and is about 8 inches thick. The upper part of the subsoil is brown, friable silty clay loam. The lower part, which begins at a depth of about 34 inches, is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part is a fragipan.

The plow layer is easy to till. It is medium in organic-matter content and high in natural fertility. The reaction is medium acid or strongly acid, and the response to lime and fertilizer is good. The moisture-supplying capacity

772-184—66——3

is high and is seldom a limiting factor in a normal growing season. Permeability is moderate in the upper part of the subsoil and slow in the lower part. This lower part limits the depth of the root zone.

This soil is well suited to corn, tobacco, small grain, and most of the other general crops. It is not subject to erosion. Thus, it can be cultivated continuously under a high level of management. (Capability unit I–3; woodland suitability group 4; wildlife productivity group 1)

Russellville silt loam, 2 to 6 percent slopes (RuB).—This is a well drained or moderately well drained soil on ridges of high-grade limestone. The plow layer normally consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is brown, friable silty clay loam. The lower part, which begins at a depth of about 30 inches, is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan.

The plow layer is easy to till. It is medium in organic-matter content, high in natural fertility, and medium acid or strongly acid. It responds well to lime and to fertilizer. The moisture-supplying capacity is high and is seldom a limiting factor in a normal growing season. Permeability is moderate in the upper part of the subsoil and slow in the lower part. Root penetration is limited by the fragipan.

This soil is suited to all the general crops and is moderately productive to highly productive. It is especially well suited to corn, tobacco, small grain, and hay. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. The erosion hazard is moderately low. (Capability unit IIe–10; woodland suitability group 4; wildlife productivity group 1)

Russellville silt loam, 2 to 6 percent slopes, eroded (RuB2).—This is a well drained or moderately well drained soil on ridges of high-grade limestone. Generally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is brown, friable silty clay loam. The lower part, which begins at a depth of about 26 inches, is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part is a fragipan. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is easy to till, though generally low in organic-matter content. The natural fertility is moderately high, and the response to fertilizer is good. The reaction is medium acid or strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is high and is seldom a limiting factor in a normal growing season. Permeability is moderate in the upper part of the subsoil but very slow in the lower part. This lower part, the fragipan, limits the depth of the root zone.

This soil is suited to all the general crops and is moderately productive to highly productive. It is especially well suited to corn, tobacco, small grain, and hay. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Erosion is a moderately low hazard. (Capability unit IIe–10; woodland suitability group 4; wildlife productivity group 1)

Russellville silt loam, 6 to 12 percent slopes, eroded (RuC2).—This is a well drained or moderately well drained soil on ridges of high-grade limestone. Generally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is brown, friable silty clay loam. The lower part, which begins at a depth of about 26 inches, is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

Mapped with this soil are other soils that have lost all or nearly all of their original surface layer. These soils have a plow layer that consists almost entirely of material from the upper part of the subsoil. The plow layer consequently is low in organic-matter content. Also mapped with this soil are scattered areas of a soil that has lost little or none of its original surface layer.

Generally the plow layer is easy to till, although it is low in organic-matter content. The natural fertility is moderately high, and the response to fertilizer is good. The reaction is medium acid or strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is high and is seldom a limiting factor. Permeability is moderate in the upper part of the subsoil but slow in the lower part. This lower part, the fragipan, limits the depth of the root zone.

This soil is well suited to pasture and hay crops and moderately well suited to most general crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Erosion is a moderate hazard on this soil. Contour cultivation and terraces or stripcropping help to reduce runoff. Generally a cropping system that is dominated by sod crops is suitable. (Capability unit IIIe–2; woodland suitability group 4; wildlife productivity group 1)

Sciotoville Series

The Sciotoville series consists of moderately well drained, alluvial soils that are widely scattered on terraces in the Ohio Valley. The acreage is moderate. These soils formed in mixed sediment that washed from the upper part of the Ohio River basin. They have a brittle, compact fragipan at a depth of about 25 inches. Representative profile:

0 to 7 inches, dark-brown, friable silt loam.
7 to 17 inches, yellowish-brown, friable silt loam; medium, blocky structure.
17 to 25 inches, yellowish-brown silty clay loam; few faint mottles; medium, blocky structure.
25 to 38 inches, yellowish-brown silty clay loam; many grayish-brown mottles; brittle and compact (fragipan).
38 to 58 inches, mottled brown, grayish-brown, and dark yellowish-brown silty clay loam; massive.

In places the lowest horizon, especially the lower part, is stratified silt loam, loam, or even fine sandy loam.

Sciotoville soils are generally strongly acid. Their fragipan limits the depth of the root zone and restricts the movement of water. Practically all areas are cultivated, but yields are moderate. Crops that require good drainage and a deep root zone are not suitable.

Sciotoville silt loam, 0 to 2 percent slopes (ScA).—This is a moderately well drained, alluvial soil in the Ohio Valley. Normally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is yellowish-brown silt loam. At a depth of about 25 inches, the lower part is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part is a fragipan. It restricts the movement of water and limits the depth of the root zone.

The plow layer is only medium in organic-matter content but nevertheless is easy to till. It can be worked throughout a wide range of moisture content without clodding or crusting. The natural fertility is moderate, but the response to fertilizer is good. The reaction is strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is moderate; crop yields generally are reduced in a dry period because of insufficient moisture.

Erosion is not a hazard on this soil, so continuous cultivation is possible under a high level of management. Wetness is a limitation in some areas, but it can be reduced by surface drainage. Corn, soybeans, and most hay crops grow well on this soil; alfalfa and other deep-rooted crops do not. (Capability unit IIw-1; woodland suitability group 5; wildlife productivity group 2)

Sciotoville silt loam, 2 to 6 percent slopes (ScB).—This is a gently sloping, moderately well drained, alluvial soil in the Ohio Valley. Normally the plow layer consists of dark-brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is yellowish-brown silt loam. At a depth of about 25 inches, the lower part is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part is a fragipan. It restricts the movement of water and limits the depth of the root zone.

The plow layer is only medium in organic-matter content but nevertheless is easy to till. It can be worked throughout a wide range of moisture content without clodding or crusting. The natural fertility is moderate, but the response to fertilizer is good. The reaction is strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is moderate; crop yields generally are reduced in a dry period because of a shortage of moisture.

This soil is well suited to corn, soybeans, and most hay crops, but not to alfalfa and other deep-rooted crops. Erosion is a slight hazard in cultivated fields, but it can be controlled by using a suitable cropping system, by cultivating on the contour, and more effectively by terracing or stripcropping. Natural drainageways should be sodded. (Capability unit IIe-6; woodland suitability group 5; wildlife productivity group 2)

Sciotoville silt loam, 6 to 12 percent slopes, eroded (ScC2).—This is a moderately well drained, alluvial soil on short slopes in the Ohio Valley. Generally the plow layer consists of brown, friable silt loam and is about 7 inches thick. The upper part of the subsoil is yellowish-brown silt loam and extends to a depth of about 20 inches. The lower part is mottled yellowish-brown and grayish-brown silty clay loam that is compact and brittle. This lower part is a fragipan. It restricts the movement of water and limits the depth of the root zone. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. The natural fertility is moderate, but the response to fertilizer is fairly good. The reaction is strongly acid, but the soil responds fairly well to lime. The moisture-supplying capacity is only moderate, and crop yields are reduced in a dry period because of a shortage of moisture.

This soil is suited to corn, soybeans, and most hay crops. If cultivated, it needs specific conservation practices that will effectively control erosion, which is a moderate hazard. Contour cultivation in combination with a suitable cropping system helps to control erosion on short slopes. These practices need to be supplemented by terraces or stripcropping on the long slopes. Natural drainageways should be sodded. (Capability unit IIIe-8; woodland suitability group 5; wildlife productivity group 2)

Sequatchie Series

The Sequatchie series consists of deep, sandy, alluvial soils that are well drained. These soils are widely scattered in the Ohio Valley, mostly along the bank of the Ohio River but also on long, low ridges in other parts of the valley. Their total acreage is small. Sequatchie soils formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 7 inches, dark-brown, very friable fine sandy loam.
7 to 11 inches, brown, very friable fine sandy loam; weak, blocky structure.
11 to 32 inches, brown, friable fine sandy loam; weak to moderate, blocky structure.
32 to 43 inches +, brown fine sandy loam; few gray and reddish-brown variegations; weak, blocky structure or nearly loose.

The color of the subsoil ranges from brown to yellowish brown.

Sequatchie soils are very strongly acid. Nevertheless, they are productive, especially if limed. They are well suited to vegetable crops, particularly melons, and are good for a wide variety of other crops, including corn, alfalfa, and small grain.

Sequatchie fine sandy loam, 0 to 2 percent slopes (SfA).—This is a deep, well-drained soil on terraces along the Ohio River. Normally the plow layer consists of dark-brown, very friable fine sandy loam and is about 7 inches thick. The subsoil is brown, friable fine sandy loam and extends to a depth of 4 feet or more.

The plow layer is medium in organic-matter content and is in excellent tilth. It can be plowed and cultivated early in spring and soon after heavy rains because infiltration and permeability are moderately rapid. It is not likely to clod or crust. The moisture-supplying capacity is high, and crops generally receive sufficient water, except during a dry period. The reaction is strongly acid or very strongly acid, but the response to lime is good. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity.

This soil is suited to a wide variety of crops, including corn, alfalfa, small grain, and tobacco, and is excellent for vegetable, orchard, and other specialized crops. It is not subject to erosion and consequently can be cultivated continuously if a high level of management is practiced.

(Capability unit I–3; woodland suitability group 2; wildlife productivity group 1)

Sequatchie fine sandy loam, 2 to 6 percent slopes (SfB).—This is a deep, well-drained soil on terraces along the Ohio River. Normally the plow layer consists of dark-brown, very friable fine sandy loam and is about 7 inches thick. The subsoil is brown, friable fine sandy loam and extends to a depth of 4 feet or more.

The plow layer is medium in organic-matter content and is in excellent tilth. It can be plowed and cultivated early in spring and soon after heavy rains because infiltration and permeability are moderately rapid. It is not likely to clod or crust. The moisture-supplying capacity is high, and crops generally receive sufficient water, except during a dry period. The reaction is strongly acid or very strongly acid, but the response to lime is good. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity.

This soil is suited to a wide variety of crops, including corn, tobacco, alfalfa, and small grain, and is excellent for truck, orchard, and other specialized crops. Erosion is a slight hazard in cultivated fields, but contour cultivation in combination with a suitable cropping system helps to reduce runoff on short slopes. These practices need to be supplemented by terraces or stripcropping on the long slopes. (Capability unit IIe–1; woodland suitability group 2; wildlife productivity group 1)

Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded (SfC2).—This is a deep, well-drained soil on terraces along the Ohio River. Generally the plow layer is brown, very friable fine sandy loam. The subsoil is brown, friable fine sandy loam and extends to a depth of 4 feet or more. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content but nevertheless is in excellent tilth. It can be plowed and cultivated early in spring and soon after heavy rains because infiltration and permeability are moderately rapid. It is not subject to clodding and crusting. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity. The reaction is strongly acid or very strongly acid, but the response to lime is good. The moisture-supplying capacity is high, and crops generally receive sufficient water, except during a dry period.

This soil is suited to corn, tobacco, small grain, and a wide range of hay and pasture crops. Erosion is a moderate hazard in cultivated fields, but contour cultivation in combination with a suitable cropping system helps to reduce runoff on short slopes. These practices need to be supplemented by terraces or stripcropping on the long slopes. Either corn or tobacco are suitable in a cropping sequence. (Capability unit IIIe–2; woodland suitability group 2; wildlife productivity group 1)

Shelbyville Series

The Shelbyville series consists of gently sloping, well-drained soils of the uplands. These soils are not extensive but are widely scattered on moderately broad ridges in the extreme eastern part of the county. They formed in residuum derived from thin-bedded, argillaceous limestone. Representative profile:

0 to 9 inches, dark-brown, very friable silt loam.
9 to 31 inches, brown to yellowish-brown silty clay loam; slightly sticky; medium, blocky structure.
31 to 42 inches, yellowish-brown silty clay variegated with brown; sticky and slightly plastic; abundant black concretions.

The depth to limestone bedrock is generally 5 feet or more.

These soils have a deep root zone, are moderately permeable, and are high in natural fertility. They are medium acid or strongly acid but respond to lime. They are productive of all general crops, including corn, tobacco, and alfalfa, and of specialized crops, especially vegetable, fruit, and nursery crops.

Shelbyville silt loam, 2 to 6 percent slopes (ShB).—This is a deep, well-drained soil on gently sloping, limestone ridges. The plow layer consists of dark-brown, very friable silt loam and is about 9 inches thick. The upper part of the subsoil is brown to yellowish-brown, slightly sticky silty clay loam and extends to a depth of about 31 inches. The lower part is yellowish-brown, sticky or slightly plastic silty clay; it is variegated with brown.

Mapped with this soil is a small acreage of soils that have a finer textured subsoil.

This soil is in excellent tilth, although it is only medium in organic-matter content. It is high in natural fertility. It is medium acid but responds well to lime. Permeability is moderate in the deep root zone. The moisture-supplying capacity is high, and plants receive sufficient moisture, except during periods of severe drought.

Under high-level management, this soil is highly productive of corn, alfalfa, tobacco, small grain, and other general crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Erosion is a moderately low hazard. (Capability unit IIe–1; woodland suitability group 4; wildlife productivity group 1)

Taft Series

The Taft series consists of level, somewhat poorly drained soils on low terraces along Floyds Fork and along large creeks in the limestone area. The acreage is moderate. These soils formed in old alluvium that washed from soils of limestone origin. They have a fragipan. Representative profile:

0 to 6 inches, dark grayish-brown, friable silt loam.
6 to 17 inches, mottled light brownish-gray and yellowish-brown, friable silt loam and silty clay loam; weak, blocky structure.
17 to 33 inches, mottled gray, brown, and olive, firm silty clay loam; compact and brittle (fragipan).
33 to 40 inches +, gray, firm silty clay or silty clay loam; yellowish-brown mottles; massive.

These soils, for the most part, have been cleared and are now cultivated or are in pasture and hay. Because they are somewhat poorly drained, they are best suited to plants that tolerate some wetness. Though they are slightly higher than the normal flood plain, they are flooded occasionally in some areas.

Taft silt loam (Ta).—This is a somewhat poorly drained soil on low-lying terraces along creeks. Normally the plow layer is dark grayish-brown, friable silt loam. The upper part of the subsoil is mottled brownish-gray and yellowish-brown, friable silty clay loam. The lower part is mottled gray, brown, and olive silty clay loam that is compact and brittle. This lower part, which begins at a depth of 14 to 21 inches, is a fragipan. It limits the depth of the root zone and restricts the movement of water.

The plow layer is low in organic-matter content but nevertheless is easy to till. It can be plowed and cultivated under ideal moisture conditions during a short time only. Most of the time it is too wet. The natural fertility is moderately low, but wetness is a more limiting factor. The reaction is strongly acid. The moisture-supplying capacity is moderately low, and crop yields generally are reduced because of insufficient moisture.

This soil is not subject to erosion, so under good management it can be cultivated continuously. The choice of crops, however, is limited. The most suitable crops are those that tolerate some wetness, for example, Kentucky 31 fescue, redtop, ladino clover, Kobe lespedeza, and Korean lespedeza. Alfalfa and other deep-rooted crops are not suitable. Surface drainage helps to remove excess water. (Capability unit IIIw-1; woodland suitability group 6; wildlife productivity group 2)

Tyler Series

The Tyler series consists of level, somewhat poorly drained soils on low terraces along the small creeks that originate in the Knob Hills. The acreage is small. These soils formed in old alluvium that washed mainly from soils of sandstone and shale origin. They have a compact, brittle fragipan at a depth of 20 to 32 inches. Representative profile:

0 to 8 inches, grayish-brown, friable silt loam.
8 to 20 inches, mottled yellowish-brown and light-gray silt loam; weak, blocky structure.
20 to 44 inches +, light-gray silty clay loam; many brown and olive mottles; compact and brittle (frigipan).

Tyler soils are medium acid to very strongly acid. They have a moderately low potential for most row crops and so are important mostly for pasture and hay. In a few places they have been left wooded. Generally they are slightly higher than the normal flood plain but are still flooded occasionally in some areas.

Tyler silt loam (Ty).—This is a somewhat poorly drained soil on low-lying terraces along creeks. Normally the plow layer consists of grayish-brown, friable silt loam and is about about 8 inches thick. The subsoil is mottled yellowish-brown and light-gray silt loam to a depth of about 20 inches. It grades to light-gray silty clay loam that has many brown and olive mottles and is compact and brittle. This lower part of the subsoil is a fragipan. It limits the depth of the root zone and restricts the movement of water.

The plow layer is low in organic-matter content but nevertheless is generally in good tilth. Early in spring and after heavy rains it may be too wet for plowing and cultivating. The natural fertility is moderately low, and the response to fertilizer is only fair because other factors affecting the condition of the soil are unfavorable. The reaction ranges from medium acid to very strongly acid, but lime helps to correct the acidity. The moisture-supplying capacity is moderately low; crops are damaged in a dry period because of insufficient moisture.

This soil is not subject to erosion, so under high-level management it can be cultivated continuously. The choice of crops, however, is limited. Soybeans and corn can be grown, but the most suitable crops are those that tolerate some wetness. Alfalfa and other deep-rooted crops are not suitable. (Capability unit IIIw-1; woodland suitability group 6; wildlife productivity group 2)

Weinbach Series

The Weinbach series consists of somewhat poorly drained alluvial soils that are widely scattered on terraces in the Ohio Valley. The acreage is moderate. These soils formed in mixed sediment that washed from soils in the upper part of the Ohio River basin. They have a compact, brittle fragipan. Representative profile:

0 to 7 inches, grayish-brown, friable silt loam.
7 to 17 inches, mottled yellowish-brown and light brownish-gray, friable silt loam; medium, blocky structure.
17 to 45 inches, mottled yellowish-brown and grayish-brown silt loam; compact and brittle (fragipan).

The fragipan occurs at a depth of 15 to 24 inches. It is weakly developed in some areas.

Weinbach soils are medium acid or strongly acid. Their fragipan limits the depth of the root zone and restricts the movement of water. Crops that tolerate some wetness are the most suitable for these soils. Yields are moderately low. Nearly all of the acreage is cultivated or is used for pasture and hay. A few areas have been left wooded because they are too wet for cultivated crops.

Weinbach silt loam (Wb).—This is a nearly level, somewhat poorly drained, alluvial soil of the Ohio Valley. Normally the plow layer is grayish-brown, friable silt loam. The subsoil is mottled yellowish-brown and light brownish-gray, friable silt loam to a depth of about 17 inches. It grades to mottled yellowish-brown and grayish-brown silt loam that is compact and brittle. This lower part of the subsoil is a fragipan.

The depth of the root zone is limited by the fragipan, and thus several qualities of the soil are affected. The moisture-supplying capacity is moderately low, and crop yields are reduced in a dry period because of insufficient moisture. The reaction is strongly acid, but the response to lime is good. The natural fertility is moderate, and excessive wetness prevents the full utilization of fertilizer. The organic-matter content is low, but the plow layer is generally easy to till. Wetness early in spring and after heavy rains may delay plowing or cultivation.

This soil is not subject to erosion, so under high-level management it can be cultivated continuously. Wetness, however, limits the selection of crops. Kentucky 31 fescue, ladino clover, Kobe lespedeza, and Korean lespedeza are the most suitable crops. Alfalfa and other deep-rooted crops are not suitable. (Capability unit IIIw-1; woodland suitability group 3; wildlife productivity group 2)

Westmoreland Series

This series consists of steep, shallow, somewhat excessively drained soils of the Knob Hills. These soils are of moderate acreage in the county, and they occur in close association with Litz and Muskingum soils. They formed principally in residuum derived from shaly limestone. In places the upper layers formed in loess (windblown silt) that is as much as 12 inches thick. Representative profile:

0 to 2 inches, very dark grayish-brown, friable silt loam.
2 to 6 inches, pale-brown, friable silt loam.

6 to 13 inches, yellowish-brown, friable silt loam; weak, blocky structure; many fragments of weathered limestone.
13 to 18 inches, brown, firm silty clay loam; many fragments of weathered limestone.
18 inches +, limestone interbedded with siltstone and shale.

The depth to bedrock ranges from 14 to 24 inches. In places the mantle of loess contains limestone fragments.

Westmoreland soils are neutral or slightly acid, and they are moderate in natural fertility. Their best use is for trees, and nearly all areas have been left wooded.

Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes (WcF).—This complex consists of shallow, somewhat excessively drained soils on long, steep slopes in the Knob Hills. The slopes cross geologic formations of limestone, siltstone, shale, and sandstone. Shale and siltstone are dominant along the lower part of the slope, sandstone along the middle part, and the limestone along the upper part. The soils that overlie these formations occur as parallel strips across the slopes. The pattern, however, is not consistent. Therefore, mapping these soils individually would not be practical.

The Westmoreland soil makes up about 45 percent of this complex, the Litz soil 35 percent, and the Muskingum soil 20 percent.

These soils are moderate in natural fertility, and they are nearly neutral to very strongly acid. Their moisture-supplying capacity is low, and their root zone is shallow.

These soils are not suitable for cultivation and generally are not good for pasture. They are suited to trees but need conservation practices that will promote selective tree growth. Steepness greatly limits the use of machinery. Practically all of the acreage is wooded and is under the control of the county. (Capability unit VIIe-1; woodland suitability groups 8 and 9; wildlife productivity group 3)

Wheeling Series

This series consists of deep, silty, alluvial soils that are well drained. These soils are widely scattered on terraces in the Ohio Valley and cover a moderately large acreage. They formed in mixed sediment that washed from the upper part of the Ohio River basin. Representative profile:

0 to 9 inches, dark-brown, very friable silt loam.
9 to 23 inches, brown to strong-brown, friable silt loam; medium, blocky structure.
23 to 36 inches, brown to yellowish-brown silty clay loam; medium, blocky structure.
36 to 52 inches, yellowish-brown silt loam, massive.

In some places the material at a depth below 36 inches is stratified loam, silt loam, or fine sandy loam.

Wheeling soils are medium acid or strongly acid. They are among the most productive soils in the county. They are suited to a wide variety of crops, including vegetable, fruit, nursery, and specialized crops, and are excellent for corn, alfalfa, and tobacco. Practically all areas have been cleared, and most are cultivated intensively.

Wheeling silt loam, 0 to 2 percent slopes (WeA).—This is a deep, well-drained soil on terraces along the Ohio River. Normally the plow layer is dark-brown, very friable silt loam. The upper part of the subsoil is brown to strong-brown, friable silt loam. The lower part, which begins at a depth of about 24 inches, is yellowish-brown silty clay loam. In places the material at a depth below 36 inches is stratified loam, silt loam, or fine sandy loam.

Mapped with this soil is a small acreage of soils, in the vicinity of Pond Creek, that are less acid and have a finer textured subsoil.

The plow layer is medium in organic-matter content and is in good tilth. It can be plowed and cultivated throughout a wide range of moisture content without crusting or clodding. The natural fertility is high, but fertilizer is needed to help maintain productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high; crops generally receive sufficient water, except during an extremely dry period.

This soil is not subject to erosion. It can be cultivated continuously under a high level of management. It is well suited to corn, alfalfa, tobacco, and other general crops and is excellent for truck, orchard, and other specialized crops. (Capability unit I-3; woodland suitability group 2; wildlife productivity group 1)

Wheeling silt loam, 2 to 6 percent slopes (WeB).—This is a deep, well-drained soil on terraces along the Ohio River. Normally the plow layer is dark-brown, very friable silt loam. The upper part of the subsoil is brown to strong-brown friable silt loam. The lower part, which begins at a depth of about 24 inches, is yellowish-brown silty clay loam. In some places the material at a depth below 36 inches is stratified loam, silt loam, or fine sandy loam.

The plow layer is medium in organic-matter content and is in good tilth. It can be plowed and cultivated throughout a wide range of moisture content without crusting or clodding. The natural fertility is high, but fertilizer is needed to help maintain productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high, and crops generally receive sufficient water, except during an extremely dry period.

This soil is suited to a wide variety of crops, including corn, tobacco, soybeans, and small grain, and is excellent for truck, orchard, and other specialized crops. If cultivated, it needs specific conservation practices that will effectively control erosion, which is a slight hazard. Contour cultivation in combination with a suitable cropping system helps to control erosion on short slopes, but terracing or stripcropping is more effective. Natural drainageways should be sodded. (Capabiilty unit IIe-1; woodland suitability group 2; wildlife productivity group 1)

Wheeling silt loam, 6 to 12 percent slopes, eroded (WeC2).—This is a deep, well-drained soil in the Ohio Valley. Generally the plow layer consists of brown, friable silt loam and is about 7 inches thick. The subsoil is brown to strong-brown silt loam in the upper part and grades to yellowish-brown silty clay loam at a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed. In some areas the material below a depth of 36 inches is stratified loam, silt loam, or fine sandy loam.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. It seldom crusts or clods, except in the more eroded spots. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high, and crops generally receive sufficient water except during an extremely dry period.

Erosion is a moderate hazard in cultivated fields. It can be controlled on the short slopes by using a suitable cropping system and cultivating on the contour. On the long slopes, terracing or stripcropping is more effective. Corn, small grain, and tobacco are suitable in the cropping sequence. (Capability unit IIIe-1; woodland suitability group 2; wildlife productivity group 1)

Wheeling silt loam, 12 to 20 percent slopes, eroded (WeD2).—This is a deep, well-drained soil on short slopes in the Ohio Valley. Generally the plow layer consists of brown, friable silt loam and is about 7 inches thick. The subsoil is brown to strong-brown silt loam in the upper part and grades to yellowish-brown silty clay loam at a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed. In some areas the material below a depth of about 36 inches is stratified loam, silt loam, or fine sandy loam.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. It seldom crusts or clods, except in the more eroded spots. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high; crops usually receive sufficient water, except during an extremely dry period.

Most cultivated crops will grow on this soil, but hay and pasture crops are the most suitable because erosion is a moderately severe hazard in cultivated fields. Erosion can be controlled by contour cultivation used in conjunction with a cropping system that is dominated by sod crops and that includes a row crop only occasionally. In some areas, erosion can be controlled more effectively by stripcropping and by sodding waterways. (Capability unit IVe-1; woodland suitability group 2; wildlife productivity group 1)

Wheeling silt loam, 20 to 30 percent slopes, eroded (WeE2).—This is a deep, well-drained soil on short slopes in the Ohio Valley. Generally the plow layer consists of brown, friable silt loam and is about 7 inches thick. The subsoil is brown to strong-brown silt loam in the upper part and grades to yellowish-brown silty clay loam at a depth of about 24 inches. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed. In some areas the material below a depth of about 36 inches is stratified loam, silt loam, or fine sandy loam.

The plow layer is low in organic-matter content but nevertheless is generally easy to till. It seldom crusts or clods, except in the more eroded spots. The natural fertility is moderately high, but fertilizer is needed to help maintain productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high, and crops usually receive sufficient water, except during an extremely dry period.

This soil is not suitable for cultivation, because surface runoff is so rapid that erosion is a severe hazard in cultivated fields. Thus, plowing and seedbed preparation should be limited to the reestablishment of permanent pasture. Kentucky 31 fescue, red clover, Korean lespedeza, and sericea lespedeza are suitable pasture plants. Kentucky bluegrass, orchardgrass, sweetclover, and Kobe lespedeza are suitable under high-level management. (Capability unit VIe-7; woodland suitability group 2; wildlife productivity group 2)

Woolper Series

The Woolper series consists of well drained or moderately well drained soils that occur as long narrow strips along the base of steep, limestone hillsides in the eastern part of the county. The acreage is small. These soils formed in local alluvium that washed from soils of limestone origin. Representative profile:

- 0 to 6 inches, dark-brown, friable silty clay loam.
- 6 to 12 inches, dark yellowish-brown silty clay loam; medium, blocky structure.
- 12 to 23 inches, dark yellowish-brown or yellowish-brown silty clay; strong, blocky structure; sticky and plastic.
- 23 to 35 inches, dark yellowish-brown silty clay; few gray mottles; strong, blocky structure; sticky and plastic.
- 35 to 48 inches +, mottled gray, yellowish-brown, and grayish-brown silty clay or clay.

Generally the surface layer and the subsoil are nearly neutral, but they are slightly acid in some areas.

Woolper soils are productive and are suited to a wide variety of crops. Nearly all of the acreage is cultivated, and most areas are farmed with the adjacent bottom lands.

Woolper silty clay loam, 2 to 6 percent slopes (WmB).—This is a deep, well drained or moderately well drained soil at the base of steep, limestone hillsides. Normally the plow layer consists of dark-brown, friable silty clay loam and is about 6 inches thick. The subsoil is dark yellowish-brown silty clay loam in the upper part and grades to yellowish-brown or dark yellowish-brown silty clay at a depth of about 12 inches. The lowermost part of the subsoil, which begins at a depth of about 35 inches, is mottled yellowish-brown and gray silty clay or clay.

The plow layer is medium in organic-matter content. It is slightly difficult to till because of the clay content. Furthermore, it tends to clod if plowed or cultivated when too wet. The natural fertility is high, and fertilizer increases productivity. The reaction is slightly acid or neutral, and therefore little or no lime is needed. The moisture-supplying capacity is high, and plants usually receive sufficient water for normal growth. Permeability is low in the lower part of the subsoil.

This soil is suited to corn, small grain, soybeans, tobacco, and nearly all hay and pasture crops. If cultivated, it needs a suitable cropping system and some conservation practices that will effectively control erosion, which is a moderately low hazard. A few spots are wet because of seepage from the adjacent hillsides. (Capability unit

IIe–2; woodland suitability group 7; wildlife productivity group 1)

Woolper silty clay loam, 6 to 12 percent slopes, eroded (WmC2).—This is a deep, well drained or moderately well drained soil at the base of steep, limestone hillsides. Normally the plow layer consists of dark-brown silty clay loam and is about 6 inches thick. The subsoil is dark yellowish-brown silty clay loam in the upper part and grades to yellowish-brown or dark yellowish-brown silty clay at a depth of about 8 to 10 inches. The lowermost part of the subsoil, which begins at a depth of about 32 inches, is mottled yellowish-brown and gray. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is slightly difficult to till because of the clay content. Furthermore, it clods or crusts if plowed or cultivated when too dry or too wet. The natural fertility is high, and fertilizer helps to increase productivity. The reaction is slightly acid or neutral, and therefore little or no lime is needed. The moisture-supplying capacity is high, and plants usually receive sufficient water, except during an extended dry period. Permeability is slow in the subsoil.

This soil is suited to almost all the locally grown crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control erosion, which is a moderate hazard. A few spots are wet because of seepage from the adjacent hillsides. (Capability unit IIIe–4; woodland suitability group 7; wildlife productivity group 1)

Zanesville Series

The Zanesville series consists of moderately well drained or well drained silty soils. These soils are confined to the Knob Hills in the southwestern part of the county. Generally they are in gently sloping to strongly sloping areas near the base of the hills. Their acreage is moderate. Their surface layer and the upper part of their subsoil formed mostly in loess (windblown silt) that is about 30 inches thick. The lower part of their subsoil formed in residuum derived from sandstone and shale. This lower part is a compact, brittle fragipan that limits the depth of the root zone and restricts the movement of water. Representative profile:

0 to 7 inches, brown, friable silt loam.

7 to 29 inches, strong-brown to brown silt loam; medium, blocky structure.

29 to 40 inches, yellowish-brown silty clay loam; grayish-brown and gray mottles; compact and brittle (fragipan).

The fragipan is 6 to 12 inches thick and is weakly developed in places. It is at a depth of 24 to 38 inches. Sandstone and shale bedrock is generally at a depth of more than 4 feet.

Zanesville soils are medium acid or strongly acid. Most areas are cultivated or are in pasture. Nearly all general crops can be grown, but yields are moderate.

Zanesville silt loam, 2 to 6 percent slopes (ZaB).—This is a well drained or moderately well drained soil of the Knob Hills. Normally the plow layer is brown, friable silt loam. The subsoil is strong-brown to brown silt loam to a depth of about 29 inches. It grades to mottled yellowish-brown and gray silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan that limits the depth of the root zone and restricts the movement of water. Sandstone and shale bedrock is at a depth of more than 4 feet.

The plow layer is medium in organic-matter content. It can be tilled throughout a wide range of moisture content without clodding or crusting. The natural fertility is moderate, but fertilizer helps to increase productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high; only in an extremely dry period is plant growth affected because of insufficient moisture.

This soil is suited to corn, small grain, soybeans, tobacco, hay, and pasture, but not to alfalfa and other deep-rooted crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Erosion is a moderately low hazard. (Capability unit IIe–10; woodland suitability group 4; wildlife productivity group 2)

Zanesville silt loam, 6 to 12 percent slopes, eroded (ZaC2).—This is a well drained or moderately well drained soil of the Knob Hills. Normally the plow layer is brown, friable silt loam. The subsoil is strong-brown to brown, friable silt loam to a depth of about 24 inches. It grades to mottled yellowish-brown and gray silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan that limits the depth of the root zone and restricts the movement of water. Sandstone and shale bedrock is at a depth of more than 4 feet. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content. In the more eroded areas, it tends to clod or crust if tilled when too moist or too dry. The natural fertility is moderate, but the response to fertilizer is good. The reaction is medium acid or strongly acid, but lime helps to check the acidity. The moisture-supplying capacity is high, and plants receive sufficient water, except during a dry period.

This soil is suited to corn, soybeans, hay, pasture, and most of the other general crops. If cultivated, it needs a suitable cropping system and specific conservation practices that will effectively control runoff and erosion. Erosion is a moderate hazard. (Capability unit IIIe–2 woodland suitability group 4; wildlife productivity group 2)

Zanesville silt loam, 12 to 20 percent slopes, eroded (ZaD2).—This is a well drained or moderately well drained soil of the Knob Hills. Normally the plow layer is brown, friable silt loam. The subsoil is strong-brown to brown, friable silt loam to a depth of about 24 inches. It grades to mottled yellowish-brown and gray silty clay loam that is compact and brittle. This lower part of the subsoil is a fragipan that limits the depth of the root zone and restricts the movement of water. Sandstone and shale bedrock is at a depth of more than 4 feet. In plowing, material from the upper part of the subsoil has been mixed with the plow layer. Sheet erosion has removed nearly all of the original surface layer in some places, and patches of subsoil are exposed.

The plow layer is low in organic-matter content. In the more eroded areas, it tends to clod if tilled when too moist.

The natural fertility is moderate, but fertilizer helps to increase productivity. The reaction is medium acid or strongly acid, but the response to lime is good. The moisture-supplying capacity is high, and plants receive sufficient water, except during a dry period.

This soil is suited to corn, small grain, hay, and pasture. If cultivated, it is subject to moderately severe erosion. It therefore needs specific conservation practices, plus a cropping system dominated by sod crops, that can reduce runoff and thereby control erosion. (Capability unit IVe–3; woodland suitability group 4; wildlife productivity group 2)

Zipp Series

The Zipp series consists of poorly drained soils that formed in water-deposited, calcareous silt and clay. These soils are on broad flats in the old slack-water area south of Louisville. Their acreage is moderate. Representative profile:

0 to 7 inches, dark-gray silty clay.
7 to 21 inches, dark-gray to gray clay; many brown and dark-brown mottles; strong, blocky structure; sticky and very plastic when wet.
21 to 42 inches +, mottled gray, yellowish-brown, and brown clay; strong, blocky structure; sticky and very plastic when wet.

The texture of the surface layer ranges from silty clay to silty clay loam. In many places the plow layer is neutral in reaction, and the material below the plow layer is alkaline. The alkalinity increases with depth.

Zipp soils are wet, and thus only a small acreage has been cleared. Most of the cleared areas are idle, but a few have been drained and are planted to corn and soybeans. Yields are moderate. Hay and pasture crops that tolerate wetness do better on these soils than any other crops. The potential yield of wood crops is high.

Zipp silty clay (Zp).—This is a poorly drained soil that formed in fine-textured, calcareous sediment in the slack-water flats. The plow layer is dark-gray silty clay or silty clay loam. The subsoil, to a depth of about 21 inches, is gray and mottled brown clay that is plastic and sticky. It grades to mottled gray, yellowish-brown, and brown clay that is very plastic and sticky.

The plow layer is low in organic-matter content, and it is in poor tilth because of its high content of clay. It is likely to clod or crust if plowed at other than during the limited time it is most friable. The natural fertility is moderate, but the response to fertilizer is fairly good, especially after the soil has been drained. In many places the surface layer is nearly neutral in reaction, and the material below the surface layer is alkaline. The alkalinity increases with depth. Only small amounts of lime are needed. The moisture-supplying capacity is moderately high, and plants generally receive sufficient moisture, except during an extended dry period.

This soil is best suited to soybeans and other crops that tolerate wetness. It is not subject to erosion, so it can be cultivated continuously. Excessive wetness in spring and after heavy rains may delay plowing and cultivating. Open ditches and, in some areas, tile drainage can generally reduce wetness. (Capability unit IIIw–4; woodland suitability group 3; wildlife productivity group 3)

Use of the Soils for Crops and Pasture

This section has several parts. The first part discusses briefly general management and the principles of conservation management. The second explains the capability classification system, and the third discusses use and management of the soils in each of the capability units. The last part gives estimated yields of the principal crops.

General Management and Principles of Conservation Management

In Jefferson County, controlling erosion is the major problem encountered in managing the soils. Other problems include reducing wetness and increasing fertility.

The susceptibility of a soil to erosion depends, above all, on its physical and chemical make up, the steepness and length of its slope, the kind and amount of plants on it, and the conservation practices in use. Some soils erode faster than others because soils vary in depth, structure, texture, and other characteristics that determine erodibility. Also, the rate of erosion increases as the steepness and length of the slope increases. Certain practices, however, such as terracing and stripcropping, break the slope and thereby help to control erosion. Grasses and other close-growing crops sharply reduce runoff, and thus they too help to control erosion.

Generally, specific conservation practices combined with a suitable cropping system can effectively control erosion in most places. As a rule, more practices are put into use as the erosion hazard increases. Also, as the erosion hazard increases, the choice of suitable cropping systems decreases.

A nearly level, deep, productive soil, for example, has no significant erosion hazard and therefore can be cultivated continuously with little or no control measures. A soil that slopes more than 20 percent, on the other hand, can be used only for pasture or woods. Between these two extremes are many different soils, each calling for a suitable cropping system and a specific kind and number of conservation practices.

In other than extreme areas, a more intensive cropping system can be used if additional conservation practices are applied. To illustrate, Crider silt loam on a 5 percent slope that is 170 feet long should have a maximum intensity cropping system consisting of a row crop for 2 years and a meadow crop for 2 years if no conservation practices are applied. But this same soil could be row cropped 2 years out of 3 if it were contoured, and it could be cultivated year after year if it were both contoured and terraced.

Wetness can be reduced in some soils by means of a tile drainage system. In other soils, open ditches are effective. Wherever needed, diversion ditches and levees can prevent overwash and overflow. Crops that tolerate wetness should be grown on wet soils that cannot be drained artificially. Other crops will fail.

The content of organic matter can be maintained or increased by proper residue management, which includes the return of both animal and green manure to the soils. Good tilth can be maintained or improved by plowing or cultivating the soils only during the time that their moisture content favors these operations. Fertilizer and lime are needed on most soils either to maintain yields or to increase them.

Capability Groups of Soils

The capability classification is a grouping that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels—the capability class, the subclass, and the unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated 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; *w* means 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 country, indicates 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 or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it are subject to little or no erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils, enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I. Soils that have few limitations that restrict their use.
- Capability unit I-1.—Deep, level or nearly level, well-drained soils of the bottom lands.
- Capability unit I-2.—Deep, level or nearly level, moderately well drained soils of the bottom lands.
- Capability unit I-3.—Deep, nearly level, well drained or moderately well drained soils on terraces and uplands.

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

Subclass IIe. Gently sloping soils that have a moderately low erosion hazard if cultivated and not protected.
- Capability unit IIe-1.—Deep, well-drained, medium-textured soils.
- Capability unit IIe-2.—Deep or moderately deep, well-drained soils.
- Capability unit IIe-6.—Moderately well drained, medium-textured soils that have a compact, brittle fragipan at a depth of about 2 feet.
- Capability unit IIe-10.—Well drained or moderately well drained, medium-textured soils that have a compact, brittle fragipan at a depth of about 30 inches.

Subclass IIw. Soils that have moderate limitations because of excess water.
- Capability unit IIw-1.—Level or nearly level, moderately well drained soils on terraces and uplands; a compact, brittle fragipan is at a depth of about 2 feet.
- Capability unit IIw-4.—Somewhat poorly drained soils of the bottom lands.

Subclass IIs. Soils that have moderate limitations because of unfavorable characteristics of the soil material.
- Capability unit IIs-1.—Well-drained, medium-textured, gravelly soils that have a moderate moisture-supplying capacity.

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

Subclass IIIe. Gently sloping to sloping soils that are subject to moderate erosion if cultivated and not protected.
- Capability unit IIIe-1.—Deep, well-drained, medium-textured soils.
- Capability unit IIIe-2.—Well drained or moderately well drained, medium-textured soils.
- Capability unit IIIe-4.—Deep or moderately deep, well-drained soils.
- Capability unit IIIe-8.—Moderately well drained, medium-textured soils that have a compact, brittle fragipan at a depth of about 2 feet.
- Capability unit IIIe-10.—Well-drained, shallow soils that are underlain by limestone at a depth of 20 to 30 inches.
- Capability unit IIIe-14.—Deep or moderately deep, well drained or moderately well drained, eroded and severely eroded soils.

Subclass IIIw. Soils that have severe limitations because of excess water.
- Capability unit IIIw-1.—Level or nearly level, somewhat poorly drained soils that have a

compact layer at a depth of about 15 to 20 inches.

Capability unit IIIw-4.—Poorly drained, neutral or mildly alkaline, fine-textured alluvial soils.

Capability unit IIIw-5.—Level, poorly drained, slightly acid or neutral soils of the bottom lands.

Capability unit IIIw-7.—Level, dark-colored, very poorly drained soils of the bottom lands.

Subclass IIIs. Soils that have severe limitations because of unfavorable characteristics of the soil material.

Capability unit IIIs-1.—Gently sloping, excessively drained, strongly acid, sandy soils on terraces.

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

Subclass IVe. Soils that are subject to moderately severe erosion if cultivated and not protected.

Capability unit IVe-1.—Moderately steep, well-drained, deep, eroded soils.

Capability unit IVe-2.—Moderately steep, well-drained, deep, gravelly soils.

Capability unit IVe-3.—Moderately steep, well-drained or moderately well drained, moderately deep, eroded soils.

Capability unit IVe-8.—Sloping, eroded soils that have a fine-textured, alkaline layer at a depth of about 12 inches.

Capability unit IVe-9.—Sloping, deep, well-drained, medium-textured, severely eroded soils.

Capability unit IVe-11.—Sloping, moderately deep, well-drained, severely eroded soils that have fine-textured, alkaline material in the lower part of their subsoil.

Subclass IVw. Soils that have very severe limitations for cultivation because of excess water.

Capability unit IVw-1.—Level, poorly drained soils on terraces and uplands; a compact, brittle fragipan is at a depth of 12 to 18 inches.

Subclass IVs. Soils that have very severe limitations because of unfavorable characteristics of the soil material.

Capability unit IVs-2.—Sloping, excessively drained, strongly acid, sandy soils on terraces.

Class V. Soils that have little or no hazard of erosion but have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (None in Jefferson County.)

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture and woodland.

Subclass VIe. Sloping to steep soils that are subject to severe erosion if cover is not maintained.

Capability unit VIe-1.—Moderately well drained to somewhat excessively drained, shallow to moderately deep, medium-textured to fine-textured soils.

Capability unit VIe-2. Well-drained, severely eroded, moderately deep soils.

Capability unit VIe-4.—Well-drained and somewhat excessively drained, severely eroded, shallow soils.

Capability unit VIe-7.—Deep or moderately deep, medium-textured, well-drained soils.

Subclass VIs. Soils generally unsuitable for cultivation and severely limited for other uses because of unfavorable characteristics of the soils.

Capability unit VIs-1.—Sloping or moderately steep, well-drained, shallow to moderately deep, very rocky soils.

Capability unit VIs-2.—Sloping, well-drained, shallow to moderately deep, severely eroded, very rocky soils.

Capability unit VIs-3.—Moderately steep, excessively drained, deep, sandy soils.

Class VII. Soils that have very severe limitations that make them unsuited to cultivation without major reclamation and that restrict their use to woodland or limited grazing.

Subclass VIIe. Soils that are subject to very severe erosion if cover is not maintained.

Capability unit VIIe-1.—Steep, shallow, excessively drained soils that are restricted in use to limited grazing or woodland.

Capability unit VIIe-2.—Steep, shallow, excessively drained, severely eroded soils that are restricted in use to limited grazing or woodland.

Capability unit VIIe-4.—Miscellaneous land types that are restricted in use to woodland or; after extensive reclamation, to limited grazing.

Subclass VIIs. Soils very severely limited because of unfavorable characteristics of the soil material.

Capability unit VIIs-2.—Moderately steep or steep, slightly eroded to severely eroded, shallow, very rocky or stony soils that are restricted in use to woodland or to extremelv limited grazing.

Capability unit VIIs-3.—Moderately steep, somewhat excessively drained, shallow soils that are restricted in use to woodland.

Capability unit VIIs-5.—Areas that are 25 to 90 percent covered by rock outcrops and therefore restricted in use to woodland.

Class VIII. Soils and landforms that, without major reclamation, have limitations that preclude their use for commercial production of plants and that restrict their use to recreation, wildlife, water supply, or esthetic purposes. (None in Jefferson County.)

Management by Capability Units

The soils in one capability unit have about the same limitations. They are suited to about the same kinds of crops and can produce about the same yields. The soils in one unit, therefore, need about the same kind of management, though they may have formed from different kinds of parent materials and in different ways.

The capability units are described in the following pages. The soils in each unit are listed, characteristics of the soils that affect use and management are discussed, and management suitable for the soils of each unit is suggested.

Capability unit I-1

This unit consists of level or nearly level, deep, well-drained soils of the bottom lands. These soils make up 4.3 percent of the county. They have a favorable yield potential and no more than slight limitations that restrict their use. They are—

Huntington fine sandy loam.
Huntington silt loam.

Huntington silt loam is dominant in this unit. In addition to the fine sandy loam type, some areas of a soil that has a loam surface layer have been included. The soils in this unit are medium in organic-matter content, high in natural fertility, and neutral or slightly acid. They are moderately permeable, and their moisture-supplying capacity is high or very high.

Under high-level management these soils are excellent for corn, small grain, soybeans, and tobacco, and they are suited to orchard, nursery, truck, and other specialized crops. Furthermore, they are well suited to all the locally grown grasses and legumes, including alfalfa, smooth brome, orchardgrass, and ladino clover.

The soils in this unit are not subject to erosion and, therefore, can be cultivated continuously but under high-level management. They are in excellent tilth and can easily be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer and lime are needed to help keep productivity high, and both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Irrigation can be used to advantage, especially where high-value crops are grown. The sprinkler system of irrigation is suitable, and nearby streams ordinarily are an adequate source of water.

Some areas are subject to flooding, but generally floods are of short duration and occur in winter or early in spring. Nevertheless, plowing and the preparation of seedbeds are delayed in some years because of floods late in spring.

Capability unit I-2

Lindside silt loam is the only soil in this unit. It is a level or nearly level, deep, moderately well drained soil of the bottom lands. It occupies about 0.9 percent of the county. If drained it has a favorable yield potential and no more than slight limitations that restrict its use.

Ordinarily this soil has both a plow layer and a subsoil of friable silt loam. It is medium in organic-matter content, high in natural fertility, and neutral or slightly acid. It is moderately permeable, and its moisture-supplying capacity is very high. It remains slightly wet during rainy seasons because of a seasonally high water table.

Under high-level management that includes drainage, this soil is good for corn, small grain, soybeans, and tobacco. If drained it is suited to alfalfa and to truck and orchard crops. Furthermore, it is suited to nearly all the locally grown grasses and legumes.

This soil is not subject to erosion and therefore can be cultivated continuously. It is in excellent tilth and can easily be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer and lime are needed to help keep productivity high, and both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Diversion ditches can prevent overwash from adjacent hillsides. Tile drainage is not necessary, but it would lengthen the time available for field operations and possibly increase yields. Irrigation can be used to advantage, especially where high-value crops are grown. The sprinkler system of irrigation is suitable, and nearby streams are an adequate source of water.

Some areas are subject to flooding, but generally floods are of short duration and occur in winter or early in spring. Nevertheless, plowing and the preparation of seedbeds are delayed in some years because of floods late in spring.

Capability unit I-3

This unit consists of nearly level, deep, well drained or moderately well drained soils on terraces and uplands. These soils make up 4.5 percent of the county. They have a favorable yield potential and no more than slight limitations that restrict their use. They are—

Ashton silt loam, 0 to 2 percent slopes.
Crider silt loam, 0 to 2 percent slopes.
Elk silt loam, 0 to 2 percent slopes.
Russellville silt loam, 0 to 2 percent slopes.
Sequatchie fine sandy loam, 0 to 2 percent slopes.
Wheeling silt loam, 0 to 2 percent slopes.

These soils have a very friable plow layer and a friable or firm subsoil. Generally they are medium in organic-matter content, high in natural fertility, and slightly acid to strongly acid. Their moisture-supplying capacity is high or very high. The Russellville soil, at a depth of about 30 inches, has a slowly permeable fragipan that limits the depth of the root zone.

Under high-level management the soils in this unit are excellent for corn, small grain, soybeans, and tobacco, and they are suited to orchard, nursery, vegetable, and other specialized crops (fig. 14). Furthermore, they are well suited to alfalfa, ladino clover, orchardgrass, smooth brome, and almost all other grasses and legumes.

These soils are not subject to erosion; they can be cultivated continuously if high-level management is prac-

***Figure 14.*—Truck crops on Crider silt loam, 0 to 2 percent slopes, a soil in capability unit I-3. Soils in this unit have no more than slight limitations that restrict their use.**

ticed. They can be worked throughout a wide range of moisture content without clodding or crusting. They are in excellent tilth and can easily be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer and lime are needed to help keep productivity high, and both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. The moisture-supplying capacity of these soils is high enough that plants receive sufficient moisture, except in an extremely dry year. Nevertheless, irrigation can be used to advantage, especially where high-value crops are grown.

Because they are well drained and nearly level, the soils in this unit are excellent for suburban development and other nonagricultural uses.

Capability unit IIe-1

This unit consists of gently sloping, deep, well-drained soils on terraces and uplands. These soils occupy about 19 percent of the county. They are—

Ashton silt loam, 2 to 6 percent slopes.
Crider silt loam, 2 to 6 percent slopes.
Crider silt loam, 2 to 6 percent slopes, eroded.
Elk silt loam, 2 to 6 percent slopes.
Memphis silt loam, 2 to 6 percent slopes.
Sequatchie fine sandy loam, 2 to 6 percent slopes.
Shelbyville silt loam, 2 to 6 percent slopes.
Wheeling silt loam, 2 to 6 percent slopes.

Generally the plow layer of these soils is friable silt loam. In a few places on the terraces, it is loam or fine sandy loam. The subsoil is medium textured and friable. The organic-matter content is medium, the natural fertility is moderately high or high, the reaction is slightly acid to strongly acid, and the moisture-supplying capacity is high or very high.

The soils in this unit are suited to a wide range of crops, and they are productive. Yields of corn, small grain, soybeans, and tobacco are favorable if these crops are grown under high-level management. Orchard, nursery, vegetable, and other specialized crops can be grown, as well as orchardgrass, smooth brome, alfalfa, ladino clover, and nearly all other grasses and legumes.

Erosion is a moderately low hazard in cultivated fields, but it can be controlled by means of various combinations of cropping systems and conservation practices. If fewer conservation practices are used, a longer rotation dominated by close-growing crops is needed to control runoff and erosion effectively. For example, if only contour cultivation is used, a rotation that consists of meadow or sod crops about 50 percent of the time is necessary. But if terraces, contour cultivation (fig. 15), and other high-level conservation practices are used, the soils can be cultivated almost continuously.

These soils are in excellent tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. They can be tilled throughout a wide range of moisture content without clodding. Fertilizer and lime are needed to help keep productivity high. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Except during an abnormally dry period, plants receive sufficient moisture. Nevertheless, irrigation can be used to advantage, especially where high-value crops are grown.

***Figure 15.*—Nursery stock on Crider silt loam, 2 to 6 percent slopes. Contour cultivation helps to reduce soil losses.**

Some areas on terraces are subject to flooding, but floods are minor.

Capability unit IIe-2

This unit consists of gently sloping, well-drained soils on foot slopes and on uplands. These soils occupy about 3 percent of the county. They are—

Beasley silt loam, 2 to 6 percent slopes.
Beasley silt loam, 2 to 6 percent slopes, eroded.
Woolper silty clay loam, 2 to 6 percent slopes.

These soils formed in calcareous shale and limestone. Their plow layer consists of friable silt loam or silty clay loam, and their subsoil consists of firm silty clay loam. At a depth of about 20 inches, the subsoil is underlain by silty clay. The organic-matter content of these soils is low or medium, the natural fertility is moderately high or high, the reaction is nearly neutral to medium acid, and the moisture-supplying capacity is high or very high.

The soils in this unit are suited to nearly all cultivated crops and pasture plants grown in the county. Yields of corn, small grain, soybeans, and tobacco are favorable. Kentucky 31 fescue, orchardgrass, red clover, sweetclover, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Alfalfa, smooth brome, Kentucky bluegrass, and Kobe lespedeza need high-level management.

Erosion is a moderately low hazard in cultivated fields, but it can be controlled by means of various combinations of cropping systems and conservation practices. On long slopes or where fewer conservation practices are used, a longer rotation dominated by close-growing crops is necessary to control erosion. For example, where only contour cultivation is used, a rotation that consists of meadow or sod crops about 50 percent of the time is necessary. But where terraces, contour cultivation, and other high-level conservation practices are used, the soils can be cultivated more intensively.

These soils are in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. The silty clay loam plow layer is likely to clod if plowed or cultivated when too wet. The silt loam plow layer, however, can be tilled throughout a wide range of moisture content without clodding. Lime and fertilizer are needed to help maintain favorable yields. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Plant growth is affected during an exceptionally dry period, at which time a sprinkler irrigation system can be used to advantage, especially in fields of high-value crops.

Capability unit IIe-6

This unit consists of gently sloping, moderately well drained soils on terraces and uplands. These soils make up 5.4 percent of the county. They are—

Captina silt loam, 2 to 6 percent slopes.
Dickson silt loam, 2 to 6 percent slopes.
Sciotoville silt loam, 2 to 6 percent slopes.

These soils have a plow layer that consists of friable silt loam. Their subsoil is friable silty clay loam in the upper part and compact, brittle silty clay loam in the lower part. This lower part, which begins at a depth of about 2 feet, is a fragipan that limits the depth of the root zone and restricts the movement of air and water. The organic-matter content of these soils is medium, the natural fertility is moderate, the reaction is strongly acid or very strongly acid, and the moisture-supplying capacity is moderate.

Most general crops can be grown on the soils in this unit. Yields of corn, small grain, tobacco, and soybeans are favorable if these crops are grown under high-level management. Kentucky bluegrass, orchardgrass, alfalfa, alsike clover, and sweetclover also need high-level management. Alfalfa gradually dies after a few years. Kentucky 31 fescue, ladino clover, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management.

Erosion is a moderately low hazard in cultivated fields, but it can be controlled by means of various combinations of cropping systems and conservation practices. If fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary to control runoff and erosion effectively. For example, if only contour cultivation is used, a rotation that consists of meadow or sod crops about 50 percent of the time is necessary. But if terraces, contour cultivation, and other high-level conservation practices are used, the soils can be cultivated almost continuously.

These soils can be maintained in good tilth by using a cropping system that includes a cover crop and by utilizing crop residues properly. They can be tilled throughout a wide range of moisture content without clodding. In spring and after heavy rains, however, plowing and cultivating may be delayed because of wetness. Fertilizer and lime are needed to help keep productivity high. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Because the moisture-supplying capacity of these soils is moderate (less than moderate during a dry period), plants at times are damaged and crop yields are reduced. Irrigation therefore can be used to advantage, especially where high-value crops are grown.

A few of the low-lying areas on terraces are subject to infrequent overflows.

Capability unit IIe-10

This unit consists of gently sloping, well drained or moderately well drained soils on uplands. These soils make up about 5.1 percent of the county. They are—

Loring silt loam, 2 to 6 percent slopes.
Russellville silt loam, 2 to 6 percent slopes.
Russellville silt loam, 2 to 6 percent slopes, eroded.
Zanesville silt loam, 2 to 6 percent slopes.

These soils have a plow layer that consists of friable silt loam. Their subsoil is friable silt loam to silty clay loam in the upper part and compact, brittle silty clay loam in the lower part. This lower part, which begins at a depth of about 30 inches, is a fragipan that limits the depth of the root zone and restricts the movement of air and water. The organic-matter content of these soils is generally medium, the natural fertility is moderate or high, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high.

Almost all of the locally grown crops can be grown on the soils in this unit. Yields of corn, small grain, tobacco, and soybeans are favorable if these crops are grown under high-level management. Kentucky bluegrass, smooth brome, alfalfa, and alsike clover also need high-level management. Kentucky 31 fescue, orchardgrass, ladino clover, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management.

Erosion is a moderately low hazard in cultivated fields, but it can be controlled by means of various combinations of cropping systems and conservation practices. If fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is needed to control runoff and erosion. On average slopes for example, if only contour cultivation is used, a rotation that consists of meadow or sod crops about 50 percent of the time is necessary. But if terraces, contour cultivation, and other high-level management practices are used, the soils can be cultivated almost continuously.

These soils are in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. They can be cultivated throughout a wide range of moisture content without clodding. Lime and fertilizer are needed to help maintain favorable yields. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Plants seldom are damaged because of insufficient moisture, except during an extremely dry period. Nevertheless, a sprinkler irrigation system can be used to advantage in fields of high-value crops.

Capability unit IIw-1

This unit consists of level or nearly level, moderately well drained soils on terraces and uplands. These soils occupy about 2.6 percent of the county. They are—

Captina silt loam, 0 to 2 percent slopes.
Dickson silt loam, 0 to 2 percent slopes.
Sciotoville silt loam, 0 to 2 percent slopes.

These soils have a plow layer that consists of friable silt loam. Their subsoil is friable silty clay loam or silt loam in the upper part and compact, brittle silty clay loam in the lower part. This lower part, which begins at a depth of about 2 feet, is a fragipan that limits the depth of the root zone and restricts the movement of air and water. The organic-matter content of these soils is medium, the natural fertility is moderate, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is moderate.

The soils in this unit are best suited to crops that tolerate some wetness. Yields of corn, small grain, tobacco, and soybeans are somewhat favorable or favorable if these crops are grown under high-level management. Kentucky bluegrass, orchardgrass, timothy, ladino clover, and sweetclover also need high-level management. Kentucky 31 fescue, redtop, alsike clover, red clover, Kobe lespedeza, and Korean lespedeza can be grown under medium-level management. Alfalfa and other deep-rooted crops are not suitable.

These soils are not subject to erosion and consequently can be cultivated continuously. Ordinarily they are in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. After heavy rains, plowing and cultivating may be delayed because of wetness. Lime and fertilizer are needed to help maintain productivity. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. During a dry period, plants may be damaged because of insufficient moisture, and crop yields will be reduced. Sprinkler irrigation, therefore, can be used to advantage, especially in fields of high-value crops.

Wetness is the main limitation of the soils in this unit. In some areas, open drainage ditches are effective in removing surface water.

Capability unit IIw-4

This unit consists of deep, somewhat poorly drained soils of the bottom lands. These soils occupy 3 percent of the county. They are—

Melvin silt loam, overwash.
Newark silt loam.

These soils have both a plow layer and a subsoil of friable silt loam. They are medium in organic-matter content, moderately high in natural fertility, and neutral or slightly acid. Their moisture-supplying capacity is very high. The water table is high, and water often stands on the surface during wet periods. Seepage water from higher elevations adds to the wetness.

Most general crops can be grown on the soils in this unit. Yields of corn, small grain, tobacco, and soybeans are favorable if these crops are grown under high-level management that includes drainage. Kentucky bluegrass, smooth brome, orchardgrass, reed canarygrass, sweetclover, and sericea lespedeza also need high-level management, including drainage. Kentucky 31 fescue, timothy, redtop, alsike clover, ladino clover, red clover, Kobe lespedeza, and Korean lespedeza can be grown under medium-level management. Alfalfa is not suitable.

These soils are not subject to erosion and consequently can be cultivated continuously. They are easy to till, but plowing or cultivating may be delayed for a short period after heavy rains. The organic-matter content can be maintained by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer and lime are needed to help maintain favorable yields. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Crops receive sufficient water, except during an extremely dry period, but sprinkler irrigation can be used to advantage, especially where high-value crops are grown.

Wetness is the main limitation of the soils in this unit. Because these soils are permeable, a tile drainage system can be used if suitable outlets are available. Open drainage ditches are effective in removing surface water. Diversion ditches, in some areas, can prevent overwash from adjacent hillsides.

Most areas, but especially those along large streams, are subject to occasional flooding. Most floods occur before the normal crop season and are of short duration.

Capability unit IIs-1

Ennis cherty silt loam is the only soil in this unit. It is a nearly level, well-drained, gravelly soil that occurs on narrow bottoms. It occupies only about 0.2 percent of the county.

This soil formed in alluvium that washed from soils of shale, sandstone, or cherty limestone origin. Both the surface layer and the subsoil consist of very friable, gravelly silt loam. The gravel content increases with depth. In some areas the subsoil is slightly mottled below a depth of about 30 inches. The organic-matter content of this soil is medium, the natural fertility is moderately low, the reaction is slightly acid or medium acid, and the moisture-supplying capacity is moderate.

Almost all of the crops grown in this county can be grown on this soil. Yields of corn, small grain, soybeans, and tobacco are moderate. Alsike clover, Kentucky 31 fescue, red clover, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but all other commonly grown hay and pasture plants, including orchardgrass, timothy, ladino clover, and Kobe lespedeza, require high-level management.

This soil is not subject to erosion and consequently can be cultivated continuously. It is in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. It can be tilled throughout a wide range of moisture content, but in most places the gravel interferes with tillage. Lime and fertilizer are needed. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Split applications of fertilizer generally are more beneficial than single ones because permeability is rapid and consequently the soil is readily leached. During a dry period, plants are damaged because of insufficient moisture, but even in a normal year, crop yields are often reduced. Diversion ditches can prevent overwash from adjacent hillsides.

Flooding occasionally damages crops, but most floods are of short duration and occur before the crop season.

Capability unit IIIe-1

This unit consists of sloping, deep,well-drained soils on terraces and uplands. These soils occupy about 5.6 percent of the county. They have a favorable yield potential but are likely to erode if cultivated. They are—

Crider silt loam, 6 to 12 percent slopes.
Crider silt loam, 6 to 12 percent slopes, eroded.
Wheeling silt loam, 6 to 12 percent slopes, eroded.

The plow layer of these soils is friable silt loam, and the subsoil is friable or firm silty clay loam. The organic-matter content generally is low, the natural fertility is moderately high, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high.

The soils in this unit are suited to a wide range of crops. Yields of corn, small grain, soybeans, and tobacco are favorable if these crops are grown under high-level management. Orchardgrass, Kentucky 31 fescue, timothy, ladino clover, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza grow well. Smooth brome, Kentucky bluegrass, sweetclover, and alfalfa require high-level management.

If cultivated, these soils are subject to moderate erosion, and frequent cultivation results in excessive soil losses and land damage (fig. 16). Various combinations of cropping systems and conservation practices can help to control erosion. Generally, if fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. On short slopes, for example, if only contour cultivation is used, a cropping system that consists of meadow or sod crops 3 years out of 5 is necessary. But if terraces, contour cultivation, and other high-level management practices are used, meadow or sod crops are necessary only 1 year out of 3.

Except in some small areas where most of the original surface layer has been lost through erosion, the soils in this unit are in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. They can be tilled satisfactorily throughout a fairly wide range of moisture content without clodding. Lime and fertilizer are needed to help maintain productivity at a favorable level. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Only in an extremely dry period are crops damaged because of insufficient moisture. Nevertheless, a sprinkler irrigation system can be used to advantage, especially in fields of high-value crops.

Capability unit IIIe-2

This unit consists of sloping, well drained or moderately well drained soils on terraces and uplands. These soils occupy about 2.3 percent of the county. They are—

- Loring silt loam, 6 to 12 percent slopes, eroded.
- Loring-Crider silt loams, 6 to 12 percent slopes, eroded.
- Lowell silt loam, 6 to 12 percent slopes, eroded.
- Memphis silt loam, 6 to 12 percent slopes, eroded.
- Russellville silt loam, 6 to 12 percent slopes, eroded.
- Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded.
- Zanesville silt loam, 6 to 12 percent slopes, eroded.

The plow layer and the upper part of the subsoil are medium textured and friable. In many places the lower part of the subsoil, beginning at a depth of about 30 inches, consists of a compact layer that limits the depth of the root zone. In other places the root zone is deep. The organic-matter content generally is low, the natural fertility is moderate or moderately high, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high or very high.

The soils in this unit are suited to nearly all the locally grown crops. Yields of corn, small grain, soybeans, and tobacco are favorable if these crops are grown under high-level management. Kentucky 31 fescue, redtop, ladino clover, red clover, Korean lespedeza, and sericea lespedeza will grow under medium-level management, but Kentucky bluegrass, orchardgrass, timothy, alfalfa, alsike clover, sweetclover, and Kobe lespedeza require high-level management.

***Figure 16.*—Mixed hay on Crider silt loam, 6 to 12 percent slopes, a soil in capability class III. Frequent cultivation of the soils in class III results in excessive soil losses and land damage.**

If cultivated, these soils are subject to moderate erosion. Various combinations of cropping systems and conservation practices, however, can help to control erosion. Generally, if fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. On average slopes, for example, if only contour cultivation is used, a cropping system that consists of meadow or sod crops 3 years out of 5 is necessary. But if terraces, contour cultivation, and other high-level management practices are used, meadow or sod crops are necessary only 1 year out of 3. On long slopes, a cropping system dominated by close-growing crops is needed 3 years out of 5.

Except for patches that are eroded, the soils in this unit are in good tilth and can be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. They can be plowed and cultivated throughout a fairly wide range of moisture content without clodding. Fertilizer and lime are needed to help maintain productivity at a favorable level. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Generally, only in an extremely dry period are crops damaged because of a shortage of moisture. Nevertheless, a sprinkler irrigation system can be used to advantage, especially in fields of high-value crops.

Capability unit IIIe-4

This unit consists of sloping, well-drained soils on foot slopes and on uplands. These soils occupy about 3.9 percent of the county. They are—

- Beasley silt loam, 6 to 12 percent slopes, eroded.
- Woolper silty clay loam, 6 to 12 percent slopes, eroded.

These soils formed in calcareous shale and limestone. Their plow layer is friable silt loam or silty clay loam. The upper part of their subsoil is silty clay loam, and the lower part, which begins at a depth of about 20 inches, is firm silty clay. The organic-matter content is low, the natural fertility is moderately high or high, the reaction is neutral to medium acid, and the moisture-suppling capacity is high.

The soils in this unit are suited to nearly all of the crops grown in the county. Yields of corn, soybeans, small grain, and tobacco are generally moderate. All hay and pasture plants are suitable, except those that require wet conditions, and normally yields are favorable if these plants are grown under high-level management.

If cultivated, these soils are subject to moderate erosion. Various combinations of cropping systems and conservation practices, however, can help to control erosion. It is important that the correct combination be chosen. Generally, if fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. For example, in fields that are under high-level general management, if only contour cultivation is used, a cropping system that consists of close-growing crops 3 years out of 4 is necessary. But if both terraces and contour cultivation are used, the need for a close-growing crop is less and more intensive cultivation is possible.

The silty clay loam plow layer is likely to clod if plowed or cultivated when too wet. The silt loam plow layer, however, can be tilled throughout a fairly wide range of moisture content without clodding. Tilth can be improved by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer and lime are needed to help maintain productivity. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Except during an extended dry period, plants generally receive sufficient water from these soils.

Capability unit IIIe-8

This unit consists of sloping, moderately well drained soils on stream terraces. These soils make up about 0.3 percent of the county. They are—

Captina silt loam, 6 to 12 percent slopes, eroded.
Sciotoville silt loam, 6 to 12 percent slopes, eroded.

The plow layer and the upper part of the subsoil are friable silt loam. The lower part of the subsoil is compact, brittle silty clay loam. This lower part, which begins at a depth of about 22 inches, is a fragipan that limits the depth of the root zone and restricts the movement of water. The organic-matter content of these soils generally is low, the natural fertility is moderate, the reaction is strongly acid or very strongly acid, and the moisture-supplying capacity is moderate.

The soils in this unit are best suited to crops that tolerate some wetness. Corn, small grain, soybeans, and tobacco, for example, can be grown. The yields are moderate. Kentucky 31 fescue, timothy, alsike clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Kentucky bluegrass, orchardgrass, reed canarygrass, ladino clover, and red clover require high-level management. Alfalfa is short lived.

If cultivated, these soils are subject to moderate erosion. Various combinations of cropping systems and conservation practices, however, can help to control erosion. Generally, if fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. On average slopes, under high-level general management, for example, if only contour cultivation is used, a cropping system that consists of close-growing crops 3 years out of 4 is necessary. But if both terraces and contour cultivation are used, a close-growing crop is needed only every other year, or about 50 percent of the time. On long slopes, a close-growing crop is needed most of the time, and a row crop should be grown only occasionally.

The soils in this unit are in good tilth and can be cultivated throughout a fairly wide range of moisture content without clodding. A few patches that are more eroded than the surrounding soils require special attention when cultivated. Fertilizer and lime are needed to help maintain productivity. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Crops may be damaged during a dry period, and yields are sometimes reduced, especially in a dry year.

Capability unit IIIe-10

Corydon silt loam, 2 to 6 percent slopes, eroded, is the only soil in this unit. It is a well-drained soil that developed from limestone. It occupies about 0.2 percent of the county.

The plow layer is friable silt loam. The subsoil is silty clay loam in the upper part and, at a depth of about 12 inches, grades to firm silty clay. Bedrock generally is at a depth of 20 to 30 inches. The organic-matter content of this soil is low, the natural fertility is moderate, the reaction is slightly acid or medium acid, and the moisture-supplying capacity is moderately low.

Because it is shallow, this soil is only fairly well suited to row crops, including corn, soybeans, and tobacco. Kentucky 31 fescue, sweetclover, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Kentucky bluegrass, orchardgrass, timothy, ladino clover, red clover, and Kobe lespedeza require high-level management.

Erosion is a moderate hazard in cultivated fields, but a cropping system combined with conservation practices helps to reduce runoff and thereby to control erosion. If fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. For example, if only contour cultivation is used, meadow or sod crops are needed 2 years out of 3. But if both terraces and contour cultivation are used, the need for meadow or sod crops is less and more intensive cultivation is possible.

This soil can be plowed or cultivated throughout a fairly wide range of moisture content without clodding. Ordinarily it is in satisfactory tilth and can be kept that way by including a cover crop in the cropping system and by utilizing crop residues properly. Fertilizer and lime are needed to help keep productivity at a favorable level. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. During a dry period, plants do not receive enough water, and consequently crop yields are generally reduced. In fields of high-value crops, a sprinkler irrigation system can be used to advantage.

Capability unit IIIe-14

This unit consists of well drained or moderately well drained soils on terraces and uplands. These soils occupy about 0.2 percent of the county. They are—

Beasley silty clay loam, 2 to 6 percent slopes, severely eroded.
Markland silt loam, 2 to 6 percent slopes, eroded.

The plow layer of these soils is medium acid, as is the upper part of the subsoil, which ranges from firm silty clay loam to silty clay in texture. The lower part of the subsoil, which is fine textured, is alkaline. The organic-matter content is low or very low, the natural fertility is moderate, and the moisture-supplying capacity is moderate to high.

The soils in this unit are only fairly well suited to row crops. Yields of corn, soybeans, small grain, and tobacco, for example, are seldom favorable. Kentucky 31 fescue, red clover, Korean lespedeza, and sericea lespedeza, on the other hand, grow well under medium-level management. Orchardgrass, timothy, alfalfa, alsike clover, and ladino clover require high-level management.

Erosion is a moderate hazard in cultivated fields, but the right cropping system, combined with various conservation practices, helps to reduce runoff and thereby to control erosion. Generally, if fewer conservation practices are used, a longer rotation dominated by meadow or sod crops is necessary. For example, if only contour cultivation is used in a field that is under high-level general management, a meadow or sod crop is needed 2 years out of 3. But, in the same field, if both terraces and contour cultivation are used, the need for a meadow or sod crop is less and more intensive cultivation is possible.

These soils, especially the Beasley soil because of its silty clay loam plow layer, are likely to clod or crust if plowed or cultivated when too wet or too dry. They are not in good tilth. Tilth, however, can be improved by the use of cover crops in the cropping system and the proper utilization of crop residues. Fertilizer and lime are needed, and these should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. During a dry period, crop yields may be reduced.

Capability unit IIIw-1

This unit consists of level or nearly level, somewhat poorly drained soils on terraces and uplands. These soils occupy about 6.3 percent of the county. They are—

Lawrence silt loam.
McGary silt loam.
Taft silt loam.
Tyler silt loam.
Weinbach silt loam.

These soils have a friable plow layer. The upper part of their subsoil ranges from silt loam to silty clay loam in texture. The lower part of the subsoil of the McGary soil is firm silty clay. That of the other soils is compact silty clay loam—a fragipan. In all the soils, however, the lower part of the subsoil limits the depth of the root zone and restricts the movement of water. The organic-matter content of these soils is low, the natural fertility is moderate or moderately low, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is moderate or moderately low.

The soils in this unit are wet, and consequently the range of suitable crops is limited. Soybeans are the most suitable of the row crops; tobacco generally is not suitable. Corn and small grain will grow, but yields are low to moderate. Kentucky 31 fescue, reed canarygrass, ladino clover, Kobe lespedeza, and Korean lespedeza grow well under medium-level management. Orchardgrass, alsike clover, and red clover require high-level management. Alfalfa and other deep-rooted crops are not suitable.

These soils are not subject to erosion and consequently can be cultivated continuously. They are in good tilth and can easily be kept that way by using a cropping system that includes a cover crop and by utilizing crop residues properly. In spring and after heavy rains, plowing or cultivating is often delayed because of wetness. Fertilizer and lime are needed, even for average yields. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Large amounts of fertilizer, however, are seldom justified. In a dry year, low crop yields can be expected. But even in a normal year, yields are generally reduced because the root zone is shallow and the moisture-supplying capacity is moderate or moderately low. Irrigating these soils is not practical, because their yield potential is low.

Wetness is the main limitation of these soils. Water stands on the surface early in spring and after heavy rains. Open drainage ditches are effective in removing surface water, but a tile drainage system generally is not workable. Diversion ditches, in some areas, can prevent overwash from higher places.

Capability unit IIIw-4

Zipp silty clay is the only soil in this unit. It is a level, poorly drained soil that formed in water-deposited silt and clay. It occupies about 2 percent of the county.

The plow layer is either silty clay or silty clay loam and generally is neutral or mildly alkaline. The subsoil is silty clay and is alkaline. It is very firm when moist and plastic when wet. The organic-matter content is low, the natural fertility is moderate, and the moisture-supplying capacity is moderately high.

The soil is excessively wet, and thus the range of suitable crops is limited. Soybeans and corn will grow, but the soil must be drained, and only moderate yields can be expected. Kentucky 31 fescue, reed canarygrass, alsike clover, and ladino clover, on the other hand, grow well under medium-level management. Orchardgrass, timothy, Kobe lespedeza, and Korean lespedeza require high-level management. Alfalfa and other crops that do not tolerate wetness are not suitable.

Because this soil occurs in flat areas, it is not subject to erosion. Consequently, it can be cultivated continuously. High-level management, however, is needed because of some unfavorable characteristics of the soil. One such unfavorable characteristic is poor tilth. This soil is difficult to till, and it can be plowed or cultivated only within a narrow range of moisture content without clodding or crusting. Tilth can be improved and the organic-matter content can be increased by using a cropping system that includes a cover crop and by turning under crop residues. Fertilizer is needed and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests.

Only small amounts of lime are needed. Because the depth of the root zone is slightly limited, plants may not receive sufficient moisture during an extended dry period.

Wetness is the main limitation of this soil. Open drainage ditches are effective in removing surface water. A tile drainage system works satisfactorily in some areas, but generally this type of system is not effective, because of the fine texture and the slow permeability of the subsoil.

Capability unit IIIw-5

This unit consists of poorly drained soils that are on bottom lands. These soils occupy about 1.6 percent of the county. They are—

Melvin silt loam.
Melvin silty clay loam.

The plow layer of these soils is friable and ranges from silt loam to silty clay loam in texture. The texture of the subsoil is much the same as that of the plow layer. The organic-matter content is low, the natural fertility is moderately low, the reaction is slightly acid or neutral, and the moisture-supplying capacity is very high.

These soils are excessively wet, and thus the range of suitable crops is limited. Corn, soybeans, and small grain will grow, but the soils must be drained, and then only moderate yields can be expected. Kentucky 31 fescue, reed canarygrass, alsike clover, ladino clover, and Kobe lespedeza grow well under medium-level management. Orchardgrass, timothy, and red clover require high-level management. Tobacco and alfalfa are not suitable.

The soils in this unit are level and are not likely to erode. Consequently, they can be cultivated continuously. Plowing or cultivating is often delayed in spring or after heavy rains. Melvin silty clay loam is likely to clod if tilled when too wet. Using a cropping system that includes a cover crop and utilizing crop residues properly will help to improve tilth and increase the organic-matter content. Fertilizer and lime are needed and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Most plants receive sufficient moisture, even during short periods of drought.

Wetness is the main limitation of these soils, but open drainage ditches and a tile drainage system can remove excess water in most places. Overflows occasionally damage crops and reduce yields, although most floods are of short duration and occur before the regular crop season.

Capability unit IIIw-7

Dunning silty clay loam is the only soil in this unit. It is a dark-colored, very poorly drained soil of the bottom lands. It occupies only about 0.1 percent of the county.

The plow layer is slightly friable silty clay loam, and the subsoil is firm silty clay loam. The organic-matter content is high, the natural fertility is high, the reaction is nearly neutral, and the moisture-supplying capacity is very high.

This soil is excessively wet and therefore is not suited to certain crops. If drained, it is well suited to corn, soybeans, and wheat. It is not well suited to tobacco. Under medium-level management, it is good for Kentucky 31 fescue, reed canarygrass, timothy, alsike clover, ladino clover, Kobe lespedeza, and Korean lespedeza. Under high-level management, it is suited to Kentucky bluegrass, orchardgrass, red clover, sweetclover, and smooth brome. If the soil is drained, alfalfa will grow but generally is short lived.

Because this soil is level, it is not likely to erode. Consequently, it can be cultivated continuously. It is slightly difficult to till and tends to clod if plowed when too wet. Its tilth can be improved and its organic-matter content can be maintained at a high level by using a cropping system that includes a cover crop and by utilizing crop residues properly. Fertilizer is needed for favorable yields and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Generally little or no lime is needed. Plants normally receive sufficient moisture for good growth.

Wetness is the main limitation of this soil. It can be reduced, however, by means of open drainage ditches and a tile drainage system. Overflows occasionally damage crops, although most floods are of short duration and occur before the regular crop season.

Capability unit IIIs-1

Lakin loamy fine sand, 2 to 6 percent slopes, makes up this unit. It is a deep, excessively drained soil on terraces. It occupies only 0.2 percent of the county.

The plow layer is a very friable loamy fine sand, and the subsoil is very friable or loose loamy fine sand or very fine sandy loam. The organic-matter content is low, the natural fertility is moderate, the reaction is strongly acid, and the moisture-supplying capacity is moderately low.

Almost all of the locally grown crops can be grown on this soil, but insufficient moisture results in reduced yields and sometimes in crop failure. Very early truck crops and melons grow well, but only low or moderately low yields of corn, small grain, soybeans, and tobacco can be expected. Kentucky 31 fescue and sericea lespedeza grow well under medium-level management, and sweetclover and Korean lespedeza grow well under high-level management. But only low yields of most of the other grasses and legumes can be expected, except in years of heavy rainfall.

Erosion is a moderately low hazard on this soil. Various combinations of cropping systems and conservation practices, however, can be used to reduce runoff and thereby control erosion. On average slopes, for example, a cropping system that consists of a meadow or sod crop every other year, or 50 percent of the time, plus contour cultivation, will effectively control erosion. On long slopes, a longer rotation dominated by meadow or sod crops is needed.

This soil is in excellent tilth. It can be worked early in spring and after heavy rains. Its content of organic matter can be increased by including a cover crop in the cropping system and by utilizing crop residues properly. Lime and fertilizer are needed, even for average yields, and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Split applications of fertilizer generally are more beneficial than single ones because this soil is readily leached.

Dryness is the main limitation of this soil. Thus, irrigation can be used to advantage, especially in fields of high-value crops.

Capability unit IVe-1

This unit consists of moderately steep, well-drained, deep soils on terraces and uplands. Generally the slopes are short. These soils occupy about 0.9 percent of the county. They are—

Crider silt loam, 12 to 20 percent slopes, eroded.
Wheeling silt loam, 12 to 20 percent slopes, eroded.

The plow layer is ordinarily friable silt loam, and the subsoil is friable or firm silty clay loam. About 50 percent of the original surface layer has been removed by erosion, and patches of subsoil are exposed in places. The organic-matter content is low, the natural fertility is moderately high, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high or very high.

These soils are suited to a wide range of crops. Corn, tobacco, soybeans, and small grain can be grown, and favorable yields can be expected. Orchardgrass, Kentucky 31 fescue, red clover, sweetclover, Korean lespedeza, Kobe lespedeza, and sericea lespedeza can be grown under medium-level management. Almost all other grasses and legumes require high-level management.

If cultivated, the soils in this unit are subject to moderately severe erosion. Terraces to help control erosion cannot be constructed, because the slopes are too steep, and stripcropping is feasible only on the long, uniform slopes. A cropping system, therefore, must be relied upon to control erosion. One that includes a row crop no more than 1 year out of 5 should be chosen. Natural waterways should be seeded with permanent grasses to prevent gully formation.

Generally these soils are easy to till. Tillage should be on the contour and should be held to a minimum. The organic-matter content can be increased by using cover crops in the rotation and by utilizing crop residues properly. Lime and fertilizer are needed, and these should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Except during an extremely dry period, plants generally receive sufficient water from these soils.

Capability unit IVe-2

Holston gravelly silt loam, 12 to 20 percent slopes, is the only soil in this unit. It is a deep, well-drained soil on foot slopes. It occupies only about 0.1 percent of the county.

Generally the plow layer consists of very friable gravelly silt loam. The subsoil is much like the plow layer, though less friable. The organic-matter content is medium, the natural fertility is moderate, the reaction is extremely acid, and the moisture-supplying capacity is high.

Most of the local crops can be grown on this soil, but favorable yields are uncommon. Corn, tobacco, soybeans, and small grain should be grown only occasionally. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Kentucky bluegrass, orchardgrass, timothy, alsike clover, and ladino clover require high-level management.

If cultivated, this soil is subject to moderately severe erosion. To control the erosion, a cropping system is needed that provides cover 5 years out of 6. The slopes are too steep to terrace, but the long slopes can be stripcropped. Plowing and other machinery operations should be on the contour. Gullying can be prevented by sodding waterways with permanent grasses. Diversion ditches can prevent overwash from the steeper slopes.

This soil is easy to till, but plowing should be held to a minimum. It needs lime and fertilizer, both of which should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. The organic-matter content can be increased by the use of cover crops in the rotation and by the proper utilization of crop residues. Except in a long dry period, plants generally receive sufficient water from this soil.

Capability unit IVe-3

The soils in this unit are moderately deep and well drained or moderately well drained. They occupy about 1.1 percent of the county. They are—

Beasley silt loam, 12 to 20 percent slopes, eroded.
Zanesville silt loam, 12 to 20 percent slopes, eroded.

The plow layer of these soils is friable silt loam, and the upper part of their subsoil is silty clay loam. The lower part of the subsoil of the Beasley soil is firm silty clay, and that of the Zanesville soil is compact, brittle silty clay loam (a fragipan). About 50 percent of the original surface layer has been removed by erosion, and patches of subsoil are exposed in places. The organic-matter content is low, the natural fertility is moderate, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high.

Most of the local crops can be grown on the soils in this unit. Corn, small grain, and soybeans can be grown, but no more than fair yields can be expected. Tobacco does not grow well. Kentucky 31 fescue, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but orchardgrass, timothy, alfalfa, ladino clover, and sweetclover require high-level management.

If cultivated, this soil is subject to moderately severe erosion. To control the erosion, a cropping system is needed that provides cover at least 4 years out of 5. The slopes are too steep to terrace, but the long slopes can be stripcropped. Plowing and other machinery operations should be on the contour.

Generally this soil is in good tilth, and it seldom clods when plowed, except in some of the eroded spots. Good tilth can be maintained or improved and the organic-matter content can be increased by the use of cover crops in the rotation and by the proper utilization of crop residues. Lime and fertilizer are needed and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. In a dry period, plants may be damaged because of insufficient moisture, and crop yields may be reduced.

Capability unit IVe-8

Markland silt loam, 6 to 12 percent slopes, eroded, is the only soil in this unit. It is a deep, well drained or moderately well drained soil on terraces. It occupies less than 0.05 percent of the county.

The plow layer consists of friable silt loam. The subsoil is firm silty clay loam in the upper part and grades to silty clay at a depth of about 12 inches. The plow layer and the upper part of the subsoil are slightly acid or medium acid, and the lower part of the subsoil is alkaline. The organic-matter content is low, the natural fertility is moderate, and the moisture-supplying capacity is high.

This soil is fairly well suited to most of the locally grown crops. Under high-level management, it is moderately productive of corn, tobacco, small grain, and soybeans, and it is good for orchardgrass, Kobe lespedeza, and sweetclover. Under medium-level management, it is good for Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza.

If cultivated, this soil is subject to moderately severe erosion. To control the erosion, a cropping system is needed that provides cover for 4 years out of 5 or for 5 years out of 6. If the soil is terraced and contoured, it can be cultivated a little more intensively because the need for cover is less.

Generally this soil is easy to till, but if plowed when too wet it may clod in some of the eroded spots. It is likely to be too wet for plowing or cultivating early in spring and after heavy rains because it is slowly permeable. It needs lime and fertilizer, both of which should be applied in amounts determined by soil tests or according to recommendations of the Kentucky Agricultural Experiment Station. In an extremely dry period, plants may not receive sufficient water from this soil.

Capability unit IVe-9

Crider silt loam, 6 to 12 percent slopes, severely eroded, makes up this unit. This is a deep, well-drained soil on hillsides. It occupies about 0.6 percent of the county.

The plow layer consists of friable or firm silt loam, and the subsoil is firm silty clay loam to silty clay. A few gullies have formed; most are shallow. The organic-matter content is very low, the natural fertility is moderately high, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is high.

This soil is suited to a fairly wide range of crops. Corn, soybeans, and small grain can be grown, but yields are moderate. Kentucky 31 fescue, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but orchardgrass, alfalfa, red clover, ladino clover, and sweetclover require high-level management.

If cultivated, this soil is subject to moderately severe erosion. To control the erosion, a cropping system is needed that provides cover 4 years out of 5. If the soil is terraced and contoured, it can be cultivated a little more intensively because the need for cover is less.

This soil is likely to clod if it is plowed or cultivated when too wet. It needs lime and fertilizer, both of which should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Tilth can be improved and the organic-matter content can be increased by using a cropping system that includes cover crops and by utilizing crop residues properly. Plants normally receive sufficient water from this soil, except in an extremely dry period.

Gullies and galled spots should be mulched and heavily fertilized. If necessary, gullies should be smoothed.

Capability unit IVe-11

Beasley silty clay loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. This soil is moderately deep and well drained. It occupies about 4 percent of the county.

The plow layer and the upper part of the subsoil consist of silty clay loam that is slightly acid or medium acid. The lower part of the subsoil is firm silty clay that is alkaline. A few gullies have formed, but most of these are shallow. The organic-matter content is very low, the natural fertility is moderate, and the moisture-supplying capacity is moderate.

This soil is poorly suited to most row crops, including tobacco, and usually only low yields of corn, small grain, and soybeans can be expected. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, and orchardgrass, timothy, ladino clover, and sweetclover do fairly well under high-level management.

If cultivated, this soil is subject to moderately severe erosion. To control the erosion, a cropping system is needed that provides cover 4 years out of 5. If the soil is terraced or contoured, it can be cultivated a little more intensively.

This soil is slightly difficult to till and is likely to clod if plowed or cultivated when too wet. Its tilth can be improved and its content of organic matter can be increased by the use of cover crops in the cropping system and by the proper utilization of crop residues. Lime and fertilizer are needed and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. In a dry period, plants are damaged because of insufficient moisture, and crop yields are often reduced.

Gullies and galled spots should be mulched and heavily fertilized. If necessary, gullies should be smoothed.

Capability unit IVw-1

This unit consists of level, poorly drained soils on terraces and uplands. These soils make up about 5.1 percent of the county. They are—

Ginat silt loam.
Guthrie silt loam.
Purdy silt loam.
Robertsville silt loam.

The plow layer of these soils is friable silt loam, and the upper part of their subsoil is friable or firm silt loam to silty clay loam. The lower part of their subsoil, beginning at a depth of 12 to 18 inches, is compact, brittle silty clay loam, a fragipan. The organic-matter content is low, the natural fertility is moderately low, the reaction is strongly acid, and the moisture-supplying capacity is moderately low.

The soils in this unit are wet and consequently are poorly suited to many of the locally grown crops, including tobacco and small grain. Yields of corn and soybeans are low unless the soils are drained, but even if the soils are drained, yields are below average. Kentucky 31 fescue, reed canarygrass, Kobe lespedeza, and Korean lespedeza can be grown under medium-level management. Redtop, alsike clover, and ladino clover require high-level management. Alfalfa, sweetclover, smooth brome, and Kentucky bluegrass are not suitable.

Under high-level management these soils can be cultivated continuously, for they are not subject to erosion. Generally they are in good tilth. Nevertheless, their tilth can be improved and their content of organic matter can be increased by using a cropping system that includes a cover crop wherever possible and by utilizing crop residues properly. Because of excessive wetness, plowing or cultivating are usually delayed until late in spring. These soils, however, are shallow and have an inadequate moisture-supplying capacity. Consequently, plants do not receive sufficient moisture in a dry period, and crop yields generally are reduced considerably. Lime and fertilizer are needed, even for average yields, and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Large amounts of fertilizer should not be applied, because in most places unfavorable characteristics of the soil reduce recovery.

Wetness is the main limitation of the soils in this unit. Water stands on the surface after heavy rains and during most of winter and spring. Open drainage ditches are effective in removing most of the surface water. The lower part of the subsoil is very slowly permeable, and thus a tile drainage system is of questionable value. Some soils, however, may have a less compact subsoil than others, but onsite examination would be necessary to determine tiling possibilities. Diversion ditches, in some areas, can prevent overwash from higher elevations.

Capability unit IVs-2

This unit consists of Lakin loamy fine sand, 6 to 12 percent slopes, a deep and excessively drained soil on terraces. This soil occupies only about 0.1 percent of the county.

The plow layer of this soil is very friable loamy fine sand, and the subsoil is very friable or loose loamy fine sand or very fine sandy loam. The organic-matter content is low, the natural fertility is moderate, the reaction is strongly acid, and the moisture-supplying capacity is moderately low.

This soil is suited to most of the locally grown crops, but a lack of water results in reduced yields and sometimes in crop failure. Corn, small grain, and soybeans can be grown, but only low yields can be expected. Tobacco cannot be grown with much success. Kentucky 31 fescue and serica lespedeza can be grown under medium-level management. Orchardgrass, redtop, red clover, and Korean lespedeza require high-level management, and in a dry year these plants do not yield a good crop.

Erosion is a moderate hazard on this soil, but it can be controlled by means of various combinations of cropping systems and conservation practices. On short slopes, contour cultivation plus a 5-year cropping system that consists of corn for 2 years and meadow crops for 3 years can effectively control erosion. On long slopes, terraces are needed or the cropping system should consist less of row crops and more of meadow or sod crops.

Although its content of organic matter is low, this soil is in excellent tilth; it can be plowed or cultivated early in spring and after heavy rains. The excellent tilth can be maintained and the content of organic matter can be increased by using a cropping system that includes a cover crop and by utilizing crop residues properly. Lime and fertilizer are needed, even for average yields, and should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Split applications usually are more beneficial than single ones because many of the added nutrients can be lost through leaching.

The lack of moisture is the main limitation of this soil. Plants are damaged because they do not receive sufficient water, and generally yields are reduced. Irrigation can be used to advantage where high-value crops are grown.

Capability unit VIe-1

This unit consists of moderately steep, moderately well drained to somewhat excessively drained, shallow to moderately deep soils on hillsides. These soils occupy about 2.1 percent of the county. They are—

- Fairmount flaggy silty clay, 12 to 20 percent slopes.
- Fairmount flaggy silty clay, 20 to 30 percent slopes.
- Markland silt loam, 12 to 30 percent slopes.
- Otway silty clay, 12 to 20 percent slopes.

These soils, for the most part, have a firm surface layer. Their subsoil ranges from silty clay loam in the upper part to calcareous clay in the lower part, but mostly it is silty clay, and it is very firm and plastic. Thin fragments of limestone are scattered on the surface of the Fairmount soils.

The organic-matter content of the soils in this unit is medium, the natural fertility is moderately low or moderate, the reaction is mildly alkaline to slightly acid, and the moisture-supplying capacity is low or moderately low.

Erosion is a severe hazard in cultivated fields. Consequently, the soils in this unit are not suitable for cultivation. The potential yield of forage is moderate. Kentucky 31 fescue, red clover, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but Kentucky bluegrass, orchardgrass, sweetclover, and Kobe lespedeza require high-level management. Alfalfa is only fairly suitable. In a dry period, plants do not receive sufficient moisture from these soils.

Tillage is slightly difficult because of the high content of clay. On the Fairmount soils, tillage is even more difficult because of the fragments of limestone on the surface. To avoid excessive clodding, plowing and seedbed preparation should be delayed until the soils have dried out a little. If possible, pastures should be renovated by disking, fertilizing, and seeding instead of by plowing and preparing a seedbed. Machinery should be operated on the contour to help slow runoff and thereby reduce erosion. The use of tractors is limited on the steeper slopes. Fertilizer is needed to establish a dense sod and to maintain growth. It should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled, especially in the first year of growth and during excessively wet or extremely dry periods. At least a 3-inch growth of grasses and legumes should be maintained at all times. Gullies and galled areas should be mulched and more heavily fertilized than the rest of the field. If necessary, gullies should be smoothed.

Capability unit VIe-2

Beasley silty clay loam, 12 to 20 percent slopes, severely eroded, is the only soil in this unit. It is a well-drained, moderately deep soil on hillsides. It occupies about 2.7 percent of the county.

The surface layer and the upper part of the subsoil consist of silty clay loam that is slightly acid or medium acid. The lower part of the subsoil consists of firm silty clay that is alkaline. A few gullies have formed, and most of these are shallow. The organic-matter content of this soil is low, the natural fertility is moderate, and the moisture-supplying capacity is moderate.

Erosion is a severe hazard in cultivated fields. Consequently this soil is not suitable for cultivation. The potential yield of forage is moderately low. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but orchardgrass, timothy, sweetclover, and Kobe lespedeza require high-level management.

This soil is slightly difficult to till because of its high content of clay. It is likely to clod if plowed when too wet. Pastures should be renovated by disking, fertilizing, and seeding, if possible, instead of by plowing and preparing a seedbed. Machinery should be operated on the contour to help slow runoff and thereby reduce erosion. Lime and fertilizer are necessary to establish a dense sod and to maintain growth. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled, especially in the first year and during excessively wet or extremely dry periods. At least a 3-inch growth of grasses and legumes should be maintained at all times.

Gullies and galled areas should be mulched and heavily fertilized. If necessary, gullies should be smoothed.

Capability unit VIe-4

This unit consists of well-drained and somewhat excessively drained, shallow soils on gullied hillsides and uplands. These soils occupy about 1.1 percent of the county. They are—

Corydon silty clay loam, 6 to 12 percent slopes, severely eroded.
Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded.

The Corydon soil is slightly acid or medium acid. Its subsoil consists of sticky and plastic silty clay. The Fairmount soil is neutral or mildly alkaline, and its subsoil consists of very firm, plastic silty clay. These soils are underlain by limestone at a depth of 12 to 24 inches. They are low in organic matter, are moderate in natural fertility, and have a low moisture-supplying capacity.

These soils are subject to severe erosion if cultivated. They have a moderately low potential for forage crops. Under medium-level management they are suited to Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza. Under high-level management they are fairly well suited to Kentucky bluegrass, orchardgrass, red clover, and sweetclover. In a dry period they cannot provide plants with sufficient moisture.

Tillage is difficult because of the high content of clay. On the Fairmount soil, it is further hindered by the limestone flags that are on the surface. Clodding is likely to occur if the soils are plowed when they are too wet. Pastures should be renovated by disking, fertilizing, and seeding, if possible, instead of by plowing and preparing a seedbed. Machinery should be operated on the contour to help slow runoff and thereby reduce erosion. Fertilizer is needed to establish a dense sod and to maintain growth. It should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled, especially in the first year of growth and during excessively wet or extremely dry periods. At least a 3-inch growth of grasses and legumes should be maintained at all times.

Gullies and galled areas should be mulched and more heavily fertilized than the rest of the field. If necessary, gullies should be smoothed.

Capability unit VIe-7

This unit consists of soils that are deep or moderately deep, medium textured, and well drained. These soils make up about 2.4 percent of the county. They are—

Holston gravelly silt loam, 20 to 30 percent slopes.
Litz silt loam, 12 to 20 percent slopes.
Litz-Muskingum silt loams, 20 to 30 percent slopes.
Memphis silt loam, 12 to 20 percent slopes, eroded.
Memphis silt loam, 20 to 30 percent slopes, eroded.
Wheeling silt loam, 20 to 30 percent slopes, eroded.

In most places, about 50 percent of the original surface layer has been removed by sheet erosion. In the more eroded areas, patches of subsoil are exposed. The present surface layer generally is friable silt loam and is gravelly in a few places. The subsoil is friable or firm silty clay loam. The organic-matter content is low or medium, the natural fertility is moderate, the reaction is medium acid to extremely acid, and the moisture-supplying capacity is moderate or high.

Erosion is a severe hazard in plowed or cultivated fields. Consequently, these soils are not suitable for cultivation. The potential yield of forage is moderate. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Orchardgrass, timothy, redtop, and Kobe lespedeza require high-level management. Alfalfa and most locally grown clovers are short lived.

Tilth is generally favorable, and working the soils throughout a wide range of moisture content is possible. Because of the high susceptibility of these soils to erosion, plowing and other seedbed preparation for pasture should be held to a minimum. If possible, pastures should be renovated by disking, fertilizing, and seeding instead of by plowing and preparing a seedbed. Operating tractors on these soils is difficult in places and impossible on some of the steeper slopes. Wherever possible, tractors should be operated on the contour to help slow runoff and thereby reduce erosion. Lime and fertilizer are needed to establish a dense sod and to help maintain growth. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled, especially during excessively wet or extremely dry periods. At least a 3-inch growth of grasses and legumes should be left on the soils at all times.

Capability unit VIs-1

This unit consists of well-drained, shallow to moderately deep, very rocky soils on hillsides. These soils occupy about 0.3 percent of the county. They are—

Corydon very rocky silt loam, 6 to 12 percent slopes.
Corydon very rocky silt loam, 12 to 20 percent slopes.

Generally the surface layer is friable silt loam. The subsoil is silty clay loam in the upper part and grades to firm, plastic silty clay at a depth of 10 to 14 inches. Limestone bedrock is at a depth of 24 to 30 inches. The organic-matter content of these soils is medium, the natural fertility is moderate, the reaction is slightly acid or medium acid, and the moisture-supplying capacity is moderately low.

The many outcrops of limestone make the soils in this unit unsuitable for cultivation. Furthermore, the soils are likely to erode if cultivated. They have a moderate potential for forage crops. Kentucky 31 fescue, sweetclover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza can be grown under medium-level management. Kentucky bluegrass, orchardgrass, alfalfa, ladino clover, and red clover are suitable under high-level management. In a dry period, plants do not receive sufficient moisture from these soils.

The plow layer of these soils is in good tilth, and plowing throughout a fairly wide range of moisture content is possible. The limestone outcrops, however, interfere with machinery operations. Pastures should be renovated by disking, fertilizing, and seeding wherever possible instead of by plowing and preparing a seedbed. Fertilizer and lime are needed to establish a dense sod and to maintain growth. Both should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled in the first year of growth and during excessively wet and extremely dry periods. At least a 3-inch growth of grasses and legumes should be left on these soils at all times.

Capability unit VIs-2

Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded, is the only soil in this unit. It is a well-drained, shallow to moderately deep soil on hillsides. It occupies only about 0.4 percent of the county.

The surface of this soil is scarred by a few small gullies and some scattered deep ones and is marred by outcrops of limestone. The subsoil is generally firm, plastic silty clay. Limestone bedrock is at a depth of 18 to 24 inches. The organic-matter content is low, the natural fertility is moderate, the reaction is slightly acid or medium acid, and the moisture-supplying capacity is low.

This soil is not suitable for cultivation, because of the many outcrops of limestone. Furthermore, it is severely eroded and subject to further erosion if cultivated. It has a moderately low potential for forage crops. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but Kentucky bluegrass, orchardgrass, timothy, red clover, and sweetclover require high-level management and grow only fairly well. In a dry period, plants are damaged because of insufficient moisture, and crop yields are reduced.

This soil is slightly difficult to till because of its high content of clay. It is subject to clodding if plowed when too wet. The limestone ledges interfere with machinery operations. Pastures should be renovated by disking, fertilizing, and seeding wherever possible instead of by plowing and preparing a seedbed. Lime and fertilizer are needed to establish a dense sod and to maintain growth. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled in the first year and during excessively wet and extremely dry periods. At least a 3-inch growth of grasses and legumes should be maintained at all times.

Capability unit VIs-3

Lakin loamy fine sand, 12 to 25 percent slopes, is the only soil in this unit. It is an excessively drained, deep soil on terraces. It occupies about 0.1 percent of the county.

The surface layer of this soil is very friable loamy fine sand, and the subsoil is very friable or loose loamy fine sand or very fine sandy loam. The organic-matter content is low, the natural fertility is moderate, the reaction is strongly acid, and the moisture-supplying capacity is moderately low.

Because of the strong slopes and droughtiness, this soil is not suitable for cultivation, and its potential for forage crops is moderate. Drought-resistant crops grow best. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza can be grown under medium-level management, but redtop, orchardgrass, ladino clover, and red clover require high-level management and grow only fairly well. In a dry year only low yields can be expected.

This soil is easy to till and can be worked throughout a wide range of moisture content without clodding. Tillage should be limited to seedbed preparation, and all machinery should be operated on the contour. Lime and fertilizer are needed to establish a dense sod and to maintain growth. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled, especially in the first year of growth and during dry periods. At least a 3-inch growth of grasses and legumes should be maintained at all times.

Capability unit VIIe-1

This unit consists mostly of steep, shallow, excessively drained soils on long hillsides, but it includes small areas of soils that are less sloping. The soils in this unit occupy about 2.1 percent of the county. They are—

- Fairmount flaggy silty clay, 30 to 50 percent slopes.
- Litz-Muskingum silt loams, 30 to 50 percent slopes.
- Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.

These soils are either not eroded or are only slightly eroded. Their surface layer ranges from friable silt loam to firm silty clay, and their subsoil ranges from silty clay loam to clay. The depth to bedrock generally ranges from 12 to 18 inches or more. The organic-matter content is low or medium, the natural fertility is moderately low, the reaction is neutral to strongly acid, and the moisture-supplying capacity is low or moderately low.

The soils in this unit, for the most part, are wooded and generally are best suited to woods. Because of their steepness, they are not suitable for cultivation and are difficult to keep in pasture. Only on those soils on benches and on those in the less sloping areas can pastures be maintained with machinery. In a few of the steep places, pastures can be maintained by hand. Such a practice, however, is not common in this county. Kentucky 31 fescue and sericea lespedeza are suitable pasture plants for these soils. Fertilizer is needed to obtain sufficient growth for erosion control. Applying fertilizer, however, is difficult because of the steepness of the slope. Grazing should be closely controlled. At least a 3-inch growth should be maintained at all times.

Gullies and galled areas should be mulched and more heavily fertilized than the surrounding areas. If necessary, gullies should be smoothed.

Capability unit VIIe-2

Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded, is the only soil in this unit. It is an excessively drained, shallow soil on hillsides, and it occupies only about 0.6 percent of the county.

Both the surface layer and the subsoil consist of silty clay that is firm when moist and plastic when wet. In most places, bedrock is at a depth of about 16 inches. The organic-matter content is low, the natural fertility is moderate, the reaction is neutral or mildly alkaline, and the moisture-supplying capacity is low.

This soil is not suitable for cultivation, and its potential for pasture is limited. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza grow well under medium-level management, but Kentucky bluegrass and sweetclover require high-level management and grow only fairly well. Yields are reduced in a dry period. Reforestation may be preferred in many areas.

Tillage is difficult because of the high content of clay and the limestone flags on the surface. This soil tends to clod if it is plowed when too wet. Wherever possible, pastures should be renovated by disking, fertilizing, and seeding instead of by plowing and preparing a seedbed. Machinery should be operated on the contour to help reduce runoff and thereby control erosion. Operating tractors in the steepest areas is difficult or, in places, impossible. Fertilizer is needed to establish a dense sod and to maintain growth. It should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled in the first year and during excessively wet or extremely dry periods. Some critical areas may need smoothing, mulching, and heavy applications of fertilizer.

Capability unit VIIe-4

This unit is made up of miscellaneous land types that are extremely variable in slope, texture, drainage, and suitability for agriculture. These land types occupy about 1 percent of the county. They are—

Breaks and Alluvial land.
Gullied land.
Made land.

Breaks and Alluvial land consists of strongly sloping or steep areas along the Ohio River. Flooding and scouring are common hazards, and rapid river currents sometimes leave new deposits of alluvium in these areas. This land type is not suitable for cultivation or for pasture.

Gullied land consists of areas that are more than 20 percent moderately deep or deep gullies and of areas from which most of the solum has been removed by severe sheet erosion. Most of these areas are unproductive, and unless reclaimed, only poor-quality timber can be expected from them.

Made land consists of areas where the soil material has been moved, reworked, or graded by man. Some areas are nearly level, well drained, and potentially productive, for example, graded areas surrounding highway cloverleaves. For the most part, however, this land type is not suitable for agricultural use.

Capability unit VIIs-2

This unit consists of moderately steep or steep, shallow soils on uplands. These soils occupy about 2.6 percent of the county. They are—

Corydon very rocky silt loam, 20 to 30 percent slopes.
Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded.
Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded.
Muskingum stony soils, 30 to 50 percent slopes.

The surface layer in most places is either silt loam or silty clay loam, but the subsoil ranges from silty clay loam to silty clay. The organic-matter content ranges from very low to medium, the natural fertility is moderate, the reaction is medium acid or strongly acid, and the moisture-supplying capacity is low or moderately low.

These soils, for the most part, are wooded and are best suited to woods. They are not suitable for cultivation, and their potential for pasture is limited. Reforestation is preferred in many areas. Kentucky 31 fescue, Korean lespedeza, and sericea lespedeza are the most suitable pasture plants, and these grow best under high-level management.

Operating tractors on these soils is difficult or, in places, impossible because of the steep slopes and the rock outcrops or stones on the surface. But, wherever possible, machines should be operated on the contour to help reduce runoff and thereby control erosion. Fertilizer and lime are needed to establish a dense sod and to maintain growth. These should be applied according to recommendations of the Kentucky Agricultural Experiment Station or in amounts determined by soil tests. Grazing should be controlled so that at least a 3-inch growth of grasses and legumes is left on the soils at all times. Critical areas may need smoothing, mulching, and heavy applications of fertilizer.

Capability unit VIIs-3

This unit consists of moderately steep, somewhat excessively drained, shallow soils that are on hillsides. These soils occupy about 1.5 percent of the county. They are—

Otway silty clay, 12 to 20 percent slopes, severely eroded.
Rockcastle silt loam, 15 to 30 percent slopes.

The Otway subsoil is calcareous silty clay, and the Rockcastle subsoil is extremely acid silty clay. The root zone of these soils generally is less than 20 inches deep. The organic-matter content is low, the natural fertility is low or moderately low, and the moisture-supplying capacity is low or very low.

These soils are not well suited to cultivation or to pasture. They are best suited to woods, and most of the acreage is wooded. A few areas have been cleared but are idle or are naturally reverting to woods.

Capability unit VIIs-5

Rock land makes up this unit. It occupies 0.5 percent of the county. Rock land consists of areas that are 25 to 90 percent covered by rock outcrops. The slope range is 12 to 50 percent. The many outcrops preclude the use of these areas for crops or pasture. The soil material between the outcrops generally is shallow but nevertheless is suitable for trees. Although the potential yield of wood crops is low, small scattered areas produce marketable timber.

Estimated Yields

Table 2 gives the estimated average acre yields of the principle field and pasture crops grown in Jefferson County under high-level management. It gives yields for each soil in the county but not for the land types—Breaks and Alluvial land, Gullied land, Made land, and Rock land. These land types generally are not suited to crops or pasture without extensive reclamation, and yields depend on the nature of the soil material and on its location.

Estimated yields of a given crop are not shown for a soil that is not suited to that crop. For example, class VI soils are not suited to corn, because they are eroded, steep, rocky, or shallow. Thus, estimates of corn yields are not given for soils in class VI.

The estimates in table 2 are based on yields obtained on soils that had not been irrigated and that had received an average amount of rainfall over a long period of time. Because the frequency of flooding varies as does the amount of damage resulting, flooding was not taken into consideration in estimating the yields.

The system of management under which the yields in table 2 can be expected includes the following practices:

1. Choosing well-suited varieties for planting.
2. Seeding or planting at the proper time, according to approved methods, and using the proper amount of seed or the proper number of plants.
3. Selecting crops and cropping systems that return organic residues to the soils and thus add organic matter; that maintain or improve the structure of the soil; and that help to prevent erosion.
4. Reducing excess water by draining the soils and controlling runoff by means of vegetated waterways and diversion ditches, terraces, contour tillage, and stripcropping.
5. Inoculating legumes.
6. Controlling weeds, insects, and plant diseases.
7. Cultivating at a shallow depth.
8. Applying adequate amounts of lime, where needed.
9. Protecting the soils from overgrazing.
10. Using efficient methods in harvesting.
11. Using good pasture management.
12. Applying fertilizer in amounts equal to or in excess of the current recommendations of the Kentucky Agricultural Experiment Station or equal to or in excess of the need shown by soil tests that are properly interpreted. The time and method of application should permit the most efficient utilization of nutrients by the crops.

TABLE 2.—*Estimated average acre yields of principal crops under high-level management*

[Absence of figure indicates soil is poorly suited or not suited to the crop]

Symbol	Soil	Corn	Wheat	Soybeans	Tobacco	Alfalfa-grass	Red clover-grass	Lespedeza	Pasture
		Bu.	*Bu.*	*Bu.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [1]
AsA	Ashton silt loam, 0 to 2 percent slopes	105	42	37	2,200	4.0	3.2	2.1	195
AsB	Ashton silt loam, 2 to 6 percent slopes	103	41	36	2,100	3.8	3.1	1.9	190
BaB	Beasley silt loam, 2 to 6 percent slopes	84	33	30	1,800	3.4	3.0	1.8	179
BaB2	Beasley silt loam, 2 to 6 percent slopes, eroded	75	30	26	1,600	3.2	2.8	1.7	174
BaC2	Beasley silt loam, 6 to 12 percent slopes, eroded	68	27	24	1,500	2.8	2.6	1.6	164
BaD2	Beasley silt loam, 12 to 20 percent slopes, eroded	62	24		1,400	2.3	2.2		154
BeB3	Beasley silty clay loam, 2 to 6 percent slopes, severely eroded	52	15	18	1,300	2.4	1.9	1.4	137
BeC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	48	14			1.9			131
BeD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded								118
CaA	Captina silt loam, 0 to 2 percent slopes	78	28	30	1,700	2.3	2.7	2.0	176
CaB	Captina silt loam, 2 to 6 percent slopes	80	31	30	1,800	2.4	2.8	2.0	176
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded	60	21	22	1,300	1.7	2.1	1.7	146
CdB2	Corydon silt loam, 2 to 6 percent slopes, eroded	78	31	26	1,700	3.2	2.4	1.5	167
CmC3	Corydon silty clay loam, 6 to 12 percent slopes, severely eroded	52				2.4	1.8		118
CnC	Corydon very rocky silt loam, 6 to 12 percent slopes					2.8			135
CnD	Corydon very rocky silt loam, 12 to 20 percent slopes								145
CnE	Corydon very rocky silt loam, 20 to 30 percent slopes								140
CrC3	Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded								106
CrD3	Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded								102
CrE3	Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded								100

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of principal crops under high-level management*—Continued

Symbol	Soil	Corn	Wheat	Soybeans	Tobacco	Alfalfa-grass	Red clover-grass	Lespedeza	Pasture
		Bu.	*Bu.*	*Bu.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [1]
CsA	Crider silt loam, 0 to 2 percent slopes	100	40	35	2, 200	4. 0	3. 5	2. 1	190
CsB	Crider silt loam, 2 to 6 percent slopes	98	39	34	2, 200	3. 8	3. 4	2. 0	188
CsB2	Crider silt loam, 2 to 6 percent slopes, eroded	89	32	31	2, 100	3. 6	3. 2	1. 9	178
CsC	Crider silt loam, 6 to 12 percent slopes	95	38	33	2, 000	3. 6	3. 2	1. 9	179
CsC2	Crider silt loam, 6 to 12 percent slopes, eroded	87	35	30	1, 800	3. 4	3. 1	1. 8	172
CsC3	Crider silt loam, 6 to 12 percent slopes, severely eroded	74	29		1, 500	3. 1	2. 7	1. 6	143
CsD2	Crider silt loam, 12 to 20 percent slopes, eroded	82	32		1, 600	3. 3	3. 0		167
DcA	Dickson silt loam, 0 to 2 percent slopes	78	27	30	1, 700	2. 3	2. 7	1. 9	171
DcB	Dickson silt loam, 2 to 6 percent slopes	80	30	30	1, 800	2. 4	2. 8	1. 9	171
Dn	Dunning silty clay loam	94	33	36		3. 2	2. 7	2. 0	171
EkA	Elk silt loam, 0 to 2 percent slopes	105	42	37	2, 200	4. 0	3. 5	2. 1	195
EkB	Elk silt loam, 2 to 6 percent slopes	102	41	36	2, 200	3. 8	3. 4	2. 0	185
En	Ennis cherty silt loam	70	28	25	1, 500	3. 3	3. 0	1. 8	165
FaD	Fairmount flaggy silty clay, 12 to 20 percent slopes					2. 4			118
FaD3	Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded								72
FaE	Fairmount flaggy silty clay, 20 to 30 percent slopes					2. 1			112
FaE3	Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded								62
FaF	Fairmount flaggy silty clay, 30 to 50 percent slopes								85
Gm	Ginat silt loam	45		22			1. 6	1. 6	140
Gu	Guthrie silt loam	40		22			1. 6	1. 6	140
HgD	Holston gravelly silt loam, 12 to 20 percent slopes	64	24		1, 400	2. 9	2. 4		159
HgE	Holston gravelly silt loam, 20 to 30 percent slopes					2. 6			140
Hn	Huntington fine sandy loam	96	40	34	1, 900	3. 8	3. 2	1. 9	180
Hs	Huntington silt loam	110	44	38	2, 200	4. 0	3. 5	2. 1	195
LaB	Lakin loamy fine sand, 2 to 6 percent slopes	53	22		1, 300	2. 1	1. 6	1. 4	130
LaC	Lakin loamy fine sand, 6 to 12 percent slopes	46			1, 200			1. 3	120
LaD	Lakin loamy fine sand, 12 to 25 percent slopes								110
Lb	Lawrence silt loam	54		22	1, 400		1. 9	1. 7	160
Ld	Lindside silt loam	98	36	36	2, 000	3. 6	3. 3	2. 1	195
LeD	Litz silt loam, 12 to 20 percent slopes								72
LmE	Litz-Muskingum silt loams, 20 to 30 percent slopes:								
	Litz								60
	Muskingum								120
LmF	Litz-Muskingum silt loams, 30 to 50 percent slopes:								
	Litz								42
	Muskingum								120
LnB	Loring silt loam, 2 to 6 percent slopes	87	35	30	1, 900	3. 2	3. 0	2. 0	181
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded	73	29	26	1, 600	2. 7	2. 5	1. 8	160
LoC2	Loring-Crider silt loams, 6 to 12 percent slopes, eroded	78	30	27	1, 700	3. 0	2. 9	1. 9	170
LsC2	Lowell silt loam, 6 to 12 percent slopes, eroded	71	24	24	1, 600	3. 0	2. 8	1. 8	168
MdB2	Markland silt loam, 2 to 6 percent slopes, eroded	68	24	28	1, 500	3. 1	2. 0	1. 9	170
MdC2	Markland silt loam, 6 to 12 percent slopes, eroded	64	22		1, 300	3. 0	1. 9	1. 8	165
MdE	Markland silt loam, 12 to 30 percent slopes					2. 6			155
Mg	McGary silt loam	48		20			1. 7	1. 7	155
Mm	Melvin silt loam	71	21	28	1, 300		1. 9	1. 8	165
Mn	Melvin silty clay loam	67	19	26	1, 300		2. 3	1. 6	165
Mo	Melvin silt loam, overwash	85	28	31	1, 500		2. 4	1. 7	180
MpB	Memphis silt loam, 2 to 6 percent slopes	84	34	31	1, 900	3. 9	3. 2	2. 1	186
MpC2	Memphis silt loam, 6 to 12 percent slopes, eroded	76	30	28	1, 600	3. 4	2. 8	2. 0	173
MpD2	Memphis silt loam, 12 to 20 percent slopes, eroded	67	26		1, 400	3. 2			166
MpE2	Memphis silt loam, 20 to 30 percent slopes, eroded					3. 0			158
MuF	Muskingum stony soils, 30 to 50 percent slopes								120
Ne	Newark silt loam	87	30	33	1, 700		2. 5	1. 8	185
OcD	Otway silty clay, 12 to 20 percent slopes					2. 1			108
OcD3	Otway silty clay, 12 to 20 percent slopes, severely eroded								75
Pd	Purdy silt loam	44		22	1, 200		1. 4	1. 5	135
Rb	Robertsville silt loam	46		22	1, 200		1. 6	1. 6	144

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of principal crops under high-level management*—Continued

Symbol	Soil	Corn	Wheat	Soy-beans	Tobacco	Alfalfa-grass	Red clover-grass	Lespe-deza	Pasture
		Bu.	*Bu.*	*Bu.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [1]
RcE	Rockcastle silt loam, 15 to 30 percent slopes	—	—	—	—	—	—	—	98
RuA	Russellville silt loam, 0 to 2 percent slopes	92	37	33	2,100	3.5	3.3	2.0	188
RuB	Russellville silt loam, 2 to 6 percent slopes	90	37	32	2,100	3.6	3.3	2.0	185
RuB2	Russellville silt loam, 2 to 6 percent slopes, eroded	82	31	30	1,900	3.2	3.2	1.9	175
RuC2	Russellville silt loam, 6 to 12 percent slopes, eroded	80	32	28	1,700	3.1	3.1	1.8	172
ScA	Sciotoville silt loam, 0 to 2 percent slopes	79	30	31	1,800	2.3	2.7	2.0	172
ScB	Sciotoville silt loam, 2 to 6 percent slopes	81	31	30	1,800	2.4	2.7	2.0	172
ScC2	Sciotoville silt loam, 6 to 12 percent slopes, eroded	66	24	25	1,600	2.1	2.2	1.8	158
SfA	Sequatchie fine sandy loam, 0 to 2 percent slopes	90	36	32	2,000	3.3	2.9	1.9	175
SfB	Sequatchie fine sandy loam, 2 to 6 percent slopes	89	34	31	2,000	3.2	2.8	1.8	170
SfC2	Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded	78	29	26	1,700	2.6	2.3	1.6	147
ShB	Shelbyville silt loam, 2 to 6 percent slopes	100	40	35	2,200	3.9	3.4	2.0	190
Ta	Taft silt loam	55	18	24	1,400	—	1.9	1.7	160
Ty	Tyler silt loam	49	16	22	1,300	—	1.8	1.6	155
Wb	Weinbach silt loam	54	17	24	1,400	—	1.9	1.7	158
WcF	Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes:								
	Westmoreland	—	—	—	—	—	—	—	65
	Litz	—	—	—	—	—	—	—	42
	Muskingum	—	—	—	—	—	—	—	120
WeA	Wheeling silt loam, 0 to 2 percent slopes	102	38	35	2,200	4.0	3.5	2.1	190
WeB	Wheeling silt loam, 2 to 6 percent slopes	96	36	34	2,100	3.8	3.2	2.0	185
WeC2	Wheeling silt loam, 6 to 12 percent slopes, eroded	85	32	30	1,800	3.4	3.1	1.9	172
WeD2	Wheeling silt loam, 12 to 20 percent slopes, eroded	72	29	—	1,700	3.2	3.0	—	167
WeE2	Wheeling silt loam, 20 to 30 percent slopes, eroded	—	—	—	—	3.1	—	—	160
WmB	Woolper silty clay loam, 2 to 6 percent slopes	86	33	32	1,900	3.3	2.9	1.9	178
WmC2	Woolper silty clay loam, 6 to 12 percent slopes, eroded	78	31	30	1,800	3.0	2.8	1.8	167
ZaB	Zanesville silt loam, 2 to 6 percent slopes	82	28	29	1,700	2.8	2.9	1.9	173
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	70	25	26	1,600	2.4	2.8	1.8	167
ZaD2	Zanesville silt loam, 12 to 20 percent slopes, eroded	58	22	—	1,300	2.3	2.7	1.7	162
Zp	Zipp silty clay	70	—	30	—	—	2.5	2.0	170

[1] An animal-unit-day represents one day of grazing for one animal unit (one cow, steer, or horse; five hogs; or seven sheep or goats) without injury to the pasture.

Use of the Soils for Woodland [1]

At the time of settlement, nearly all of the area that is now Jefferson County was wooded. Most of the soils of the uplands were deep and supported white oak, northern red oak, yellow-poplar, black walnut, and similar desirable species. The shallow soils in the Knob Hills supported mainly black oak, scarlet oak, chestnut oak, Virginia pine, and varieties of hickory. The shallow soils in the Outer Bluegrass region supported redcedar of good quality and a wide variety of hardwoods of fair to low quality. The soils of the lowlands supported pin oak, cottonwood, sweetgum, sycamore, and other species that are commonly found on wet lands in the central hardwood region.

Since settlement days, the woodlands have been gradually cleared. At present, the remaining woods are mostly on the steeper slopes of the Knob Hills, in rocky limestone areas, and in some poorly drained lowlands.

Although good markets exist for fair- to high-quality logs and posts, little attention is directed toward timber production. Nearly a third of the woodland is being managed primarily for recreational purposes; another third is a part of acreage that is being held by real estate interests for prospective development. The balance occurs on farmland and generally is used as woodland pasture.

[1] By E. A. OREN, woodland conservationist, and E. V. HUFFMAN, assistant State soil scientist, Soil Conservation Service.

Woodland Suitability Groups

The many soils in Jefferson County differ, and the differences influence growth and management of trees. The ways that soil differences affect growth and management of trees have been researched and studied, and on the basis of the data obtained the soils in Jefferson County were placed in woodland suitability groups. Each group consists of soils that produce similar kinds of wood crops, that need similar management, and that have about the same potential productivity. The woodland suitability groups are listed in table 3 and are discussed in the pages that follow.

The factors considered in placing each soil in a woodland group include (1) potential productivity for several kinds of trees, (2) species to favor in managing existing woodland, (3) species pereferred for planting, and (4) critical soil-related hazards and limitations to be considered in woodland management. These factors are explained as follows:

Potential productivity was estimated after studying more than 200 forest sites in Jefferson County and in other counties having similar soils. Each site was selected to represent a specific kind of forest stand growing on a recognized kind of soil. As nearly as possible, studies were confined to well-stocked, naturally occurring, even-aged, unmanaged stands not adversely affected by fire, livestock grazing, insects, or disease.

At each site, height and age were determined for two to four dominant or codominant trees—the tallest trees in the stand. From the average of these figures a site index was determined for each site. A site index is the average height of the dominant and codominant trees at a specified age. Foresters accept a site index as the best readily available indicator of potential productivity of a soil. In table 3, the potential productivity of the soils in this county for given tree species is expressed as a site index or a range of site index.

The principal species on the sites selected for study were cottonwood, pin oak, sweetgum, yellow-poplar, upland oak, Virginia pine, redcedar, shortleaf pine, and Shumard oak. For each of the sites, except those covered by yellow-poplar and redcedar, the site index was determined with the help of published site index curves (*3, 4, 6, 14, 15, 22*).[2] The curves used to help determine the site index for yellow-poplar are unpublished ones that were constructed in 1957 by W. T. Doolittle of the U.S. Forest Service. Those used for redcedar are based on observations of plots in 1948 by the Tennessee Valley Authority. Data on the sites that were studied are available in the State office of the Soil Conservation Service.

For some species, sites suitable for measurement could not be found on all kinds of soil. In such instances, a site index was interpolated by using data on site index for similar soils.

An average site index can be converted to a volumetric prediction of growth and yield, and the prediction can be shown in different common units of wood measurement, such as board feet, cubic feet, or cords per acre. Predictions of average yearly growth per acre are given in table 3 for yellow-poplar, upland oak, and shortleaf pine. To arrive at these predictions, site index values were related to published research material (*10, 14, 18*).

Species to favor in managing existing woodland are listed according to priority in table 3. The factors that determine priority are site index, quality of tree, and density of growth in natural stands. The species listed in table 3, from top to bottom in decreasing order of desirability, are those to favor in weeding, improvement cutting, and similar woodland management.

Species preferred for planting also are listed in table 3 in order of preference, the most desirable first. The order of preference is based on experience. Cottonwood, generally, is the best kind of tree to plant in open fields on lowlands, and pine is best in open fields on uplands.

Soil-related hazards and limitations to be considered in woodland management are hazard of gully erosion, equipment limitations, plant competition, and seedling mortality. These are given, where applicable, in table 3 under the column headed "Critical management factors."

Woodland operations may cause gully erosion. The hazard of gully erosion is rated slight, moderate, or severe. It is assumed that the woodlands are satisfactorily protected from fire and livestock and that damage from fire or livestock has not contributed to the rating. The dominant factors that influence the formation of gullies are steepness of slope, length of slope, and characteristics of the soil. Woodland management that prevents the formation of gullies involves proper construction, location, and maintenance of roads and skid trails. The steepness of slope is the major factor in rating the hazard of gully erosion. Generally, the hazard is rated *slight* on slopes of 0 to 6 percent, *moderate* on slopes of 6 to 12 percent, and *severe* on slopes steeper than 12 percent. These general rules are modified when the factors of slope length and soil characteristics, or both, emphasize or minimize the factor of slope.

The ratings for equipment limitations are based on the assumption that mechanical equipment normally is available for woodland operations. The dominant factors that limit the use of equipment are steepness of slope, wetness of the soils, rough terrain, and obstacles, such as rocks. Generally, the limitations are rated *slight* on slopes of 0 to 12 percent where farm-type vehicles can operate efficiently without the construction and maintenance of permanent roads and skid trails. The rating is *moderate* on slopes of 12 to 30 percent where the operation of farm-type equipment is limited and track-type equipment is necessary for efficient harvesting operations. The rating is *severe* on slopes greater than 30 percent where track-type equipment is less efficient and power winches and other special equipment may be needed. Periods of seasonal wetness that average 2 or 3 months per year in length give a soil a rating of *moderate*. Wet periods of 3 months or more annually give a soil a rating of *severe*. Such periods prevent the use of conventional wheel- or track-type equipment.

The ratings for plant competition reflect the degree to which plants invade a woodland area, following the removal of the tree canopy. Also, they reflect the degree to which invading plants impede the regeneration and growth of desirable volunteer species or compete with newly planted trees. Where invading plants impose no problem or only a minor one, the rating is *slight*. The rating is *moderate* where some attention to weeding operations is necessary to obtain a well-stocked stand of desirable trees. The rating is *severe* where special attention to weeding operations is necessary to obtain a stand of desirable trees. The dominant factors that influence plant competition are those that affect the availability of moisture in the soils during the growing season.

[2] Italic numbers in parentheses refer to Literature Cited, page 133.

TABLE 3.—*Woodland suitability groups of soils*

Woodland suitability groups and soil symbols	Species	Potential productivity		Species to favor in managing existing woodland	Species preferred for planting	Critical management factors
		Site index [1]	Average yearly growth per acre [2]			
			Bd. ft.			
Group 1: Level and nearly level, mostly well-drained, deep soils on bottom lands and terraces; subject to overflow; silt loam surface layer and subsoil; some soils on alluvial fans are gravelly. AsA, En, Hn, Hs, Ld.	Cottonwood Pin oak Sweetgum	110 to 120 90 to 100 90 to 100	(3) (3) (3)	Cottonwood, Shumard oak, pin oak, sweetgum, and sycamore.	Cottonwood, and sweetgum.	Severe plant competition.
Group 2: Level to steep, well-drained, deep soils on stream terraces and on foot slopes; surface layer ranges from silt loam to fine sandy loam, and subsoil from silty clay loam to fine sandy loam; some soils are eroded. AsB, EkA, EkB, SfA, SfB, SfC2, WeA, WeB, WeC2, WeD2, WeE2.	Yellow-poplar Upland oak	90 to 100 75 to 85	440 to 580 240 to 320	Black walnut, yellow-poplar, white oak, and northern red oak.	Cottonwood, black walnut, and yellow-poplar.	Severe plant competition.
Group 3: Level, poorly drained or somewhat poorly drained soils on bottom lands and on stream terraces; subject to overflow; surface layer ranges from silt loam to silty clay, and subsoil from silt loam to clay; some soils on terraces have an impervious fragipan at a depth of 14 to 20 inches. Dn, Gm, Gu, Mm, Mn, Mo, Ne, Pd, Rb, Wb, Zp.	Cottonwood Pin oak Sweetgum	100±5 97±7 93±6	(3) (3) (3)	Cottonwood, Shumard oak, pin oak, sweetgum, and sycamore.	Cottonwood and sweetgum.	Severe plant competition; severe equipment limitations.
Group 4: Level to moderately steep, well-drained, deep soils of the limestone, sandstone, and shale uplands; silt loam surface layer and silty clay loam subsoil; some soils are moderately eroded. CsA, CsB, CsB2, CsC, CsC2, CsD2, LoC2 (Crider soil only), RuA, RuB, RuB2, RuC2, ShB, ZaB, ZaC2, ZaD2.	Upland oak Yellow-poplar Virginia pine	76±6 90 to 100 65 to 75	250± 440 to 580 (3)	White oak, yellow-poplar, northern red oak, black walnut, and sugar maple.	White pine, loblolly pine, shortleaf pine, black locust, black walnut, and yellow-poplar.	Severe plant competition.
Group 5: Level to sloping, moderately well drained soils on stream terraces and on uplands; surface layer is silt loam, and subsoil is silt loam to silty clay loam; impervious fragipan is at a depth of 20 to 28 inches; some soils are moderately eroded. CaA, CaB, CaC2, DcA, DcB, ScA, ScB, ScC2.	Upland oak Yellow-poplar Sweetgum	74±4 80 to 90 80 to 90	240± 320 to 440 (3)	White oak, black oak, yellow-poplar, sweetgum, and hickory.	White pine, loblolly pine, shortleaf pine, and black locust.	Severe plant competition.

See footnotes at end of table.

TABLE 3.—*Woodland suitability groups of soils*—Continued

Woodland suitability groups and soil symbols	Species	Potential productivity: Site index [1]	Potential productivity: Average yearly growth per acre [2]	Species to favor in managing existing woodland	Species preferred for planting	Critical management factors
			Bd. ft.			
Group 6: Level, somewhat poorly drained soils on stream terraces and on uplands; silt loam surface layer and silty clay loam subsoil; impervious fragipan at a depth of 16 to 22 inches. Lb, Ta, Ty.	Upland oak Yellow-poplar Virginia pine Sweetgum	70±6 89±3 65 to 75 80 to 90	210± 430± (3) (3)	Yellow-poplar, black oak, white oak, sweetgum, Virginia pine, and hickory.	White pine, loblolly pine, shortleaf pine, and black locust.	Severe plant competition; moderate equipment limitations.
Group 7: Gently sloping to moderately steep, well-drained soils on limestone uplands, on foot slopes, and on stream terraces; surface layer is silt loam or silty clay loam, and subsoil is silty clay or clay; some soils are moderately eroded. BaB, BaB2, BaC2, BaD2, LsC2, MdB2, MdC2, MdE, WmB, WmC2.	Upland oak Redcedar	66±5 35 to 40	185± (3)	Black oak, white oak, northern red oak, and redcedar.	White pine and redcedar.	Severe plant competition; severe gully erosion hazard where slope is more than 6 percent; moderate gully erosion hazard where slope is less than 6 percent; moderate equipment limitations where slope is more than 12 percent.
Group 8: Steep, excessively drained soils of sandstone and shale origin on north-facing slopes;[4] silt loam surface layer and subsoil; some of the steepest soils are stony. LmE, LmF, MuF, WcF.	Upland oak Virginia pine Shortleaf pine	65 to 75 65 to 75 60 to 70	180 to 245 (3) 370 to 505	White oak, northern red oak, black oak, shortleaf pine, and Virginia pine.	White pine, shortleaf pine, and loblolly pine.	Severe plant competition; severe gully erosion hazard; severe equipment limitations.
Group 9: Moderately steep or steep, excessively drained soils of sandstone and shale origin; surface layer is silt loam, and subsoil is silt loam to silty clay; most of these soils are on south-facing slopes.[4] LeD, LmE, LmF, MuF, RcE, WcF.	Upland oak Virginia pine Shortleaf pine	50 to 60 55 to 65 50 to 60	85 to 145 (3) 225 to 370	Virginia pine, shortleaf pine, black oak, and chestnut oak.	Shortleaf pine and loblolly pine.	Severe gully erosion hazard; severe equipment limitations; moderate seedling mortality.
Group 10: Gently sloping to moderately steep, well-drained, deep soils of the loess uplands; surface layer is silt loam, and subsoil is silt loam to silty clay loam; some soils are moderately eroded. LnB, LnC2, LoC2 (Loring soil only), MpB, MpC2, MpD2, MpE2.	Yellow-popular Upland oak Virginia pine	99±5 92±6 80 to 85	570± (3) (3)	Yellow-poplar, black walnut, northern red oak, black oak, white oak, and sugar maple.	White pine, loblolly pine, shortleaf pine, black locust, black walnut, and yellow-poplar.	Severe plant competition; severe gully erosion hazard; moderate to severe equipment limitations on slopes greater than 12 percent.

See footnotes at end of table.

TABLE 3.—*Woodland suitability groups of soils*—Continued

Woodland suitability groups and soil symbols	Species	Potential productivity		Species to favor in managing existing woodland	Species preferred for planting	Critical management factors
		Site index[1]	Average yearly growth per acre[2]			
			Bd. ft.			
Group 11: Gently sloping to steep, shallow to moderately deep, clayey soils of the limestone uplands; most areas are severely eroded, and a few are extremely rocky. BeB3, BeC3, BeD3, CmC3, CrC3, CrD3, CrE3, CsC3, FaD, FaD3, FaE, FaE3, FaF, OcD, OcD3.	Redcedar Upland oak	30 to 40 40 to 50	(3) 40 to 85	Redcedar	Redcedar	Severe gully erosion hazard; moderate equipment limitations—severe where slope is more than 12 percent; severe seedling mortality.
Group 12: Gently sloping to moderately steep, very rocky, shallow soils of limestone origin; silt loam surface layer and clay subsoil. CdB2, CnC, CnD, CnE.	Upland oak Yellow-poplar	79±3 89±6	275± 430±	White oak, northern red oak, yellow-poplar, black walnut, black oak, and hickory.	White pine, loblolly pine, shortleaf pine, and black locust.	Severe plant competition; moderate equipment limitations; severe equipment limitations where slope is more than 12 percent.
Group 13: Moderately steep and steep, well-drained, deep, gravelly soils on foot slopes; surface layer is silt loam, and subsoil is silt loam to silty clay loam. HgD, HgE.	Yellow-poplar Upland oak Shortleaf pine Virginia pine	110±2 76±3 75 to 80 70 to 80	730± 250± 575 to 645 (3)	Yellow-poplar, black walnut, white oak, basswood, and sugar maple.	White pine, loblolly pine, shortleaf pine, black locust, black walnut, and yellow-poplar.	Severe plant competition; severe gully erosion hazard; severe equipment limitations.
Group 14: Gently sloping to moderately steep, excessively drained, deep, sandy soils on uplands. LaB, LaC, LaD.	Yellow-poplar Upland oak	80 to 90 65 to 75	320 to 440 175 to 245	Yellow-poplar, black walnut, white oak, black cherry, northern red oak, and basswood.	White pine, loblolly pine, shortleaf pine, black locust, black walnut, and yellow-poplar.	Severe plant competition; severe gully erosion hazard; moderate equipment limitations; severe equipment limitations where slope is more than 12 percent.
Group 15: Level, somewhat poorly drained soils on stream terraces; subsoil consists of very plastic clay. Mg.	Shumard oak	69±2	(3)	Shumard oak, black oak, white oak, and hickory.	White pine, loblolly pine, and shortleaf pine.	Severe plant competition; moderate equipment limitations.
Group 16: Miscellaneous land types. Br, Gn, Ma, Rd.	(5)	(5)	(5)	(5)	(5)	(5)

[1] Reference age is 30 years for cottonwood; for all other species it is 50 years. Where four or more site measurements were available in a group, the standard deviation was calculated and is shown following the ± symbol. Otherwise the range of site index values obtained by measurements are shown.
[2] Predictions are for well-stocked, even-aged, unmanaged stands.
[3] Information is not available.
[4] North- and east-facing slopes have azimuth bearings from 340° to 124°; south- and west-facing slopes have azimuth bearings from 124° to 340°.
[5] Because of their variable nature, miscellaneous land types generally are not suitable for planned production of woodcrops; and thus specific interpretations for them cannot be made.

The ratings for seedling mortality refer to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic features, not as a result of plant competition. The ratings are based primarily on the reaction of newly germinated seedlings and newly planted trees to the periods of drought that last for 2 or 3 weeks and that occur frequently during the early part of the growing season. The rating is *slight* where satisfactory stands are expected to survive. It is *moderate* where occasional replanting is needed and is *severe* where new stands are largely destroyed because of seedling mortality.

Woodland suitability group 1

This group consists of well drained or moderately well drained soils on bottom lands and on low terraces. These soils are—

AsA	Ashton silt loam, 0 to 2 percent slopes.
En	Ennis cherty silt loam.
Hn	Huntington fine sandy loam.
Hs	Huntington silt loam.
Ld	Lindside silt loam.

The potential productivity of these soils for cottonwood, pin oak, and sweetgum is high. Intensive management is justified.

Plant competition is severe because of the abundant moisture available during the growing season. Shade-tolerant trees of low quality establish themselves in the understory of saw-log stands. When the overstory is removed by logging, these shade-tolerant trees generally prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. In most places, interplanting or conversion planting is not feasible, mainly because of the severe competition from undesirable trees. Trees planted in open fields ordinarily require one or more cultivations.

Woodland suitability group 2

This group consists of well-drained, deep soils on stream terraces and on foot slopes. These soils are—

AsB	Ashton silt loam, 2 to 6 percent slopes.
EkA	Elk silt loam, 0 to 2 percent slopes.
EkB	Elk silt loam, 2 to 6 percent slopes.
SfA	Sequatchie fine sandy loam, 0 to 2 percent slopes.
SfB	Sequatchie fine sandy loam, 2 to 6 percent slopes.
SfC2	Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded.
WeA	Wheeling silt loam, 0 to 2 percent slopes.
WeB	Wheeling silt loam, 2 to 6 percent slopes.
WeC2	Wheeling silt loam, 6 to 12 percent slopes, eroded.
WeD2	Wheeling silt loam, 12 to 20 percent slopes, eroded.
WeE2	Wheeling silt loam, 20 to 30 percent slopes, eroded.

The potential productivity of these soils is medium for yellow-poplar and very high for upland oak. Thus, intensive management is justified.

Plant competition is severe because of the abundant moisture available during the growing season. Shade-tolerant trees of low quality establish themselves in the understory of saw-log stands. When the saw-log stands are cut, these shade-tolerant trees generally prevent successful natural regeneration of the desirable trees. Generally it is necessary to control the competing vegetation by intensive weeding. In most places, interplanting or conversion planting is not feasible, mainly because plant competition is severe. Trees planted in open fields, as a rule, require one or more cultivations.

Woodland suitability group 3

This group consists of poorly drained or somewhat poorly drained soils on bottom lands and on terraces along streams. These soils are—

Dn	Dunning silty clay loam.
Gm	Ginat silt loam.
Gu	Guthrie silt loam
Mm	Melvin silt loam.
Mn	Melvin silty clay loam.
Mo	Melvin silt loam, overwash.
Ne	Newark silt loam.
Pd	Purdy silt loam.
Rb	Robertsville silt loam.
Wb	Weinbach silt loam.
Zp	Zipp silty clay.

The potential productivity of these soils is medium for cottonwood, high for pin oak, and medium or high for sweetgum. It justifies intensive management.

Plant competition is severe. Shade-tolerant trees of low quality, aided by the abundant moisture available during the growing season, grow in the understory of saw-log stands. When the stands have been cut, these shade-tolerant trees generally prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. Because plant competition is severe, interplanting or conversion planting ordinarily is not feasible. Trees planted in open fields, as a rule, require one or more cultivations.

Equipment limitations are severe because these soils are under water or are wet during periods totaling 3 months or more every year.

Woodland suitability group 4

This group consists of level to moderately steep, well-drained, deep soils of the limestone, sandstone, and shale uplands. These soils have a moderately fine textured subsoil. They are—

CsA	Crider silt loam, 0 to 2 percent slopes.
CsB	Crider silt loam, 2 to 6 percent slopes.
CsB2	Crider silt loam, 2 to 6 percent slopes, eroded.
CsC	Crider silt loam, 6 to 12 percent slopes.
CsC2	Crider silt loam, 6 to 12 percent slopes, eroded.
CsD2	Crider silt loam, 12 to 20 percent slopes, eroded.
LoC2	Loring-Crider silt loams, 6 to 12 percent slopes, eroded (Crider soil only).
RuA	Russellville silt loam, 0 to 2 percent slopes.
RuB	Russellville silt loam, 2 to 6 percent slopes.
RuB2	Russellville silt loam, 2 to 6 percent slopes, eroded.
RuC2	Russellville silt loam, 6 to 12 percent slopes, eroded.
ShB	Shelbyville silt loam, 2 to 6 percent slopes.
ZaB	Zanesville silt loam, 2 to 6 percent slopes.
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded.
ZaD2	Zanesville silt loam, 12 to 20 percent slopes, eroded.

The potential productivity of these soils is very high for upland oak, medium for yellow-poplar, and high for Virginia pine. Thus, intensive management is justified.

The abundant moisture available during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality establish themselves in the understory of saw-log stands. Following logging of the stands, these shade-tolerant trees prevent the satisfactory reestablishment of desirable trees unless the site is weeded intensively. Interplanting or conversion planting generally is not feasible, mostly because competition from undesirable vegetation is severe. Trees planted in open fields usually require one or more cultivations.

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Woodland suitability group 5

This group consists of moderately well drained, moderately deep soils on the limestone uplands and on terraces along streams. These soils have a fragipan at a depth of 20 to 28 inches. They are—

CaA	Captina silt loam, 0 to 2 percent slopes.
CaB	Captina silt loam, 2 to 6 percent slopes.
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded.
DcA	Dickson silt loam, 0 to 2 percent slopes.
DcB	Dickson silt loam, 2 to 6 percent slopes.
ScA	Sciotoville silt loam, 0 to 2 percent slopes.
ScB	Sciotoville silt loam, 2 to 6 percent slopes.
ScC2	Sciotoville silt loam, 6 to 12 percent slopes, eroded.

The potential productivity of these soils is high or very high for upland oak, medium for yellow-poplar, and low or medium for sweetgum. These estimates of productivity can help to determine the intensity of management that would be justifiable in producing these woodcrops.

A favorable supply of moisture during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality generally establish themselves in the understory of saw-log stands. When the overstory is removed by logging, these shade-tolerant trees prevent the satisfactory reestablishment of desirable trees. To insure the dominance of desirable species, one or more weedings are required. Interplanting or conversion planting ordinarily is not feasible, mostly because plant competition is severe. Competition to newly planted trees generally is severe on open land that has been abandoned as cropland or pasture for 2 years or more.

Woodland suitability group 6

This group consists of somewhat poorly drained soils on stream terraces and on uplands. These soils have a fragipan at a depth of 16 to 22 inches. They are—

Lb	Lawrence silt loam.
Ta	Taft silt loam.
Ty	Tyler silt loam.

The potential productivity of these soils is high for upland oak and Virginia pine, medium for yellow-poplar, and medium or low for sweetgum. These estimates of productivity can be used to determine the intensity of management that would be justifiable in growing these kinds of trees.

Plant competition is severe. Shade-tolerant trees of low quality, aided by a favorable supply of moisture available during the growing season, establish themselves in the understory of saw-log stands. In most places, when the overstory is removed by logging, these shade-tolerant trees prevent the satisfactory reestablishment of desirable trees. Ordinarily one or more weedings are required to insure the dominance of the desirable trees. Because of the intensive weeding requirements imposed by the severe competition from undesirable trees, interplanting or conversion planting generally is not feasible. Competition to newly planted trees, as a rule, is severe on open land that has been abandoned as cropland or pasture for 2 years or more.

Seasonal wetness imposes moderate equipment limitations. These soils are wet for periods totaling 2 or 3 months every year.

Woodland suitability group 7

This group consists of gently sloping to moderately steep, well-drained soils on limestone uplands, on foot slopes, and on stream terraces. These soils have a fine-textured subsoil. They are—

BaB	Beasley silt loam, 2 to 6 percent slopes.
BaB2	Beasley silt loam, 2 to 6 percent slopes, eroded.
BaC2	Beasley silt loam, 6 to 12 percent slopes, eroded.
BaD2	Beasley silt loam, 12 to 20 percent slopes, eroded.
LsC2	Lowell silt loam, 6 to 12 percent slopes, eroded.
MdB2	Markland silt loam, 2 to 6 percent slopes, eroded.
MdC2	Markland silt loam, 6 to 12 percent slopes, eroded.
MdE	Markland silt loam, 12 to 30 percent slopes.
WmB	Woolper silty clay loam, 2 to 6 percent slopes.
WmC2	Woolper silty clay loam, 6 to 12 percent slopes, eroded.

The potential productivity of these soils is medium or high for upland oak and medium for redcedar. Management of moderate intensity is considered justifiable.

During the growing season, plants receive a favorable supply of moisture from these soils. Consequently, plant competition is severe. Shade-tolerant trees of low quality establish themselves in the understory of saw-log stands. When the overstory is removed by logging, these shade-tolerant trees prevent the satisfactory reestablishment of desirable trees. One or more weedings ordinarily are required to insure the dominance of the desirable trees. The weeding requirements and other limitations make interplanting or conversion planting unfeasible. Competition to newly planted trees generally is severe on open land that has been abandoned as cropland or pasture for 2 years or more.

The hazard of gully erosion is severe on slopes greater than 6 percent. Gullies form readily on these soils. Therefore, special attention needs to be given to the location, construction, and maintenance of roads and skid trails.

Equipment limitations are moderate on slopes greater than 12 percent. In such areas, track-type equipment is required for efficient harvesting of wood crops because conventional tractors and trucks are restricted to constructed roads.

Woodland suitability group 8

This group consists of steep, excessively drained, moderately deep soils of the sandstone and shale uplands. These soils are—

LmE	Litz-Muskingum silt loams, 20 to 30 percent slopes.
LmF	Litz-Muskingum silt loams, 30 to 50 percent slopes.
MuF	Muskingum stony soils, 30 to 50 percent slopes.
WcF	Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.

The interpretations for the soils in this group apply only to those areas that face north and east with an azimuth bearing of 340° to 125° because only those areas were studied and evaluated.

The potential productivity is high for upland oak and Virginia pine and medium for shortleaf pine. Moderately intensive management is considered justifiable.

Plant competition is severe. Shade-tolerant trees receive a favorable supply of moisture during the growing season and thus are able to establish themselves in the understory of saw-log stands. In most places, when the overstory is removed by logging, these shade-tolerant trees prevent the successful natural regeneration of the desirable trees. To insure the dominance of the desirable trees, one or more weedings ordinarily are required. Interplanting or conversion planting generally is not feasible, mostly because of the intensive weeding requirements. Competition to newly planted trees is severe on most open land that has been abandoned as cropland or pasture for 2 years or more.

The hazard of gully erosion is severe because of the steep slopes. The severity of the hazard increases as the steepness of the slopes increases. Gullies form readily on these soils. Therefore, special attention needs to be given to the location, construction, and maintenance of roads and skid trails.

Equipment limitations are severe. The steep slopes, the rough terrain, and rocks on the surface restrict the use of conventional equipment. Track-type equipment and power winches are needed for efficient harvesting of wood crops.

Woodland suitability group 9

This group consists of moderately steep or steep, excessively drained soils of sandstone and shale origin. These soils are—

- LeD Litz silt loam, 12 to 20 percent slopes.
- LmE Litz-Muskingum silt loams, 20 to 30 percent slopes.
- LmF Litz-Muskingum silt loams, 30 to 50 percent slopes.
- MuF Muskingum stony soils, 30 to 50 percent slopes.
- RcE Rockcastle silt loam, 15 to 30 percent slopes.
- WcF Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.

The interpretations for the soils in this group, except Litz silt loam, 12 to 20 percent slopes, and Rockcastle silt loam, 15 to 30 percent slopes, apply only to those areas that face south and west with an azimuth bearing of 125° to 340° because only those areas were studied and evaluated.

The potential productivity is medium or low for upland oak, medium for Virginia pine, and low for shortleaf pine. Generally, a somewhat limited degree of management is justifiable.

The hazard of gully erosion is severe because of the steep slopes. The severity of the hazard increases as the steepness of the slope increases. Gullies form readily on these soils. Therefore, special attention needs to be given to the location, construction, and maintenance of roads and skid trails.

Equipment limitations also are severe. The steep slopes, the rough terrain, and rocks on the surface restrict the use of conventional equipment. Track-type equipment and power winches are needed for efficient harvesting of wood crops.

Seedling mortality is moderate. Droughts of 2 or 3 weeks duration in the early part of some growing seasons cause moderate loss of newly planted trees. Natural seedlings normally grow too slowly to provide adequate cover.

Woodland suitability group 10

This group consists of deep, well-drained soils of the loess uplands. These soils are—

- LnB Loring silt loam, 2 to 6 percent slopes.
- LnC2 Loring silt loam, 6 to 12 percent slopes, eroded.
- LoC2 Loring-Crider silt loams, 6 to 12 percent slopes, eroded (Loring soil only).
- MpB Memphis silt loam, 2 to 6 percent slopes.
- MpC2 Memphis silt loam, 6 to 12 percent slopes, eroded.
- MpD2 Memphis silt loam, 12 to 20 percent slopes, eroded.
- MpE2 Memphis silt loam, 20 to 30 percent slopes, eroded.

The potential productivity of these soils is medium or high for yellow-poplar and very high for upland oak and Virginia pine. Intensive management, in most places, should be considered.

Plant competition is severe because of the favorable amount of moisture in the soils during the growing season. The moisture enables shade-tolerant trees of low quality to establish themselves in the understory of saw-log stands. Following the logging of the stands, these shade-tolerant trees generally prevent the satisfactory reestablishment of desirable trees. One or more weedings are required, in most places, to insure the dominance of desirable trees. Interplanting or conversion planting generally is not feasible, because of the weeding requirements and other limitations. Competition to newly planted trees ordinarily is severe in open fields that have been abandoned as cropland or pasture for 2 years or more.

The hazard of gully erosion is severe, mainly because of the existing runoff channels that formed as a result of past erosion. Excess water readily cuts gullies in these soils. For this reason, the location, construction, and maintenance of roads and skid trails require special attention.

Equipment limitations are moderate to severe on slopes greater than 12 percent. Conventional farm-type equipment cannot be used, because of the steep slopes and rough terrain. Consequently, track-type equipment and power winches are needed to harvest wood crops efficiently.

Woodland suitability group 11

This group consists of gently sloping to steep soils of the uplands. Most of the soils are severely eroded, and some are very rocky. The soils in this group are—

- BeB3 Beasley silty clay loam, 2 to 6 percent slopes, severely eroded.
- BeC3 Beasley silty clay loam, 6 to 12 percent slopes, severely eroded.
- BeD3 Beasley silty clay loam, 12 to 20 percent slopes, severely eroded.
- CmC3 Corydon silty clay loam, 6 to 12 percent slopes, severely eroded.
- CrC3 Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded.
- CrD3 Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded.
- CrE3 Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded.
- CsC3 Crider silt loam, 6 to 12 percent slopes, severely eroded.
- FaD Fairmount flaggy silty clay, 12 to 20 percent slopes.
- FaD3 Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded.
- FaE Fairmount flaggy silty clay, 20 to 30 percent slopes.
- FaE3 Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded.
- FaF Fairmount flaggy silty clay, 30 to 50 percent slopes.
- OcD Otway silty clay, 12 to 20 percent slopes.
- OcD3 Otway silty clay, 12 to 20 percent slopes, severely eroded.

The potential productivity of these soils is medium for redcedar and low or very low for upland oak. Few management practices would be justifiable on these soils.

The hazard of gully erosion is severe, mainly because of the existing runoff channels that formed as a result of past erosion. Excess water readily cuts gullies in these soils. For this reason, the location, construction, and maintenance of roads and skid trails require special attention.

Equipment limitations are severe on slopes greater than 12 percent. Conventional farm-type equipment cannot be used, because of the steep slopes, rough terrain, and rocks. Consequently, track-type equipment and power winches are needed to harvest wood crops efficiently.

Seedling mortality is severe during short droughts in the early part of some growing seasons. These dry periods last 2 or 3 weeks and cause severe loss of newly planted trees. Natural seedlings usually grow too slowly to provide adequate cover.

Woodland suitability group 12

This group consists of shallow, gently sloping to moderately steep soils of the limestone uplands. These soils are—

- CdB2 Corydon silt loam, 2 to 6 percent slopes, eroded.
- CnC Corydon very rocky silt loam, 6 to 12 percent slopes.
- CnD Corydon very rocky silt loam, 12 to 20 percent slopes.
- CnE Corydon very rocky silt loam, 20 to 30 percent slopes.

The potential productivity of these soils is very high for upland oak and medium for yellow-poplar. Intensive management would be justified.

Plant competition is severe because of the favorable amount of moisture in the soils during the growing season. The moisture enables shade-tolerant trees of low quality to establish themselves in the understory of saw-log stands. Following the logging of the stands, these shade-tolerant trees generally prevent the satisfactory reestablishment of desirable trees. One or more weedings are required, in most places, to insure the dominance of desirable trees. Interplanting or conversion planting generally is not feasible, because of the weeding requirements and other limitations. Competition to newly planted trees ordinarily is severe in open fields that have been abandoned as cropland or pasture for 2 years or more.

Equipment limitations are severe on slopes greater than 12 percent. The steep slopes, the rough terrain, and rocks limit the use of conventional farm-type equipment. Track-type equipment and, in places, power winches are needed to harvest wood crops efficiently.

Woodland suitability group 13

This group is made up of well-drained soils that are on foot slopes. These soils are—

- HgD Holston gravelly silt loam, 12 to 20 percent slopes.
- HgE Holston gravelly silt loam, 20 to 30 percent slopes.

The potential productivity of these soils is high for yellow-poplar, upland oak, and shortleaf pine, and it is high or very high for Virginia pine. Intensive management should be considered.

A favorable supply of moisture available during the growing season helps to make plant competition severe. Shade-tolerant trees of low quality grow in the understory of saw-log stands. These trees prevent satisfactory natural regeneration of desirable trees after the overstory is removed by logging. Generally, intensive weeding is required to insure the dominance of the desirable trees. Interplanting or conversion planting ordinarily is not feasible. Competition to newly planted trees is usually severe in open fields that have been abandoned as cropland or pasture for 2 years or more.

The soils in this group are subject to severe gully erosion because of their texture and their steep slopes. Therefore, special care needs to be taken in locating, constructing, and maintaining roads and skid trails.

Equipment limitations are severe. The steep slopes and rough terrain restrict the use of farm-type equipment. Track-type equipment is needed to harvest wood crops efficiently.

Woodland suitability group 14

This group is made up of deep, excessively drained soils of the uplands. These soils are—

- LaB Lakin loamy fine sand, 2 to 6 percent slopes.
- LaC Lakin loamy fine sand, 6 to 12 percent slopes.
- LaD Lakin loamy fine sand, 12 to 25 percent slopes.

The potential productivity of these soils is medium for yellow-poplar and high for upland oak. Intensive management, in most places, should be considered.

The moisture available during the growing season is enough to make plant competition severe. Shade-tolerant trees of low quality grow in the understory of saw-log stands. These trees prevent satisfactory natural regeneration of desirable trees after the overstory is removed by logging. One or more weedings generally are required to insure the dominance of the desirable trees. Interplanting or conversion planting ordinarily is not feasible. Competition to newly planted trees, as a rule, is severe in open fields that have been abandoned as cropland or pasture for 2 years or more.

The soils in this group are subject to severe gully erosion because of their texture and their steep slopes. Therefore, special care needs to be taken in locating, constructing, and maintaining roads and skid trails.

Equipment limitations are severe on slopes greater than 12 percent. In other places they are moderate. The steep slopes and the sandy texture of the soils restrict the use of farm-type equipment. Track-type equipment is needed to harvest wood crops efficiently.

Woodland suitability group 15

McGary silt loam (Mg) is the only soil in this group. It is a somewhat poorly drained soil on terraces in the slackwater area. Its subsoil consists of very plastic clay.

The potential productivity of this soil is high for Shumard oak and, thus, justifies intensive management.

Plant competition is severe because an abundant supply of moisture is available to plants during the growing season. Shade-tolerant trees of low quality establish themselves in the understory of saw-log stands. Following the logging of the stands, these shade-tolerant trees ordinarily prevent the reestablishment of desirable trees. Intensive weeding is required to insure the dominance of desirable trees. Interplanting or conversion planting generally is not feasible, mainly because competition from undesirable trees is severe. Trees planted in open fields, as a rule, require one or more cultivations.

Wetness imposes moderate equipment limitations for periods totaling 2 or 3 months every year.

Woodland suitability group 16

This group is made up of miscellaneous land types so variable in origin, soil characteristics, physiography, behavior, and management requirements that on-site inspection is necessary in making interpretations regarding growth and management of trees. These land types are—

Br Breaks and Alluvial land.
Gn Gullied land.
Ma Made land.
Rd Rock land.

Breaks and Alluvial land consist of escarpments on terraces and along riverbanks and of riverwash that varies in texture and slope. The potential productivity generally is low for most kinds of trees. A few areas may be suitable for species of economic importance, but most places can support willows, silver maples, sycamores, and other low-quality hardwoods only for their usefulness in controlling erosion.

Gullied land consists of areas that are subject to severe sheet erosion. These areas are more than 20 percent scarred by deep or moderately deep gullies. The potential productivity is very low for most kinds of trees. Shortleaf pine, loblolly pine, and Virginia pine will grow, though slowly, in acid areas and will provide some protection and ground cover. Redcedar will grow in limy, or calcareous, areas where raw marl is not exposed.

Made land consists of areas where construction operations have greatly altered the soil profile. Examples of Made land include graded areas surrounding highway cloverleaves, deep fills and cuts, borrow pits, and earth levees. Most areas are gently sloping to strongly sloping, and a few are nearly level. Each individual area has to be appraised separately because the soil material varies so much in origin, in composition, and in degree of compaction.

Rock land consists of areas in which limestone outcrops cover 25 to 90 percent of the surface. In most places the soil material between the outcrops is shallow or very shallow clay. Consequently, the moisture-supplying capacity is very low. Slopes generally are steep or moderately steep. The potential productivity is low or very low for most kinds of trees. Applying management practices is hardly worthwhile. This land type supports mixed, generally sparse stands of redcedar, oak, and hickory, but growth is slow and the quality of the trees is poor or fair at the most. Plant competition is variable, but all other critical soil-related hazards and limitations are severe.

Management of the Soils for Wildlife[3]

This section tells about the kinds of wildlife in the county and their requirements for a habitat. It also describes the soils according to their ability to support vegetation that will provide food and cover for wildlife.

Wildlife Resources and Habitat Requirements

The principal kinds of wildlife in Jefferson County are cottontail rabbit, gray squirrel, fox squirrel, bobwhite quail, mourning dove, waterfowl (ducks and geese), white-tailed deer, raccoon, opossum, skunk, mink, muskrat, red fox, and gray fox. The county also supports a wide variety of songbirds and nongame mammals. In the streams of the county are the kinds of game, pan, and rough fish that are commonly found throughout the State.

Cottontail rabbits are common in the county, but their number fluctuates from year to year. Generally they are found in greatest numbers in the Beasley-Fairmount-Russellville and Russellville-Crider-Dickson soil associations. (See soil association map at back of this report.) They occur to some extent in the Crider-Corydon soil association and to a lesser extent in the Westermoreland-Litz-Muskingum soil association.

Cottontail rabbits are most plentiful in agricultural areas. They are vegetarians and eat such a wide variety of plants that food is seldom a problem. The shortage of desirable cover, however, is a problem. The proverbial brier patch is a good example of the best kind of protection rabbits can have. Farms that have both cropland and pasture support the most rabbits, provided the fields are separated by wide, brushy fence rows. In periods of bitter cold, rabbits use abandoned groundhog burrows.

Gray squirrels also are common. They are most numerous in the Beasley-Fairmount-Russellville and Russell-Crider-Dickson associations. They are less numerous in the Westmoreland-Litz-Muskingum association.

Gray squirrels prefer large, unbroken expanses of hardwood forest for their home. A forest that has a high percentage of mature or decaying hardwood trees supports the most squirrels because these trees generally provide many hollows that can be used as dens by these animals. Because squirrels eat nuts, their number fluctuates in proportion to the yield from the hardwood trees that furnish the bulk of their food. Among the important producers of food for squirrels are shagbark hickory, white oak, black oak, walnut, hackberry, sassafras, dogwood, blackgum, mulberry, and Osage-orange.

Fox squirrels are about as numerous as gray squirrels, and they occur in the same soil associations. In the Westmoreland-Litz-Muskingum association, however, their number is higher than that of gray squirrels, and in some parts of the Beasley-Fairmount-Russellville association it is lower.

Fox squirrels, in contrast to gray squirrels, prefer small farm woodlots that have parklike openings. The need for den trees and food-producing trees is the same for fox squirrels as for gray squirrels, and the same kinds of trees meet this need. For some reason not clearly understood, fox squirrels seem to have greater preference for bottom lands and areas along streams than do gray squirrels.

Bobwhite quail are most numerous in the Beasley-Fairmount-Russellville and Russellville-Crider-Dickson associations. They are found in lesser numbers in the Crider-Corydon association, which is in the northernmost part of the county, and in the Westmoreland-Litz-Muskingum and Wheeling-Weinbach-Huntington associations, which are in the extreme southwestern part of the county.

Bobwhite quail thrive best on farms that have a mixture of cultivated land, pasture, and woodland. To quail, the most attractive fields are those that are not more than 10 acres in size and that are separated by wide, brushy fence rows. These birds require grass and other herbaceous cover for nesting, wild seed-bearing plants and cultivated crops for food, and brush and trees for protection from weather and from natural enemies. They do not require open water for drinking, except possibly during a period of extreme drought. Ordinarily, quail obtain sufficient moisture from the insects, berries, and fleshy fruit they eat.

[3] By WILLIAM H. CASEY, biologist, Soil Conservation Service, U.S. Department of Agriculture.

Mourning doves are abundant. The largest numbers are in the Westmoreland-Litz-Muskingum association, but these birds are distributed in fairly large numbers throughout the Beasley-Fairmount-Russellville association, the Russellville-Crider-Dickson association, and parts of the Crider-Corydon and Wheeling-Weinbach-Huntington associations.

Mourning doves are migratory, but a few probably remain in the county through the winter. These birds eat seeds and, therefore, find especially attractive the agricultural areas where grain crops are grown. Partly because they do not eat insects, doves require open water for drinking. Farm ponds are an important source of this water. Most doves nest in pines, elms, or similar trees that have rather open foliage. A few nest on the ground. Plantings of pine trees or ornamental evergreens in urban parks and cemeteries are preferred nesting sites.

Waterfowl, with the possible exception of wood ducks, do not nest in this county. A few waterfowl—geese more commonly than ducks—visit in winter when water and food are available. These concentrate along the Ohio River in the Wheeling-Weinbach-Huntington association.

Ducks prefer to eat millet, corn, smartweed, soybeans, and small acorns, especially those from pin oaks. They sometimes feed in dry cornfields, but they prefer that their food be flooded. For this reason, ducks are most numerous on bottom lands that produce food and that are periodically flooded.

Geese also eat grain, but their feeding habits differ from those of ducks. Their food need not be flooded. Geese readily feed in a dry cornfield, and they also graze in fields of grass or other green plants. They are especially fond of winter wheat and ladino clover.

White-tailed deer are common but are restricted at present to the Westmoreland-Litz-Muskingum association, which is in the southwestern part of the county.

White-tailed deer are considered to be forest animals, although they thrive in agricultural areas where there is a rather large acreage of woodland interspersed with cultivated land and pasture. These deer browse more than they graze, but their feeding habits change with the seasons. In spring they eat tender grass and clover. In summer they generally eat the leaves of herbs, shrubs, and trees. And in fall they eat acorns. In winter, when they do most of their browsing, they eat the tender twigs of shrubs and trees. They are also fond of corn and apples. Deer require open water for drinking, especially during a dry period.

Skunks and opossums are abundant and are about uniformly distributed throughout the county.

Skunks are encountered mostly in agricultural areas that have a good balance in acreage of woodland, brushland, and grassland. These beneficial animals seldom stray farther than a couple of miles from water. Their den is ordinarily a hole in the ground, but skunks also use old buildings as temporary shelter. Their food consists of insects, mice, eggs, and various fruits and berries.

Opossums, though most common on farmland, are primarily woodland animals. Their dens are in abandoned groundhog burrows, under brushpiles, in old buildings, or in hollow trees. Their diet consists of fruits (particularly persimmons), insects, mice, garbage, and carrion. Wherever they live, opossums must have sufficient water.

Raccoons and muskrats are abundant, and mink are common. All three of these furbearers occupy essentially the same areas. These areas lie mostly within the Beasley-Fairmount-Russellville association, the Russellville-Crider-Dickson association, and the Westmoreland-Litz-Muskingum association. Raccoons do not encroach upon urban areas so much as skunks and opossums.

Raccoons are likely to be found wherever there is woodland containing large, hollow trees they can use as dens. They are especially attracted to wooded areas along streams or near bodies of water. Their principal plant foods are persimmons, pecans, acorns, grapes, pokeberries, and corn. Their animal foods include crayfish, insects, frogs, and small mammals.

Muskrats require an aquatic habitat. They live along streams and near farm ponds, ordinarily in burrows they dig into banks along the shore. In marshes they build houses of aquatic vegetation. Sometimes they eat frogs, turtles, and fish, but their principal food consists of the stems and roots of cattails, rushes, and other aquatic plants. At certain times of the year, changed environmental conditions result in a "shuffling" of muskrat populations. This explains why muskrats constantly reappear in farm ponds from which they have been removed.

Mink, like raccoons and muskrats, prefer wooded shores of streams and lakes. Their home ordinarily is a brushpile or a burrow in a streambank. Mink spend most of their lives near water, where they feed on sick muskrats, aquatic insects, crayfish, frogs, and small fish. Occasionally they roam a considerable distance from water, probably because food is scarce where they normally live.

Both red and gray foxes are common in this county. The largest numbers are found in the Beasley-Fairmount-Russellville association, the Russellville-Crider-Dickson association, the Westmoreland-Litz-Muskingum association, and the Crider-Corydon association. Gray foxes are particularly numerous in the Crider-Corydon association.

Red foxes are most numerous in rolling or hilly country where the topography dictates use of the land partly for crops, partly for meadow, and partly for fairly open woods. Generally these foxes live in abandoned groundhog burrows. Rabbits and mice make up about 45 percent of their food; birds, 15 percent; insects, 20 percent; and vegetables and fruit, 20 percent.

Gray foxes are more secretive than red foxes. They seem to prefer river bottoms, bluffs or cliffs, and areas of fairly open brushland. They are less likely than red foxes to make their den in the ground. Instead, they may use a hollow log or a hole in a cliff. Gray foxes are able to climb trees. Their food habits are about the same as those of red foxes, except that they probably eat more vegetables and fruit.

Songbirds are common throughout the county. Some kinds are more numerous in certain parts of the county than in others. Areas that have the most diverse and ample vegetation have the greatest numbers and kinds of birds. The exact number of species found in the county is not known, but nearly all of the 228 species known to visit the State probably are in this county at one time or another.

The kinds of habitat required by songbirds are many and varied. Some nest on the ground, some in shrubs, some in tall trees, and some in hollow trees. Their food requirements also are varied. Some eat mostly seeds, insects, and fruit; others eat mostly meat.

Such game fish as largemouth bass and walleye and such pan fish as bluegill and other small sunfish are common in the principal streams of the county—the Ohio River, Harrods Creek, and Floyds Fork—as well as in smaller streams. Carp, bullhead, and other rough fish are abundant in all, or nearly all, streams. Rough fish outnumber game and pan fish. Kentucky's Department of Fish and Wildlife Resources has stocked most farm ponds with game and pan fish.

Game fish, pan fish, and rough fish are not normally found in the same body of water in large numbers. These different kinds of fish require, or tolerate, water with markedly different physical and chemical properties. Generally, rough fish tolerate water that contains less oxygen than the minimum amount of oxygen required by game fish and pan fish. Rough fish, furthermore, feed largely by taste and smell and, therefore, do not require water so clear as that required by game fish and pan fish, both of which feed by sight. This partly explains why silt-laden, chemically polluted waters are generally devoid of the more desirable kinds of game and pan fish.

Wildlife Productivity Groups

Soils vary in their ability to support wildlife according to their capacity to produce many kinds and large amounts of vegetation. On this basis, the soils of Jefferson County have been placed in wildlife productivity groups. All the soils in one group are estimated to have similar capacity to produce food and cover for wildlife.

WILDLIFE PRODUCTIVITY GROUP 1

The soils in this group have a high or very high moisture-supplying capacity and are moderately high or high in natural fertility. They are the most productive of the soils in the county. They not only produce plants in large quantities but also produce many kinds of plants. These soils are—

Ashton silt loam, 0 to 2 percent slopes.
Ashton silt loam, 2 to 6 percent slopes.
Beasley silt loam, 2 to 6 percent slopes.
Beasley silt loam, 2 to 6 percent slopes, eroded.
Beasley silt loam, 6 to 12 percent slopes, eroded.
Crider silt loam, 0 to 2 percent slopes.
Crider silt loam, 2 to 6 percent slopes.
Crider silt loam, 2 to 6 percent slopes, eroded.
Crider silt loam, 6 to 12 percent slopes.
Crider silt loam, 6 to 12 percent slopes, eroded.
Crider silt loam, 12 to 20 percent slopes, eroded.
Elk silt loam, 0 to 2 percent slopes.
Elk silt loam, 2 to 6 percent slopes.
Huntington fine sandy loam.
Huntington silt loam.
Lindside silt loam.
Loring silt loam, 2 to 6 percent slopes.
Loring silt loam, 6 to 12 percent slopes, eroded.
Loring-Crider silt loams, 6 to 12 percent slopes, eroded.
Lowell silt loam, 6 to 12 percent slopes, eroded.
Memphis silt loam, 2 to 6 percent slopes.
Memphis silt loam, 6 to 12 percent slopes, eroded.
Russellville silt loam, 0 to 2 percent slopes.
Russellville silt loam, 2 to 6 percent slopes.
Russellville silt loam, 2 to 6 percent slopes, eroded.
Russellville silt loam, 6 to 12 percent slopes, eroded.
Sequatchie fine sandy loam, 0 to 2 percent slopes.
Sequatchie fine sandy loam, 2 to 6 percent slopes.
Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded.
Shelbyville silt loam, 2 to 6 percent slopes.
Wheeling silt loam, 0 to 2 percent slopes.
Wheeling silt loam, 2 to 6 percent slopes.
Wheeling silt loam, 6 to 12 percent slopes, eroded.
Wheeling silt loam, 12 to 20 percent slopes, eroded.
Woolper silty clay loam, 2 to 6 percent slopes.
Woolper silty clay loam, 6 to 12 percent slopes, eroded.

These soils are used mostly for cultivated crops. Some areas are wooded, and in these the principal trees are yellow-poplar, white oak, sugar maple, and shagbark hickory.

These soils can support large numbers of both migratory and resident wildlife, but because they are intensively cultivated, they are a habitat more for rabbits and mourning doves than for any other kinds of wildlife. Conditions for bobwhite quail could improve if hedgerows were planted around fields used for crops or pasture. Conditions for some other kinds of wildlife could improve if wooded areas and idle land were not grazed.

Fishponds on these soils produce about 600 to 1,000 pounds of fish per surface acre without fertilization.

WILDLIFE PRODUCTIVITY GROUP 2

In this group, the moisture-supplying capacity of the soils ranges from moderately low to high, and the natural fertility is moderately low or moderate. The soils in this group produce about as many kinds of plants as the soils in wildlife group 1, but in lesser amounts. These soils are—

Beasley silt loam, 12 to 20 percent slopes, eroded.
Captina silt loam, 0 to 2 percent slopes.
Captina silt loam, 2 to 6 percent slopes.
Captina silt loam, 6 to 12 percent slopes, eroded.
Corydon silt loam, 2 to 6 percent slopes, eroded.
Corydon very rocky silt loam, 6 to 12 percent slopes.
Corydon very rocky silt loam, 12 to 20 percent slopes.
Corydon very rocky silt loam, 20 to 30 percent slopes.
Crider silt loam, 6 to 12 percent slopes, severely eroded.
Dickson silt loam, 0 to 2 percent slopes.
Dickson silt loam, 2 to 6 percent slopes.
Ennis cherty silt loam.
Fairmount flaggy silty clay, 12 to 20 percent slopes.
Fairmount flaggy silty clay, 20 to 30 percent slopes.
Holston gravelly silt loam, 12 to 20 percent slopes.
Holston gravelly silt loam, 20 to 30 percent slopes.
Lawrence silt loam.
Litz silt loam, 12 to 20 percent slopes.
Markland silt loam, 2 to 6 percent slopes, eroded.
Markland silt loam, 6 to 12 percent slopes, eroded.
Markland silt loam, 12 to 30 percent slopes.
McGary silt loam.
Melvin silt loam, overwash.
Memphis silt loam, 12 to 20 percent slopes, eroded.
Memphis silt loam, 20 to 30 percent slopes, eroded.
Newark silt loam.
Robertsville silt loam.
Sciotoville silt loam, 0 to 2 percent slopes.
Sciotoville silt loam, 2 to 6 percent slopes.
Sciotoville silt loam, 6 to 12 percent slopes, eroded.
Taft silt loam.
Tyler silt loam.
Weinbach silt loam.
Wheeling silt loam, 20 to 30 percent slopes, eroded.
Zanesville silt loam, 2 to 6 percent slopes.
Zanesville silt loam, 6 to 12 percent slopes, eroded.
Zanesville silt loam, 12 to 20 percent slopes, eroded.

The kinds of trees most associated with the soils in this group are shingle oak, elm, sassafras, silver maple, and persimmon.

These soils support rabbits and mourning doves in substantial numbers and probably support more bobwhite quail than the soils in wildlife group 1. But because of limitations imposed by moderate fertility, these soils generally support only moderate numbers of both migratory and resident wildlife.

Fishponds produce about 600 pounds of fish per surface acre without fertilization.

WILDLIFE PRODUCTIVITY GROUP 3

Some soils in this group are droughty, others are wet, and still others are low in natural fertility. All have in common a severely limited capacity to produce many kinds and large amounts of vegetation. These soils are—

Beasley silty clay loam, 2 to 6 percent slopes, severely eroded.
Beasley silty clay loam, 6 to 12 percent slopes, severely eroded.
Beasley silty clay loam, 12 to 20 percent slopes, severely eroded.
Breaks and Alluvial land.
Corydon silty clay loam, 6 to 12 percent slopes, severely eroded.
Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded.
Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded.
Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded.
Dunning silty clay loam.
Fairmount flaggy silty clay, 30 to 50 percent slopes.
Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded.
Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded.
Ginat silt loam.
Gullied land.
Guthrie silt loam.
Lakin loamy fine sand, 2 to 6 percent slopes.
Lakin loamy fine sand, 6 to 12 percent slopes.
Lakin loamy fine sand, 12 to 25 percent slopes.
Litz-Muskingum silt loams, 20 to 30 percent slopes.
Litz-Muskingum silt loams, 30 to 50 percent slopes.
Made land.
Melvin silt loam.
Melvin silty clay loam.
Muskingum stony soils, 30 to 50 percent slopes.
Otway silty clay, 12 to 20 percent slopes.
Otway silty clay, 12 to 20 percent slopes, severely eroded.
Purdy silt loam.
Rockcastle silt loam, 15 to 30 percent slopes.
Rock land.
Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.
Zipp silty clay.

Typical of the trees that grow on the wet soils are willow, cottonwood, and pin oak, and typical of the herbaceous plants are cattails, sedges, and smartweed. Redcedar, Virginia pine, post oak, and black oak are typical of the trees that grow on the droughty soils.

The soils in this group probably support more squirrels, foxes, skunks, opossums, and deer than the soils in either of the other two groups. Their potential, however, for the production of food and cover for all kinds of wildlife is considerably less. Probably the best way of improving conditions for wildlife on these soils would be to apply conservation practices that build up soil fertility.

Fishponds produce less than 600 pounds of fish per surface acre without fertilization.

Engineering Applications [4]

Soils engineering deals with soil as structural material and as foundation material upon which structures are built. Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. The soil properties most important to the engineer are shear strength, drainage, grain size, plasticity, and permeability to water. Compaction characteristics, shrink-swell characteristics, depth to water table, depth to bedrock, topography, and degree of acidity or alkalinity are perhaps as important. These properties and characteristics are discussed in this section.

With the use of the soil map for identification, the engineering interpretations reported here can be used to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of soil properties for use in the planning of soil and water conservation systems, including systems for surface and internal drainage and for storage and supply of water.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations of the selected locations.
4. Locate probable sources of sand and gravel for use in construction.
5. Correlate performance of engineering structures with types of soil and thus develop information that will be useful in overall planning, designing, and maintaining other engineering structures.
6. Determine the suitability of the soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs in preparing maps or reports for a specific area or areas.
8. Develop preliminary estimates for construction purposes pertinent to a particular area.

It should be emphasized that the engineering interpretations reported here may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Some terms used by soil scientists may not be familiar to engineers, and other terms have special meanings in soil science. Many of the terms soil scientists use in describing soils are defined in the Glossary at the back of this report. Other parts of this report, particularly the section "Descriptions of the Soils," can be both informative and useful to the engineer.

Engineering Classification of the Soils

Soils are classified for various purposes but mainly for agriculture and for engineering. The three most widely used systems of classification are explained in the pages that follow.

The system used by the U.S. Department of Agriculture

[4] By WM. M. ADAMS, civil engineer, and W. H. ZIMMERMAN, soil specialist, Soil Conservation Service.

is primarily for agricultural use. It is helpful to engineers, however, because it classifies soil material according to texture and consistence. Of primary importance in this system is the relative proportion of the various-sized individual grains in a mass of soil. Textural classes are based on different combinations of sand (2.0 millimeters to 0.05 millimeter), silt (0.05 to 0.002 millimeter), and clay (less than 0.002 millimeter). The basic classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. Sands are further identified as very coarse, coarse, fine, and very fine. Soils containing gravel up to 3 inches in diameter are classified gravelly; soils containing stones more than 10 inches in diameter are stony; soils containing flattened fragments of shale less than 6 inches along the longer axis are shaly; and soils containing relatively thin fragments of sandstone, limestone, slate, or shale 6 to 15 inches long are flaggy.

The Unified soil classification system (*20*), developed by the U.S. Army Corps of Engineers and the U.S. Bureau of Reclamation, is based on the identification of soils according to their textural and plasticity qualities and on their grouping with respect to behavior. Of primary importance in this system are those characteristics of the soil that indicate how it will behave as a construction material. The characteristics that have been most useful for this purpose and that form the basis of soil identification are: (1) percentages of gravel, sand, and fines (fraction passing No. 200 sieve [5]), (2) shape of the grain-size distribution curve, and (3) plasticity and compressibility characteristics.

In this system, soils are primarily divided into coarse-grained soils, fine-grained soils, and highly organic soils.

Coarse-grained soils are 50 percent, or less, material that passes the No. 200 sieve. They are subdivided into gravel and gravelly soils (symbol G) and sand and sandy soils (symbol S). If the greater ppercentage of the coarse fraction retained on the No. 200 sieve is also retained on the No. 4 sieve (4.76 millimeters), the soil is classed as gravel. If the greater portion of the coarse fraction passes the No. 4 sieve, the soil is classed as sand. The gravel and sand groups are each divided into four secondary groups as follows; well-graded material (symbol W), poorly graded material (symbol P), coarse material with nonplastic fines (silty material) (symbol M), and coarse material with plastic fines (clayey material) (symbol C). Thus, well-graded gravels are designated by the symbol GW, and well-graded sands by the symbol SW; poorly graded gravels are GP, and poorly graded sands are SP; silty gravels are GM, and silty sands are SM; clayey gravels are GC, and clayey sands are SC.

Fine-grained soils are more than 50 percent material that passes the No. 200 sieve. They are subdivided into inorganic silts (symbol M), inorganic clays (symbol C), and organic silts and clays (symbol O). These groups are further subdivided on the basis of the liquid limit; symbol L is used for soils with a low liquid limit (50 and less), and symbol H for soils with a high liquid limit (in excess of 50). Thus, the groups that evolve are ML, CL, and OL and MH, CH, and OH.

[5] The No. 200 sieve (0.074 millimeter) passes about the smallest particle visible to the naked eye.

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Highly organic soils generally are readily identified by sight. They are very compressible and have characteristics that make them undesirable as construction material. These soils contain a high percentage of organic matter and decayed roots. Generally they are designated by the symbol Pt (peat) and are not subdivided.

The system of classifying soils that is used by the American Association of State Highway Officials (AASHO) (*1*) is based on properties of a soil that affect engineering and on field performance of soils in highways. Soils of about the same general load-carrying capacity and service are grouped together. In this system soil materials are classified in seven principal groups. The groups range from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clayey soils that have low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index. Group indexes range from 0 for the best material to 20 for the poorest. Increasing values of the group index reflect decreasing load-carrying capacity of the subgrade, increasing liquid limit and plasticity index, and decreasing percentage of coarse material. The group index is shown in parentheses following the soil group symbol, for example, A–4(1).

In this system, soil materials are divided into two major groups: granular materials (35 percent or less of the material passes the No. 200 sieve) and silt-clay materials (more than 35 percent of the material passes the No. 200 sieve). Whether a soil is silty or clayey depends on its plasticity index (P.I.). Fine material having a P.I. of 10 or less is silty, and fine material having a P.I. of more than 10 is clayey. Five soil fractions are recognized: boulders, gravel, coarse sand, fine sand, and combined silt and clay.

Granular materials are classified in the A–1, A–2, and A–3 soil groups. A–1 soils are well-graded, coarse- to fine-textured mixtures that have nonplastic or slightly plastic soil binder. Soil binder is generally considered as minus No. 200 sieve-size material. A–2 soils are poorly graded or have inferior soil binder, or both. A–3 soils are sands deficient in soil binder and coarse material. The A–1 group is divided into A–1–a soils and A–1–b soils, and the A–2 group is divided into A–2–4, A–2–5, A–2–6, and A–2–7 soils. A–1–a soils include those materials that consist predominantly of stone fragments or gravel either with or without a well-graded soil binder. A–1–b soils include those materials that consist predominantly of coarse sand either with or without a well-graded soil binder. A–2–4 and A–2–5 soils include those granular materials that have soil binder characteristic of the A–4 and A–5 groups. A–2–6 and A–2–7 soils include those granular materials that have soil binder characteristic of the A–6 and A–7 groups.

Silt-clay materials are classified in the A–4, A–5, A–6, and A–7 groups. A–4 soils consist mostly of silt and contain only moderate or small amounts of coarse material and only small amounts of sticky colloidal clay. When dry, they provide a firm riding surface with little rebound after loading. When water is absorbed rapidly, they expand or lose stability. These soils are subject to frost-heave. A–5 soils are similar to A–4 soils, except that they include very poorly graded soils that have elastic properties and very low stability. A–6 soils consist mostly of clay and contain moderate or small amounts of coarse material.

They have good bearing capacity when compacted to maximum practical density but lose this bearing capacity when moisture is absorbed. A–7 soils also consist mostly of clay, but they are elastic because of the presence of one-size silt particles, organic matter, mica flakes, or lime carbonate. At certain moisture contents, they deform quickly under load and rebound when load is removed. The A–7 group is divided into A–7–5 and A–7–6 soils. A–7–5 soils represent those A–7 soils that have a moderate plasticity index in relation to liquid limit and may be highly elastic as well as subject to considerable volume change. A–7–6 soils represent those A–7 soils that have a high plasticity index in relation to liquid limit and are subject to extremely high volume change.

Table 4 shows the estimated classification of all soils in the county according to the three systems. Table 5 shows the AASHO and the Unified classification of specified soils in the county as determined by laboratory tests.

Engineering Descriptions of the Soils

Table 4 gives a brief description of all the soils mapped in Jefferson County. Also, it gives estimates of some soil characteristics significant in engineering, and the engineering classification of the soil material in the principal horizons. This table excludes Breaks and Alluvial land, Gullied land, Made land, and Rock land, all of which are miscellaneous land types. On-site studies are necessary to determine the engineering properties of these land types because the soil material in these units is variable.

TABLE 4.—*Brief description of the soils, and*

Map symbol	Soil	Description of soil	Depth to rock	Depth from surface
				Inches
AsA	Ashton silt loam, 0 to 2 percent slopes.	Silt loam; on well-drained foot slopes and on low terraces along large streams and the Ohio River; soils on terraces generally are underlain by stratified silt and sand at a depth of more than 3½ feet.	About 6 to 8 feet to limestone (soils on foot slopes only).	0 to 8
AsB	Ashton silt loam, 2 to 6 percent slopes.			8 to 42+
BaB	Beasley silt loam, 2 to 6 percent slopes.	Silt loam or silty clay loam over silty clay loam that, in turn, is over silty clay; on well-drained ridges and side slopes in eastern part of the county.	About 4 to 6 feet to limestone and marl.	0 to 6
BaB2	Beasley silt loam, 2 to 6 percent slopes, eroded.			6 to 24
BaC2	Beasley silt loam, 6 to 12 percent slopes, eroded.			24 to 42
BaD2	Beasley silt loam, 12 to 20 percent slopes, eroded.			
BeB3	Beasley silty clay loam, 2 to 6 percent slopes, severely eroded.			
BeC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded.			
BeD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded.			
CaA	Captina silt loam, 0 to 2 percent slopes.	Silt loam over silty clay loam that, in turn, is over silty clay; on moderately well drained low terraces along Floyds Fork and the large creeks; above the normal flood plain.	In most places, 4 to 10 feet or more to limestone.	0 to 10
CaB	Captina silt loam, 2 to 6 percent slopes.			10 to 38
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded.			38 to 48+
CdB2	Corydon silt loam, 2 to 6 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, is over silty clay; on well-drained hillsides along Goose Creek and Harrods Creek and on Ohio River bluffs northeast of Louisville, in an area that forms a broad north-south belt across the center of the county.	About 1 foot to 2½ feet to limestone.	0 to 6
CmC3	Corydon silty clay loam, 6 to 12 percent slopes, severely eroded.			
CnC	Corydon very rocky silt loam, 6 to 12 percent slopes.			6 to 12 12 to 26
CnD	Corydon very rocky silt loam, 12 to 20 percent slopes.			26+
CnE	Corydon very rocky silt loam, 20 to 30 percent slopes.			
CrC3	Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded.			
CrD3	Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded.			
CrE3	Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded.			

Some of the items in table 4 need no explanation; others are explained as follows:

The brief soil description gives the position of the soil on the landscape and the texture of its significant horizons.

The depth to rock means the depth to noncompressible material, which may be shale, limestone, or sandstone.

The depth from the surface refers to depth in the typical soil profile, always assuming the starting place as the surface of the soil. The thickness of each layer is indicated in inches.

Permeability indicates the rate at which water will move downward in soil material that is not compacted (undisturbed material). It is measured in inches per hour. The rates are based on estimates made by soil scientists familiar with the soils in this county.

The available water capacity refers to the amount of water in the soil that can be taken up by plants. It is measured in inches per inch of soil. The estimates are based on experiments made on soils in various parts of Kentucky and in Tennessee.

Reaction, the estimated degree of acidity or alkalinity, is expressed in pH value. A notation of pH 7.0 indicates precise neutrality; higher values indicate increasing alkalinity, and lower values indicate increasing acidity. The values in table 4 are based on quick tests made with "Soiltex" at the time the soils were identified.

The depth to the seasonally high water table is the estimated depth to the water level during a prolonged period of rainfall.

their estimated physical and chemical properties

Classification			Permeability	Available water capacity	Reaction	Depth to seasonally high water table	Remarks
USDA texture	Unified	AASHO					
			Inches per hour	*Inches per inch of soil*	*pH*	*Feet*	
Silt loam	ML	A-4	0. 8 to 2. 0	0. 22	6. 1 to 6. 5	4 to 6	
Silt loam	ML, CL, or SM.	A-4 or A-6	0. 8 to 2. 0	0. 22	5. 6 to 6. 0		
Silt loam or silty clay loam.	ML or CL	A-4 or A-6	0. 8 to 2. 0	0. 19 to 0. 22	6. 1 to 6. 5	3 to 5	Sinkholes are common in some areas.
Silty clay loam	CH	A-7	0. 2 to 0. 8	0. 19	5. 6 to 6. 0		
Silty clay	CH or MH	A-7	0. 05 to 0. 2	0. 16	7. 4 to 7. 8		
Silt loam	ML or CL	A-4	0. 8 to 2. 0	0. 22	5. 1 to 6. 0	1 or 2	A fragipan is at a depth of about 18 to 26 inches.
Silty clay loam	CL	A-4 or A-6	0. 2 to 0. 8	0. 19	4. 5 to 5. 0		
Silty clay	CL	A-4 or A-6	0. 05 to 0. 2	0. 16	4. 5 to 5. 0		
Silt loam	ML or CL	A-4	0. 8 to 2. 0	0. 22	6. 1 to 6. 5	1 to 3	Limestone outcrops are scattered or cover up to 25 percent of the surface.
Silty clay loam	CL	A-6 or A-7	0. 2 to 0. 8	0. 19	6. 1 to 6. 5		
Silty clay	CL or CH	A-7	0. 2 to 0. 8	0. 16	6. 6 to 7. 3		
Limestone							

TABLE 4.—*Brief description of the soils, and*

Map symbol	Soil	Description of soil	Depth to rock	Depth from surface
				Inches
CsA CsB CsB2 CsC CsC2 CsC3 CsD2	Crider silt loam, 0 to 2 percent slopes. Crider silt loam, 2 to 6 percent slopes. Crider silt loam, 2 to 6 percent slopes, eroded. Crider silt loam, 6 to 12 percent slopes. Crider silt loam, 6 to 12 percent slopes, eroded. Crider silt loam, 6 to 12 percent slopes, severely eroded. Crider silt loam, 12 to 20 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, overlies silty clay; on well-drained, broad ridges and on short side slopes below the ridges in a broad north-south belt across the center of the county.	5 feet or more to limestone.	0 to 7 7 to 30 30 to 48+
DcA DcB	Dickson silt loam, 0 to 2 percent slopes. Dickson silt loam, 2 to 6 percent slopes.	Silt loam over silty clay loam; on moderately well drained, broad ridges in eastern half of the county.	About 5 to 9 feet to limestone.	0 to 7 7 to 22 22 to 42
Dn	Dunning silty clay loam.	Silty clay loam over silty clay loam or silty clay; on very poorly drained first bottoms of small creeks and on bottoms along the Ohio River.	4 to 8 feet or more to limestone.	0 to 15 15 to 24 24 to 42+
EkA EkB	Elk silt loam, 0 to 2 percent slopes. Elk silt loam, 2 to 6 percent slopes.	Silt loam over silty clay loam; on well-drained, low terraces along Floyds Fork and along a few of the large creeks in the limestone area.	4 to 8 feet or more to limestone.	0 to 7 7 to 16 16 to 42+
En	Ennis cherty silt loam.	Cherty silt loam; on well-drained, narrow bottoms.	4 to 6 feet to shale.	0 to 9 9 to 36
FaD FaD3 FaE FaE3 FaF	Fairmount flaggy silty clay, 12 to 20 percent slopes. Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded. Fairmount flaggy silty clay, 20 to 30 percent slopes. Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded. Fairmount flaggy silty clay, 30 to 50 percent slopes.	Flaggy silty clay; on well-drained, moderately steep and steep slopes in eastern third of the county.	About 1 to 3½ feet to thin-bedded limestone and shale.	0 to 8 8 to 26 26+
Gm	Ginat silt loam.	Silt loam over silty clay loam in poorly drained areas that are widely scattered throughout the Ohio Valley.	More than 20 feet.	0 to 7 7 to 17 17 to 36+
Gu	Guthrie silt loam.	Silt loam over silty clay loam; on poorly drained, broad ridges in eastern half of the county.	About 5 to 9 feet to limestone.	0 to 8 8 to 18 18 to 36+
HgD HgE	Holston gravelly silt loam, 12 to 20 percent slopes. Holston gravelly silt loam, 20 to 30 percent slopes.	Gravelly silt loam over silt loam containing small fragments of rock; on well-drained foot slopes below sandstone and shale sides of the Knob Hills.	3 to 8 feet.	0 to 12 12 to 36 36 to 48+
Hn Hs	Huntington fine sandy loam. Huntington silt loam.	Fine sandy loam over fine sandy loam or loam on well-drained first bottoms of the Ohio River; and silt loam over silty clay loam or loam on well-drained first bottoms of creeks.	More than 20 feet.	0 to 11 11 to 48+
LaB LaC LaD	Lakin loamy fine sand, 2 to 6 percent slopes. Lakin loamy fine sand, 6 to 12 percent slopes. Lakin loamy fine sand, 12 to 25 percent slopes.	Loamy fine sand over very fine sandy loam containing many stratified bands of loamy fine sand; on excessively drained terraces along the Ohio River.	More than 20 feet.	0 to 12 12 to 42+

their estimated physical and chemical properties—Continued

Classification			Permeability	Available water capacity	Reaction	Depth to seasonally high water table	Remarks
USDA texture	Unified	AASHO					
			Inches per hour	*Inches per inch of soil*	*pH*	*Feet*	
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	5.6 to 6.0	4 to 6	Sinkholes are common in some areas.
Silty clay loam	CL	A-7	0.8 to 2.0	0.19	5.1 to 5.5		
Silty clay	CL or CH	A-7	0.2 to 0.8	0.16	5.1 to 5.5		
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	5.6 to 6.0	1 or 2	A fragipan is at a depth of about 18 to 28 inches.
Silty clay loam	CL	A-6	0.2 to 0.8	0.19	5.1 to 5.5		
Silty clay loam	CL	A-6	0.05 to 0.2	0.19	4.5 to 5.0		
Silty clay loam	CL	A-6 or A-7	0.8 to 2.0	0.19	6.6 to 7.3	0 or 1	Some areas are subject to occasional overflow.
Silty clay loam	CL or CH	A-6 or A-7	0.2 to 0.8	0.19	7.4 to 7.8		
Silty clay loam or silty clay.	CL or CH	A-6 or A-7	0.05 to 0.2	0.16 to 0.19	7.4 to 7.8		
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	6.1 to 6.5	3 to 7	Most areas are above normal flood plain.
Silt loam	CL	A-6	0.8 to 2.0	0.22	4.5 to 5.5		
Silty clay loam	CL	A-7	0.8 to 2.0	0.19	4.5 to 5.5		
Cherty silt loam	GM or ML	A-2, A-4, or A-6.	2.0 to 5.0	0.15	4.5 to 5.0	1 to 3	Some areas are subject to occasional flooding, but floods are of short duration.
Cherty silt loam	GM or ML	A-2, A-4, or A-6.	2.0 to 5.0	0.15	4.5 to 5.0		
Flaggy silty clay	GC or CL	A-4 or A-6	2.0 to 5.0	0.10 to 0.12	6.1 to 7.3	1 or 2	
Flaggy silty clay	CL or CH	A-6 or A-7	2.0 to 5.0	0.12	6.1 to 7.3		
Limestone and shale.							
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	6.1 to 6.5	0 or 1	A fragipan is at a depth of about 12 to 22 inches.
Silty clay loam	CL	A-6	0.2 to 0.8	0.19	5.6 to 6.0		
Silty clay loam	CL	A-6	0.05 to 0.2	0.19	5.6 to 6.0		
Silt loam	ML	A-4	0.8 to 2.0	0.22	5.1 to 5.5	0 or 1	A fragipan is at a depth of about 12 to 22 inches.
Silt loam	CL	A-4 or A-6	0.2 to 0.8	0.22	4.5 to 6.1		
Silty clay loam	CL	A-6 or A-7	0.05 to 0.2	0.19	4.5 to 6.1		
Gravelly silt loam.	GM or ML	A-2 or A-4	2.0 to 5.0	0.15	4.5 to 5.0	3 or 4	
Gravelly silt loam.	ML or CL	A-4 or A-6	2.0 to 5.0	0.15	<4.5		
Gravelly silt loam.	ML or CL	A-4 or A-6	2.0 to 5.0	0.15	<4.5		
Fine sandy loam or silt loam.	ML, CL, or SM.	A-4 or A-6	2.0 to 5.0 2.0 to 2.5	0.13 to 0.22	6.1 to 6.5	3 or 4	Subject to flooding.
Fine sandy loam, loam, or silty clay loam.	ML, CL, or SM.	A-4 or A-6	2.0 to 5.0 0.8 to 2.0	0.13 to 0.19	6.6 to 7.3		
Loamy fine sand	SM	A-2-4 or A-4.	5.0 to 10.0	0.09	5.1 to 5.5	10+	
Very fine sandy loam and loamy fine sand.	SM	A-2-4 or A-4.	5.0 to 10.0	0.09 to 0.17	5.1 to 5.5		

TABLE 4.—*Brief description of the soils, and*

Map symbol	Soil	Description of soil	Depth to rock	Depth from surface
				Inches
Lb	Lawrence silt loam.	Silt loam over silty clay loam; on somewhat poorly drained limestone ridges in eastern half of the county.	About 5 to 9 feet to limestone.	0 to 7 7 to 16 16 to 35+
Ld	Lindside silt loam.	Silt loam over silt loam or silty clay loam; on moderately well drained first bottoms along creeks and the Ohio River.	About 4 to 6 feet along creeks; more than 20 feet along Ohio River.	0 to 10 10 to 23 23 to 42+
LeD	Litz silt loam, 12 to 20 percent slopes.	Silt loam over light silty clay loam that, in turn, is over shaly silt loam; on somewhat excessively drained sides of the Knob Hills in southwestern part of the county.	2 or 3 feet to shale and siltstone.	0 to 5 5 to 16 16 to 28 28+
LmE LmF	Litz-Muskingum silt loams, 20 to 30 percent slopes. Litz-Muskingum silt loams, 30 to 50 percent slopes.	For properties of the Litz soil, see description of Litz silt loam (LeD); for properties of the Muskingum soil, see description of Muskingum stony soils (MuF).		
LnB LnC2	Loring silt loam, 2 to 6 percent slopes. Loring silt loam, 6 to 12 percent slopes, eroded.	Silt loam over silty clay loam; on well drained or moderately well drained ridges of the Knob Hills in western part of the county.	About 6 feet or more to limestone and shale.	0 to 6 6 to 34 34 to 45+
LoC2	Loring-Crider silt loams, 6 to 12 percent slopes, eroded.	For properties of the Loring soil, see description of Loring silt loam (LnB); for properties of the Crider soil, see description of Crider silt loam (CsA).		
LsC2	Lowell silt loam, 6 to 12 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, is over silty clay; on well-drained uplands in extreme eastern part of the county.	About 4 feet or more to limestone.	0 to 6 6 to 20 20 to 40+
MdB2 MdC2 MdE	Markland silt loam, 2 to 6 percent slopes, eroded. Markland silt loam, 6 to 12 percent slopes, eroded. Markland silt loam, 12 to 30 percent slopes.	Silt loam over silty clay loam that, in turn, is over silty clay or clay overlying clay; on well drained or moderately well drained terrace breaks, or narrow strips adjacent to the terraces, in the old slack-water area south of Louisville.	10 to 20 feet or more.	0 to 8 8 to 12 12 to 22 22 to 40+
Mg	McGary silt loam.	Silt loam over silty clay loam that, in turn, is over silty clay or clay; in the somewhat poorly drained part of the old slack-water area south of Louisville.	10 to 20 feet or more.	0 to 7 7 to 14 14 to 48
Mm Mn Mo	Melvin silt loam. Melvin silty clay loam. Melvin silt loam, overwash.	Silt loam or silty clay loam over silt loam or silty clay loam; on poorly drained first bottoms of small creeks and of the Ohio River.	4 to 50 feet or more.	0 to 8 8 to 40+
MpB MpC2 MpD2 MpE2	Memphis silt loam, 2 to 6 percent slopes. Memphis silt loam, 6 to 12 percent slopes, eroded. Memphis silt loam, 12 to 20 percent slopes, eroded. Memphis silt loam, 20 to 30 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, is over silt loam or silt; on well-drained uplands in western part of the Knob Hills.	About 6 feet to sandstone and shale.	0 to 6 6 to 40 40 to 50+
MuF	Muskingum stony soils, 30 to 50 percent slopes.	Silt loam; on excessively drained, steep sides of the Knob Hills.	16 to 36 inches to sandstone and shale.	0 to 10 10 to 30 30+
Ne	Newark silt loam.	Silt loam over silt loam, loam, or silty clay loam; on somewhat poorly drained first bottoms of small creeks and of the Ohio River.	4 to 20 feet or more.	0 to 9 9 to 17 17 to 48+

their estimated physical and chemical properties—Continued

Classification			Permeability	Available water capacity	Reaction	Depth to seasonally high water table	Remarks
USDA texture	Unified	AASHO					
			Inches per hour	*Inches per inch of soil*	*pH*	*Feet*	
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	5.6 to 6.0	0 or 1	A fragipan is at a depth of about 14 to 30 inches.
Silt loam	CL	A-4 or A-6	0.2 to 0.8	0.22	4.5 to 5.0		
Silty clay loam	CL	A-6	0.05 to 0.2	0.19	4.5 to 5.0		
Silt loam	ML or CL	A-6	0.8 to 2.0	0.22	6.1 to 7.3	2 or 3	
Silt loam	ML or CL	A-6	0.8 to 2.0	0.22	6.1 to 7.3		
Silt loam or silty clay loam.	CL	A-7	0.2 to 0.8	0.19 to 0.22	6.1 to 6.5		
Silt loam	ML or CL	A-6	2.0 to 5.0	0.22	4.5 to 5.0	2 or 3	
Silty clay loam	ML or CL	A-7	0.8 to 2.0	0.19	4.5 to 5.0		
Silt loam	ML or CL	A-6	2.0 to 5.0	0.22	4.5 to 5.0		
Shale and siltstone.							
Silt loam	ML	A-4	0.8 to 2.0	0.22	5.1 to 6.0	2 or 3	A fragipan is at a depth of about 28 to 34 inches.
Silt loam	ML or CL	A-7	0.8 to 2.0	0.22	5.1 to 6.0		
Silty clay loam	CL	A-7	0.2 to 0.8	0.19	5.1 to 6.0		
Silt loam	ML	A-6	0.8 to 2.0	0.22	6.1 to 6.5	3	
Silty clay loam	CL or CH	A-7	0.2 to 0.8	0.19	5.1 to 6.0		
Silty clay	CL or CH	A-7	0.05 to 0.2	0.16	5.1 to 6.0		
Silt loam	ML or CL	A-6	0.8 to 2.0	0.22	5.1 to 6.0	3 or 4	
Silty clay loam	ML or CL	A-6	0.8 to 2.0	0.19	5.1 to 6.0		
Silty clay or clay	CL or CH	A-7	0.2 to 0.8	0.14 to 0.15	5.6 to 6.5		
Clay	CH	A-7	0.05 to 0.2	0.14	7.4 to 7.8		
Silt loam	ML	A-4 or A-6	0.8 to 2.0	0.22	6.1 to 6.5	0 or 1	
Silty clay loam	CL	A-6 or A-7	0.2 to 0.8	0.19	6.1 to 7.3		
Silty clay or clay	CL or CH	A-7	0.05 to 0.2	0.14 to 0.15	7.4 to 7.8		
Silt loam or silty clay loam.	ML	A-6	0.8 to 2.0	0.19 to 0.22	6.1 to 6.5	0 or 1	Subject to overflow.
Silt loam or silty clay loam.	CL or ML	A-4 or A-6	0.2 to 0.8	0.19 to 0.22	6.1 to 7.3		
Silt loam	ML	A-4	0.8 to 2.0	0.22	5.6 to 6.0	4 to 6	
Silty clay loam	CL or ML	A-7	0.8 to 2.0	0.19	5.6 to 6.0		
Silt loam or silt	CL	A-6 or A-7	0.8 to 2.0	0.19 to 0.22	5.6 to 6.0		
Silt loam	ML-CL	A-4	0.8 to 2.0	0.22	5.6 to 6.0	2 or 3	
Silt loam	GM-GC	A-2 or A-4	2.0 to 5.0	0.22	4.5 to 5.5		
Sandstone and shale.							
Silt loam	ML	A-6	0.8 to 2.0	0.22	6.1 to 7.3	0 or 1	Subject to overflow.
Silt loam	CL	A-6 or A-7	0.8 to 2.0	0.22	5.6 to 6.5		
Silt loam, loam, or silty clay loam.	CL	A-6 or A-7	0.8 to 2.0	0.18 to 0.22	5.6 to 6.5		

TABLE 4.—*Brief description of the soils, and*

Map symbol	Soil	Description of soil	Depth to rock	Depth from surface
				Inches
OcD OcD3	Otway silty clay, 12 to 20 percent slopes. Otway silty clay, 12 to 20 percent slopes, severely eroded.	Silty clay over silty clay or clay that, in turn, is over clay; on excessively drained uplands in eastern third of the county.	2 to 4 feet to weathered calcareous shale (marl).	0 to 4 4 to 10 10 to 15 15+
Pd	Purdy silt loam.	Silt loam over silty clay loam; on poorly drained, low terraces along creeks that rise in the Knob Hills.	4 to 10 feet or more.	0 to 8 8 to 18 18 to 36
Rb	Robertsville silt loam.	Silt loam over silty clay loam; on poorly drained, low terraces along Floyds Fork and along the large creeks.	4 to 10 feet or more.	0 to 6 6 to 15 15 to 38+
RcE	Rockcastle silt loam, 15 to 30 percent slopes.	Silt loam over silty clay that, in turn, is over silty clay or clay; on excessively drained sides of the Knob Hills in southern part of the county.	About 8 to 36 inches to shale.	0 to 8 8 to 19 19 to 26 26+
RuA RuB RuB2 RuC2	Russellville silt loam, 0 to 2 percent slopes. Russellville silt loam, 2 to 6 percent slopes. Russellville silt loam, 2 to 6 percent slopes, eroded. Russellville silt loam, 6 to 12 percent slopes, eroded.	Silt loam over silty clay loam; on well drained or moderately well drained, wide ridges of the limestone uplands in an area that forms a broad north-south belt across the center of the county.	5 to 9 feet to limestone.	0 to 7 7 to 30 30 to 42+
ScA ScB ScC2	Sciotoville silt loam, 0 to 2 percent slopes Sciotoville silt loam, 2 to 6 percent slopes. Sciotoville silt loam, 6 to 12 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, is over silty clay loam, loam, or fine sandy loam; on moderately well drained terraces along the Ohio River.	40 to 50 feet.	0 to 17 17 to 38 38 to 58
SfA SfB SfC2	Sequatchie fine sandy loam, 0 to 2 percent slopes. Sequatchie fine sandy loam, 2 to 6 percent slopes. Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded.	Fine sandy loam; on well-drained terraces along the Ohio River or on long, low ridges in other parts of the Ohio Valley.	40 to 50 feet.	0 to 11 11 to 32 32 to 43+
ShB	Shelbyville silt loam, 2 to 6 percent slopes.	Silt loam over silty clay loam that, in turn, is over silty clay; on well-drained, moderately wide ridges of the uplands in the extreme eastern part of the county.	5 feet or more to limestone.	0 to 9 9 to 31 31 to 42+
Ta	Taft silt loam.	Silt loam over silty clay loam that, in turn, is over silty clay or silty clay loam; on somewhat poorly drained, low terraces along Floyds Fork and along the large creeks in the limestone area.	4 to 10 feet or more to limestone.	0 to 6 6 to 17 17 to 33 33 to 40+
Ty	Tyler silt loam.	Silt loam over silty clay loam; on somewhat poorly drained, low terraces along small creeks that rise in the Knob Hills.	4 to 10 feet or more.	0 to 8 8 to 20 20 to 44
Wb	Weinbach silt loam.	Silt loam; in somewhat poorly drained areas that are widely scattered throughout the Ohio Valley.	40 to 50 feet or more.	0 to 7 7 to 17 17 to 45

their estimated physical and chemical properties—Continued

Classification: USDA texture	Unified	AASHO	Permeability	Available water capacity	Reaction	Depth to seasonally high water table	Remarks
			Inches per hour	*Inches per inch of soil*	*pH*	*Feet*	
Silty clay	CL or CH	A-7	0. 2 to 0. 8	0. 16	7. 4 to 7. 8	1 to 3	
Silty clay or clay	MH or CH	A-7	0. 05 to 0. 2	0. 14 to 0. 16	8. 0+		
Clay	CH	A-7	0. 05 to 0. 2	0. 14	8. 0+		
Marl							
Silt loam	ML	A-4	0. 2to 0. 8	0. 22	5. 1 to 6. 0	0 or 1	A fragipan is at a depth of 14 to 20 inches; subject to occasional overflow.
Silty clay loam	CL	A-6	0. 05 to 0. 2	0. 19	5. 1 to 5. 5		
Silty clay loam	CL	A-6	0. 05 to 0. 2	0. 19	4. 5 to 5. 5		
Silt loam	ML or CL	A-4 or A-6	0. 2 to 0. 8	0. 22	4. 5 to 5. 0	0 or 1	A fragipan is at a depth of 12 to 20 inches.
Silt loam	ML or CL	A-4 or A-6	0. 05 to 0. 2	0. 22	4. 5 to 5. 0		
Silty clay loam	CL or CH	A-7	0. 05 to 0. 2	0. 19	4. 5 to 5. 0		
Silt loam	ML	A-6 or A-7-6.	0. 2 to 0. 8	0. 22	4. 5 to 5. 0	1 to 3	
Silty clay	ML, CL, or MH.	A-7	0. 05 to 0. 2	0. 16	4. 5 to 5. 0		
Silty clay or clay	ML or CL	A-6 or A-7	0. 05 to 0. 2	0. 14 to 0. 16	4. 5 to 5. 0		
Shale							
Silt loam	ML	A-4	0. 8 to 2. 0	0. 22	6. 1 to 6. 5	2 or 3	A fragipan is at a depth of 26 to 32 inches.
Silty clay loam	CL or ML	A-7	0. 2 to 0. 8	0. 19	5. 1 to 5. 5		
Silty clay loam	CL or ML	A-6 or A-7	0. 05 to 0. 2	0. 19	4. 5 to 5. 0		
Silt loam	ML	A-4 or A-6	0. 8 to 2. 0	0. 22	4. 5 to 5. 0	1 or 2	A fragipan is at a depth of about 25 inches.
Silty clay loam	CL or CH	A-6 or A-7	0. 05 to 0. 2	0. 19	4. 5 to 5. 0		
Silty clay loam, loam, or fine sandy loam.	CL or SM	A-2, A-4, or A-6.	0. 05 to 2. 0	0. 13 to 0. 19	4. 5 to 5. 0		
Fine sandy loam	SM	A-2-4	2. 0 to 5. 0	0. 12	5. 1 to 6. 0	4 to 6	
Fine sandy loam	SM	A-2-4	2. 0 to 5. 0	0. 12	4. 5 to 5. 0		
Fine sandy loam	SP or SM	A-2-4	2. 0 to 5. 0	0. 12	4. 5 to 5. 0		
Silt loam	ML	A-4 or A-6	0. 8 to 2. 0	0. 22	5. 6 to 6. 0	4 or 5	
Silty clay loam	CL	A-6 or A-7	0. 8 to 2. 0	0. 19	5. 1 to 5. 5		
Silty clay	CH	A-7	0. 2 to 0. 8	0. 16	5. 1 to 5. 5		
Silt loam	ML or CL	A-4 or A-6	0. 8 to 2. 0	0. 22	5. 6 to 6. 0	0 or 1	A fragipan is at a depth of 14 to 21 inches.
Silt loam	ML or CL	A-4 or A-6	0. 2 to 0. 8	0. 22	5. 1 to 5. 5		
Silty clay loam	CL	A-6	0. 05 to 0. 2	0. 19	5. 1 to 5. 5		
Silty clay or silty clay loam.	CL	A-6 or A-7	0. 05 to 0. 2	0. 16 to 0. 19	5. 1 to 5. 5		
Silt loam	ML or CL	A-4 or A-6	0. 8 to 2. 0	0. 22	5. 6 to 6. 0	0 or 1	A fragipan is at a depth of 20 to 32 inches; some areas are flooded occasionally.
Silt loam	ML or CL	A-6	0. 2 to 0. 8	0. 22	5. 1 to 5. 5		
Silty clay loam	CL	A-6	0. 05 to 0. 2	0. 19	4. 5 to 5. 0		
Silt loam	ML or CL	A-4	0. 2 to 0. 8	0. 22	5. 6 to 6. 0	0 or 1	A fragipan is at a depth of 15 to 24 inches.
Silt loam	ML or CL	A-4	0. 05 to 0. 2	0. 22	5. 1 to 5. 5		
Silt loam	CL	A-6	0. 05 to 0. 2	0. 22	5. 6 to 6. 0		

TABLE 4.—*Brief description of the soils, and*

Map symbol	Soil	Description of soil	Depth to rock	Depth from surface
				Inches
WcF	Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.	Westmoreland silt loam: Silt loam over silty clay loam; on somewhat excessively drained, steep slopes of the Knob Hills. For properties of the Litz soil, see Litz silt loam (LeD); for properties of the Muskingum soil, see Muskingum stony soils (MuF).	1½ feet to interbedded limestone and shale.	0 to 6 6 to 13 13 to 18 18+
WeA WeB WeC2 WeD2 WeE2	Wheeling silt loam, 0 to 2 percent slopes. Wheeling silt loam, 2 to 6 percent slopes. Wheeling silt loam, 6 to 12 percent slopes, eroded. Wheeling silt loam, 12 to 20 percent slopes, eroded. Wheeling silt loam, 20 to 30 percent slopes, eroded.	Silt loam over silty clay loam that, in turn, is over loam, silt loam, or fine sandy loam; on well-drained terraces in the Ohio Valley.	40 to 50 feet or more.	0 to 9 9 to 23 23 to 36 36 to 42
WmB WmC2	Woolper silty clay loam, 2 to 6 percent slopes. Woolper silty clay loam, 6 to 12 percent slopes, eroded.	Silty clay loam over silty clay that, in turn, is over silty clay or clay; in well drained or moderately well drained, long, narrow areas along the base of steep hillsides in eastern part of the county.	4 to 8 feet	0 to 6 6 to 12 12 to 35 35 to 48+
ZaB ZaC2 ZaD2	Zanesville silt loam, 2 to 6 percent slopes. Zanesville silt loam, 6 to 12 percent slopes, eroded. Zanesville silt loam, 12 to 20 percent slopes, eroded.	Silt loam over silty clay loam; in well drained or moderately well drained areas that generally are near the base of the Knob Hills in southern part of the county.	Generally 4 feet or more to sandstone and shale.	0 to 7 7 to 29 29 to 40+
Zp	Zipp silty clay.	Silty clay over clay; in the poorly drained part of the old slack-water area south of Louisville.	10 to 20 feet or more.	0 to 7 7 to 42+

Engineering Test Data

To help evaluate the soils for engineering purposes, samples from eight profiles of five soil series were tested in accordance with standard procedures. Table 5 gives the results of the tests.

In the moisture-density (compaction) test, soil material is compacted into a mold several times, each time at a successively higher moisture content, but with the compactive effort remaining constant. The dry density (unit weight) of the compacted material increases as the moisture content increases, until the optimum moisture content is reached. After that, the dry density decreases as the moisture content increases. The highest dry density obtained in the compaction test is the *maximum dry density*, and the corresponding moisture content is the *optimum moisture*. Moisture-density data are important in earthwork because, as a rule, optimum stability is obtained with the least amount of compactive effort when the soil is at approximately optimum moisture content.

The mechanical analysis was made by combined sieve and hydrometer methods and was used to determine the relative proportions of the different sized particles in the soil sample. Clay content (percentages of particles smaller than 0.002 millimeter) was obtained by the hydrometer method.

The liquid limit and the plasticity index indicate the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from semisolid to plastic. As the moisture content is further increased, the material changes from plastic to liquid. The *plastic limit* is the moisture content at which the material changes from semisolid to plastic. The *liquid limit* is the moisture content at which the material changes from plastic to liquid. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which the soil material is plastic.

their estimated physical and chemical properties—Continued

Classification			Permeability	Available water capacity	Reaction	Depth to seasonally high water table	Remarks
USDA texture	Unified	AASHO					
			Inches per hour	*Inches per inch of soil*	*pH*	*Feet*	
Silt loam	ML or CL	A-4	2.0 to 5.0	0.22	5.1 to 5.5	1½	
Silt loam	ML or CL	A-4	2.0 to 5.0	0.22	5.1 to 5.5		
Silty clay loam	CL	A-6	0.8 to 2.0	0.19	5.1 to 5.5		
Limestone and shale.							
Silt loam	ML-CL	A-4	0.8 to 2.0	0.22	5.6 to 6.5	4 to 6	
Silt loam	CL	A-4	0.8 to 2.0	0.22	4.5 to 5.5		
Silty clay loam	CL	A-4 or A-6	0.8 to 2.0	0.19	4.5 to 5.5		
Loam, silt loam, or fine sandy loam.	CL or SM	A-2 or A-4	0.8 to 2.0	0.13 to 0.22	4.5 to 5.0		
Silty clay loam	CL	A-6	0.2 to 0.8	0.19	6.6 to 7.3	2 or 3	
Silty clay loam	CL	A-6 or A-7	0.2 to 0.8	0.19	6.1 to 7.3		
Silty clay	MH or CH	A-7	0.05 to 0.2	0.16	6.1 to 7.8		
Silty clay or clay	MH or CH	A-7	0.05 to 0.2	0.14 to 0.16	6.1 to 7.8		
Silt loam	ML or CL	A-4	0.8 to 2.0	0.22	6.1 to 6.5	1 or 2	A fragipan is at a depth of 24 to 38 inches.
Silt loam	CL or ML	A-6 or A-7	0.2 to 0.8	0.22	5.1 to 5.5		
Silty clay loam	CL	A-6 or A-7	0.05 to 0.2	0.19	4.5 to 5.1		
Silty clay	CL	A-7	0.2 to 0.8	0.16	6.1 to 7.3	0	
Clay	CH	A-7	0.05 to 0.2	0.14	6.1 to 8.5		

Interpretation of the Soils for Engineering

Table 6 gives, for each soil series, suitability ratings for specific purposes and soil features affecting the location of highways and the installation of engineering structures that help to conserve soil and water on farmlands. The miscellaneous land types—Breaks and Alluvial land, Gullied land, Made land, and Rock land—are excluded from this table because of the variability of their soil material.

A rating of excellent, good, fair, or poor is given to show suitability of the soil material as a source of topsoil and sand, workability as construction material, compaction characteristics, and suitability for road subgrade when not subject to frost action.

The ratings for topsoil are based on the amount of vegetation that the soil material will support on slopes, shoulders, and ditchbanks along roads and other earth structures that require a protective cover.

Workability is a qualitative rating of the soils. This rating indicates the relative desirability of the soil material for engineering construction.

Compactability is estimated under average field conditions at suitable moisture content and correct thickness of lift. It is assumed that a reasonable number of passes are made with equipment suitable for a particular construction project.

The suitability of the soil material for road subgrade depends, to a great extent, on the susceptibility of the material to frost action. The suitability of a soil as construction material is greatly reduced if it is subject to frost heaving.

The degree of limitation of the soil material for use in foundations of low buildings and for use as a filter field for domestic septic tanks is estimated in table 6 on basis of the suitability or desirability of the soil material for these purposes.

TABLE 5.—*Engineering*

[Tests performed by Bureau of Public Roads (BPR) according to standard

Soil name and location	Parent material	BPR report no.	Depth	Horizon	Moisture-density data[1]	
					Maximum dry density	Optimum moisture
			In.		*Lb. per cu. ft.*	*Pct.*
Beasley silt loam:						
0.25 mile W. of Clark Station on Long Run Road. (Modal)	Shaly marl and limestone.	S32769	0–7	Ap	108	16
		S32770	13–18	B22	102	23
		S32771	36–60	C	100	24
1 mile SE. of U.S. Highway No. 60 and Beckley Station Road. (Shallow side)	Shale and limestone.	S32772	0–7	Ap	106	18
		S32773	15–21	B2	97	25
		S32774	26–32	B3	100	22
		S32775	32–37	C	110	18
Lakin loamy fine sand:						
300 yards E. of Valley Station High School. (Modal)	Mixed eolian and alluvial (Ohio River) material.	S32776	0–7	Ap	120	10
		S32777	16–41	C11	110	14
		S32778	78+	C2	115	12
0.75 mile E. of Medora Road, 100 yards W. of cemetery. (Slightly compacted horizon)	Mixed eolian and alluvial (Ohio River) material.	S32779	0–9	Ap	111	13
		S32780	9–29	B1	114	13
		S32781	43–66	C1	107	19
		S32782	66–84+	C2	113	13
McGary silt loam:						
0.5 mile E. of old Third Street Road and 40 yards N. of Outer Belt Highway. (Modal)	Slack-water silt and clay.	S32786	0–10	Ap	105	20
		S32787	13–27	B22g	107	19
		S32788	38–50+	C	107	20
County Outer Belt Highway, 1 mile E. of New Cut Road. (Coarser B horizon)	Slack-water silt and clay.	S32783	0–9	Ap	103	18
		S32784	15–24	B22g	106	20
		S32785	37–48+	C	106	21
Sequatchie fine sandy loam:						
100 feet W. of Cane Run Road along Motor Court Drive.	Alluvium (Ohio River).	S32792	0–7	Ap	117	12
		S32793	18–26	B22	118	13
		S32794	53–67	C	117	14
Wheeling silt loam:						
400 yards NW. of Lee's Lane and Cane Run Road. (Modal)	Alluvium (Ohio River).	S32789	0–8	Ap	109	16
		S32790	16–23	B22	114	16
		S32791	54–72	C	115	13

[1] Based on AASHO Designation: T 99–57, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation: T 88–57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for naming textural classes for soils.

[3] Based on total material unless otherwise noted. Laboratory test data corrected for amount discarded in field sampling.

test data

procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [2]												Liquid limit	Plasticity index	Classification	
Percentage of fraction passing seive [3]—								Percentage smaller than [3]—						AASHO	Unified [4]
1 in.	3/4 in.	3/8 in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
------	------	------	------	------	100	99	98	98	76	31	24	31	8	A-4(8)	ML-CL.
------	------	------	------	100	99	98	97	96	82	55	45	53	27	A-7-6(17)	CH.
[5] 94	91	88	83	78	74	73	70	69	62	52	45	63	32	A-7-5(19)	MH-CH.
------	------	------	------	100	99	98	96	94	72	34	24	34	11	A-6(8)	ML-CL.
------	------	------	------	100	99	99	97	97	88	68	61	71	42	A-7-6(20)	CH.
------	------	------	------	------	------	100	99	97	85	66	59	66	39	A-7-6(20)	CH.
------	------	------	------	[6] 100	99	98	90	82	54	33	29	35	14	A-6(10)	CL.
------	------	------	------	100	97	68	33	30	19	10	5	[7] NP	[7] NP	A-2-4(0)	SM.
------	------	------	------	100	98	75	18	15	9	6	6	NP	NP	A-2-4(0)	SM.
------	------	------	------	100	99	87	29	21	15	11	9	NP	NP	A-2-4(0)	SM.
------	------	------	------	------	------	100	49	36	21	11	9	NP	NP	A-4(3)	SM.
------	------	------	------	------	------	100	67	56	34	16	10	20	3	A-4(6)	ML.
------	------	------	------	------	100	99	96	93	66	33	27	38	17	A-6(11)	CL.
------	------	------	------	------	100	98	38	27	20	13	10	NP	NP	A-4(1)	SM.
------	------	------	------	100	98	97	95	93	73	43	29	38	14	A-6(10)	ML-CL.
------	------	------	------	------	------	100	99	97	85	62	47	50	25	A-7-6(16)	CL.
------	------	------	------	------	100	99	98	98	85	63	50	51	28	A-7-6(17)	CH.
------	100	99	99	99	96	95	92	90	67	30	19	32	8	A-4(8)	ML-CL.
------	------	------	------	------	------	100	99	97	77	46	34	42	19	A-7-6(12)	CL.
------	------	------	------	------	------	------	100	98	87	56	42	45	22	A-7-6(14)	CL.
------	------	------	------	------	100	98	51	44	31	17	11	19	2	A-4(3)	ML.
------	------	------	------	------	100	98	51	44	32	20	15	22	4	A-4(3)	ML-CL.
------	------	------	------	------	100	99	47	39	29	18	14	23	4	A-4(2)	SM-SC.
------	------	------	------	100	99	96	77	71	52	27	17	28	6	A-4(8)	ML-CL.
------	------	------	------	------	100	99	83	76	59	36	28	34	14	A-6(10)	CL.
------	------	------	------	------	100	96	32	25	17	11	8	NP	NP	A-2-4(0)	SM.

[4] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a border line classification. Examples of borderline classifications obtained by this use are ML-CL, MH-CH, and SM-SC.

[5] Six percent of the material was discarded in field sampling. Of this percentage, 3 percent was larger than 3 inches and 3 percent was smaller than 3 inches but larger than 1 inch.

[6] Forty percent of the material was larger than 3 inches and was discarded in field sampling. Remaining coarse fragments (smaller than 3 inches but larger than 2.0 millimeters) disintegrated in laboratory testing. Thus, the 100 percent that passed sieve No. 10 included these fragments.

[7] NP stands for nonplastic.

TABLE 6.—*Engineering*

Soil series and map symbols [1]	Suitability as source of—		Workability as construction material	Compaction characteristics	Suitability for road subgrade when not subject to frost action	Susceptibility to frost action	Shrink-swell potential	Degree of limitation for—	
	Topsoil	Sand						Low-building foundation (undisturbed)	Domestic septic-tank filter field
Ashton (AsA, AsB)	Good to fair	Fair in Ohio Valley; poor in other areas; soils on terraces along the Ohio River generally have sand at a depth of 10 feet.	Good to fair	Good to poor	Fair to poor	Low to high	Low to moderate.	Moderate	Moderate to slight; low-lying areas that are subject to flooding are not suitable.
Beasley (BaB, BaB2, BaC2, BaD2, BeB3, BeC3, BeD3)	Good	Not suitable	Fair to poor	Fair to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate.	Severe to moderate.
Captina (CaA, CaB, CaC2)	Good to fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Corydon (CdB2, CmC3, CnC, CnD, CnE, CrC3, CrD3, CrE3)	Good	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
Crider (CsA, CsB, CsB2, CsC, CsC2, CsC3, CsD2, LoC2)	Good	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Moderate to slight.
Dickson (DcA, DcB)	Good to fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Dunning (Dn)	Fair to poor	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
Elk (EkA, EkB)	Good	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Moderate
Ennis (En)	Fair; generally too gravelly.	Not suitable	Good to fair	Good to poor	Good to poor	Low to high	Low	Moderate to slight.	Very severe
Fairmount (FaD, FaD3, FaE, FaE3, FaF)	Poor; generally too rocky.	Not suitable	Good to poor	Fair to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
Ginat (Gm)	Poor	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Guthrie (Gu)	Poor	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Holston (HgD, HgE)	Fair; may be too gravelly.	Not suitable	Good to fair	Good to poor	Good to poor	Low to moderate.	Low to moderate.	Moderate to slight.	Severe to moderate because of slope.

See footnotes at end of table.

interpretations

Soil features affecting ²—							Remarks
Highway location	Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways	
	Reservoir area	Embankment					
Subject to occasional flooding; subject to frost action in places.	Seepage in places	None		None	None	None	Some of the low-lying areas are subject to occasional flooding.
Steep slopes in places and some sinkholes; subject to frost action.	Excessive seepage is likely if bedrock is exposed.	Fair stability; subsoil is good core material.		None	None	Limited vegetation where marl is exposed.	
Seasonally high water table; subject to frost action.	None	None	Wetness; surface drainage is needed at times.	Slow permeability in the fragipan.	None	Wetness in places caused by seepage from side slopes.	Subject to occasional flooding.
Shallow to bedrock; seasonally high water table; rocky and steep in places; subject to frost action.	Excessive seepage because of cavernous bedrock.	Limited soil material.		Steepness and unfavorable texture; only the more gently sloping silt loams are suitable for irrigation.		Very rocky	
Steep slopes in places and some sinkholes; subject to frost action.	Creviced bedrock	None		Steep slopes in places and some severe erosion.	Steep slopes in places.	None	
Seasonally high water table; subject to frost action.	None	None	Wetness; surface drainage is sometimes needed; seepage from side slopes may be a problem.	Slow permeability in the fragipan.	None	Wetness in places caused by seepage from side slopes.	
Subject to occasional overflow; high water table.	None	High shrink-swell potential in places; excellent core material.	Slow permeability in lower zone.	None	Terraces not needed.	High water table	
Subject to frost action	None	None		None	None	None	
Subject to occasional overflows of short duration; may be subject to frost action.	Rapid permeability in substratum.	Subject to piping		Moderate to moderately rapid permeability.	None	None	
Steep slopes and shallow to bedrock; subject to frost action.	Steep slopes	Limited soil material.			Not suitable for terraces.	Steep slopes	
High water table; subject to frost action.	Permeable layers of stratified sand and silt at a depth of about 6 feet.	Poor stability; high water table.	Fragipan generally precludes use of tile drainage system.		Seasonally high water table; soil is wet for long periods.	Very wet; range of suitable plants is limited.	
High water table; subject to frost action.	None	Seasonally high water table.	Fragipan precludes use of tile drainage system.		Wetness for long periods.	Wetness for long periods.	
Steep slopes; some areas are subject to frost action.	None	None			Not suitable for terraces.	Steep slopes; soil is difficult to stabilize.	

TABLE 6.—*Engineering*

Soil series and map symbols [1]	Suitability as source of—		Workability as construction material	Compaction characteristics	Suitability for road subgrade when not subject to frost action	Susceptibility to frost action	Shrink-swell potential	Degree of limitation for—	
	Topsoil	Sand						Low-building foundation (undisturbed)	Domestic septic-tank filter field
Huntington (Hn, Hs)	Excellent	Fair in the Ohio valley where sand generally is at a depth of 10 feet; poor in other areas.	Good to fair	Good to poor	Good to poor	Low to high	Low to moderate.	Moderate to slight.	Very severe in all areas because of susceptibility to overflow.
Lakin (LaB, LaC, LaD)	Fair to poor; too sandy in many places.	Good; sand generally is at a depth of 4 to 6 feet.	Fair	Good	Good to fair	Low	Low	Slight	Slight; moderate on the steeper slopes.
Lawrence (Lb)	Fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Lindside (Ld)	Excellent	Fair in the Ohio Valley where sand generally is at a depth of 10 feet; poor in other areas.	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Litz (LeD, LmE, LmF WcF)	Poor	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Loring (LnB, LnC2, LoC2)	Good to fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Severe to moderate.
Lowell (LsC2)	Good to fair	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Severe to moderate.
Markland (MdB2, MdC2, MdE)	Fair	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
McGary (Mg)	Fair to poor	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
Melvin (Mm, Mn, Mo)	Fair	Fair in the Ohio Valley where sand generally is at a depth of 10 feet; poor in other areas.	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Memphis (MpB, MpC2, MpD2, MpE2)	Good to fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate	Moderate	Moderate	Moderate
Muskingum (MuF, LmE, LmF, WcF)	Poor	Not suitable	Good to fair	Good to fair	Good to poor	Low to high	Moderate to low.	Moderate to slight.	Very severe
Newark (Ne)	Good to fair	Fair in the Ohio Valley where sand generally is at a depth of 10 feet; poor in other areas.	Good to fair	Good to fair	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe

See footnotes at end of table.

interpretations—Continued

Soil features affecting [2]—							Remarks
Highway location	Farm ponds: Reservoir area	Farm ponds: Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Waterways	
Subject to flooding; may be subject to frost action.	Excessive seepage because of rapid permeability.	Subject to piping.		None.	Terraces not needed.	None.	Low lying areas are subject to flooding.
Some steep slopes; very sandy.	Very rapid permeability in substratum.	Erodibility; subject to piping.		Rapid or very rapid permeability.	Erodibility; vegetation is difficult to establish.	Droughtiness; vegetation is difficult to establish.	
Seasonally high water table; subject to frost action.	None.	None.	Tile drainage system is not feasible.	Slow permeability in the fragipan.	None.	Seepage from side slopes.	
May be subject to frost action; subject to occasional overflow.	Seepage because of permeable subsoil.	Subject to piping.	Tile drainage is not needed for crop production but its installation will lengthen period for field operations.	None.	Terraces not needed.	None.	Low lying areas are subject to overflows of short duration.
Steep slopes and shallow to bedrock; subject to frost action.	Steep slopes.	Limited soil material.			Not suitable for terraces.	Steep slopes.	
Subject to frost action.	None.	None.		Moderate permeability above fragipan; slow or very slow permeability in the fragipan.	None.	None.	
Subject to frost action; plastic clay at a depth of 14 to 20 inches.	Seepage through exposed thin-bedded limestone.	Poor stability; subsoil is good core material.		None.	None.	None.	
Plastic clay subsoil; subject to frost action; steep slopes in places.	None.	Poor stability; high shrink-swell potential; excellent core material.		None.	None.	None.	
High water table; plastic clay subsoil; subject to frost action.	None.	Poor stability; excellent core material.	Impervious layer in subsoil may prohibit use of tile drainage system.	Very slow permeability below a 14-inch depth.	Wetness.	Wetness.	
High water table; subject to overflow and to frost action.	Seepage.	Subject to piping.	None.		Diversions may be needed.	None.	Subject to overflow.
Some steep slopes; subject to frost action.	None.	Slight hazard of piping in some areas.		None on the more gentle slopes.	Only the more gentle slopes can be terraced.	None.	
Steep slopes; shallow to bedrock; subject to frost action.	Steep slopes.	Limited soil material.			Steep slopes.	Steep slopes.	
High water table; subject to overflow and to frost action.	Excessive seepage in the subsoil.	Slight hazard of piping.	None.	None.	Terraces not needed.	None.	

TABLE 6.—*Engineering*

Soil series and map symbols [1]	Suitability as source of—		Workability as construction material	Compaction characteristics	Suitability for road subgrade when not subject to frost action	Susceptibility to frost action	Shrink-swell potential	Degree of limitation for—	
	Topsoil	Sand						Low-building foundation (undisturbed)	Domestic septic-tank filter field
Otway (OcD, OcD3)	Poor	Not suitable	Fair to poor	Fair to poor	Fair to poor	Moderate to high.	High	Severe; expansion is dangerous.	Very severe
Purdy (Pd)	Poor	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Robertsville (Rb)	Poor	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate; expansion is dangerous.	Very severe
Rockcastle (RcE)	Poor	Not suitable	Fair to poor	Good to poor	Fair to poor	Moderate to high.	High	Severe; expansion is dangerous.	Very severe
Russellville (RuA, RuB, RuB2, RuC2)	Fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Severe to moderate.
Sciotoville (ScA, ScB, ScC2)	Good to fair	Fair to poor; sand generally is at a depth of 5 feet.	Good to fair	Good to poor	Fair to poor	Low to high	Low to high	Severe to moderate; expansion is dangerous.	Very severe
Sequatchie (SfA, SfB, SfC2)	Good to fair	Fair to poor; sand generally is at a depth of 5 feet.	Fair	Good	Good to fair	Low	Low	Slight	Slight
Shelbyville (ShB)	Good	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	Moderate to high.	Severe to moderate.	Moderate
Taft (Ta)	Fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Tyler (Ty)	Fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Weinbach (Wb)	Fair	Fair to poor; sand generally is at a depth of 10 feet.	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Westmoreland (WcF)	Poor	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Very severe
Wheeling (WeA, WeB, WeC2, WeD2, WeE2)	Good	Fair; sand generally is at a depth of 10 feet.	Good to fair	Good to fair	Good to poor	Low to moderate.	Low to moderate.	Moderate	Moderate to slight; severe on slopes greater than 20 percent.
Woolper (WmB, WmC2)	Good to fair	Not suitable	Good to poor	Good to poor	Fair to poor	Moderate to high.	High	Severe	Very severe

See footnotes at end of table.

interpretations—Continued

Soil features affecting[2]— Highway location	Farm ponds: Reservoir area	Farm ponds: Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Remarks
Shallow to bedrock; plastic clay subsoil; subject to frost action.	None	Poor stability; good core material.			Not suitable for terraces because of steepness.	Calcareous clay subsoil and steep slopes.	
High water table; subject to infrequent flooding and to frost action.	None	None	Surface drainage is preferable because of the fragipan.		Terraces not needed.	The fragipan is near the surface in places.	
High water table; subject to frost action.	None	Seasonally high water table.	Surface drainage is preferable because of the fragipan.		Terraces not needed.	Seasonally high water table.	
Steep slopes; shallow to shale bedrock; subject to frost action.	None	Poor stability			Not suitable for terraces because of steepness.	Steepness: vegetation is difficult to establish.	
Seasonally high water table; subject to frost action.	None	None		Slow to very slow permeability in the fragipan.	None	None	
Seasonally high water table; subject to frost action.	None	None	Wetness; surface drainage is sometimes needed.	Slow to very slow permeability in the fragipan.	None	None	
Some sandiness	Excessive seepage	Subject to piping		None	None	None	
Subject to frost action; a clay subsoil generally is at a depth of 2 feet.	Seepage in concretionary layer.	Poor workability		None	None	None	
Seasonally high water table; subject to frost action.	None	None	Surface drainage is preferable because of the fragipan.	Very slow permeability in the fragipan.	Terraces not needed.	Seepage from side slopes.	
Seasonally high water table; subject to frost action.	None	None	Surface drainage is preferable because of the fragipan.	Slow to very slow permeability in the fragipan.	Terraces not needed.	Seepage from side slopes.	
High water table; subject to frost action.	Seepage through sandy substratum.	None	Fragipan may prohibit use of tile drainage system.	Slow to very slow permeability in the fragipan.	Terraces not needed.	Seepage from side slopes.	
Shallow to bedrock; subject to frost action.	Steep slopes	Limited soil material.			Not suitable for terraces.	Steep slopes	
Some steep slopes; subject to frost action in places.	Seepage through sandy substratum.	None		None	None	None	
Plastic clay subsoil; subject to frost action.	None	Poor stability		None	Difficult to work	Difficult to work	

TABLE 6.—*Engineering*

Soil series and map symbols [1]	Suitability as source of—		Workability as construction material	Compaction characteristics	Suitability for road subgrade when not subject to frost action	Susceptibility to frost action	Shrink-swell potential	Degree of limitation for—	
	Topsoil	Sand						Low-building foundation (undisturbed)	Domestic septic-tank filter field
Zanesville (ZaB, ZaC2, ZaD2)	Good to fair	Not suitable	Good to fair	Good to poor	Fair to poor	Moderate to high.	Moderate	Moderate	Severe
Zipp (Zp)	Poor	Not suitable	Fair to poor	Good to poor	Fair to poor	Moderate to high.	High	Severe to moderate.	Very severe

[1] For interpretations of the soils that make up a complex, it is necessary to refer to the respective series.

Nonagricultural Uses of the Soils

Of the 240,000 acres in Jefferson County, slightly more than 35,000 are within the city limits of Louisville. An additional 40,000 acres or more has been converted to industrial or commercial use, to subdivision-type housing or estate-type housing, to parks or other kinds of recreation areas, or to some other type of urban development, including development for highway and railroad use. Most of the newly developed areas are near the city limits of Louisville. The area extending southwest along the Ohio River to beyond Valley Station has been developed haphazardly. The eastern and southeastern parts of the county have been developed only slightly.

The population of the county, excluding Louisville, increased by about 85,000 from 1950 to 1960 and is estimated to increase by about 200,000 or more by 1980. The population is most dense near the city limits of Louisville, and generally it diminishes gradually toward the county lines.

From 1950 to 1960 the acreage converted to dwellings and subdivisions increased by about 10,000 acres to a total of 25,300 acres.[6] Estimates indicate that an additional 25,000 acres will be developed for residential use by 1980.

About 9,000 acres in the county is taken up by industrial and commercial enterprises. An expected 6,000 acres or more will be put to this use during the next 20 years.

Roads, streets, and alleys have been built on over 5,000 acres. The motor vehicle registration is expected to increase by 130,000 between 1960 and 1980. Thus, more acreage will have to be converted to streets, roads, and expressways. Federal and State highway departments have plans for several superhighways across the county.

Railroads and other utilities use more than 2,000 acres and expect to use more. Public schools and parks now occupy 6,000 acres or more. In the past 10 years, 43 new schools were built in the county.

[6] Estimated figures are from the Batholomew study of Louisville and from the Jefferson County Planning and Zoning Commission.

Interpretation of the Soils for Nonagricultural Uses

Table 7 gives, for each of the mapping units in Jefferson County except the miscellaneous land types, the degree of their limitation for specified nonagricultural uses. The estimates in table 7 are relative but are based on specific criteria. They are explained as follows:

Very slight. The soil has no significant limitation for the specified use.
Slight. The soil has some limitation for the specified use, but the limitation is easy to overcome.
Moderate. The soil has limitations that warrant recognition, but the limitations can be overcome.
Severe. The soil has severe limitations that are difficult and costly to overcome.
Very severe. The soil has very severe limitations, and extreme measures are needed to overcome the limitations.

The criteria for evaluating each mapping unit as a residential site were slightly different for each of the three housing types considered. Open-type housing, that is, one house on 1 acre or more, normally requires a septic-tank disposal system. Thus, the estimates for this type of housing are based on slope, permeability of the subsoil, moisture content, ground water level, stability of the soil in relation to low-type buildings, and depth to bedrock. Also considered was whether or not the soil was subject to overflow.

In subdivision-type housing that uses a septic-tank disposal system, four or more houses and perhaps a commercial enterprise generally are allotted to an acre. The estimates for this type of housing were determined on the same basis as for open-type housing, except that allowance was made for the difference in standing weight per acre.

In subdivision-type housing that uses a city sewage system, the density of development per acre is the same as in subdivision-type housing that uses a septic-tank disposal system. Permeability of the soil is not a criterion in arriving at the estimates for housing that does not use a septic-tank disposal system.

In determining the degree of limitation of soils for use

interpretations—Continued

Soil features affecting ²—							Remarks
Highway location	Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways	
	Reservoir area	Embankment					
Some steep slopes; seasonally high water table; subject to frost action.	None	None		Slow to very slow permeability in the fragipan.	None	None	
High water table; plastic clay subsoil; subject to frost action.	None	Poor stability; high shrink-swell potential; excellent core material.		Slow to very slow permeability.	Terraces not needed.	None	

² Absence of an entry indicates that the soil material is not suitable for the stated purpose, or that a specified structure or practice is not needed; the entry is "None" if there are no unfavorable features.

as industrial sites, the factors considered were slope, natural drainage, stability of the material, and depth to bedrock. The estimates are in relation to buildings of two stories or less only.

Topography, natural drainage, depth to bedrock, and suitability of the material for subgrade were considered in determining the suitability of the soils for highway, railroad, and airstrip use.

Natural recreation areas are those that can be developed into wildlife sanctuaries or as hunting reservations. In evaluating the soils for these purposes, the adaptability of the soil to natural vegetation and the productivity of the soil were considered. Developed recreation areas include golf courses, picnic areas, and playgrounds. Soils suited to these uses should be properly drained, no more than gently sloping, suitable for the construction of lakes, productive of vegetation, and able to sustain traffic, both human and vehicular.

Formation, Morphology, and Classification of the Soils

In this section, the factors of soil formation and their relation to the soils in Jefferson County are discussed; the morphology and classification of the soils are described; and laboratory data are given for selected soil series.

Factors of Soil Formation

Each individual soil is formed through the complex interaction of parent material, topography, climate, living organisms, and time—the five factors of soil formation. With a change in any one of these factors, a definite change takes place in the soil-forming process, and the resulting soil characteristics are affected. The importance of each factor differs from place to place, even within short distances.

In Jefferson County, parent material and topography, more than the other factors, account for the differences among the soils. The calcareous, clayey Fairmount soils, for example, differ from the acid, silty or loamy Muskingum soils mostly because of parent material.

Parent material

Parent material influences the textural, chemical, and mineralogical properties of soils. Parent material in Jefferson County is extremely variable. About 75 percent of the soils developed in residuum deprived from the underlying, nearly horizontal beds of sedimentary rocks. The remaining 25 percent of the soils developed in local alluvium, in old general alluvium, or in loess.

The sedimentary rocks, or geologic formations, consist of alternate layers of limestone, sandstone, and shale, all of which range from a few feet to several hundred feet in thickness. These formations have a gentle, upward tilt toward the northeast. Thus, from the southwest corner to the northeast corner of the county, different formations are exposed, each at a progressively higher level. (See figure 17 on page 130.)

In the Ohio Valley, soils of considerable acreage developed in old general alluvium that washed from a wide variety of soils in the upper Ohio River basin, which includes parts of nine States. Many of these soils in the Ohio Valley have a mantle of loess and possibly of glacial till, which further complicates their chemical and mineralogical composition. In the slack-water area west of Okolona, some soils formed in fine-textured, calcareous alluvium, most of which washed from the limestone areas and other nearby places in the county. Soils along the small streams and branches in the county formed in alluvium that washed from the small watershed of these streams and branches. Soils on foot slopes developed in local alluvium that washed and gravitated from the adjacent hillsides.

A thin mantle of loess has been deposited over most of the county, and consequently the upper part of a majority of the soils has developed in silty parent material. The point of contact between the loess and the underlying residuum generally is distinct and easily distinguished in road cuts and other places where the profile is exposed. The loess mantle is thickest near the western part of the county. Here it is as much as 15 feet thick. In a small area parallel to and just east of U.S. Highway No. 31E, the soils developed wholly in deep loess.

TABLE 7.—*Degree of limitation of soils for specified nonagricultural uses*

Map symbol	Soil	Residential			Industrial sites	Highways, railroads, or airstrips	Recreation areas	
		Open type (one house per acre)	Subdivision (septic tank)	Subdivision (city sewage system)			Natural	Developed
AsA	Ashton silt loam, 0 to 2 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
AsB	Ashton silt loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
BaB	Beasley silt loam, 2 to 6 percent slopes.	Moderate	Severe	Moderate	Severe	Moderate	Very slight	Very slight.
BaB2	Beasley silt loam, 2 to 6 percent slopes, eroded.	Moderate	Severe	Moderate	Severe	Moderate	Very slight	Very slight.
BaC2	Beasley silt loam, 6 to 12 percent slopes, eroded.	Moderate	Severe	Moderate	Severe	Severe	Very slight	Moderate.
BaD2	Beasley silt loam, 12 to 20 percent slopes, eroded.	Very severe	Very severe	Severe	Very severe	Severe	Slight	Severe.
BeB3	Beasley silty clay loam, 2 to 6 percent slopes, severely eroded.	Severe	Very severe	Severe	Severe	Moderate	Moderate	Moderate.
BeC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Severe	Severe	Moderate	Severe.
BeD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
CaA	Captina silt loam, 0 to 2 percent slopes.	Very severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.
CaB	Captina silt loam, 2 to 6 percent slopes.	Severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded.	Very severe	Very severe	Moderate	Moderate	Moderate	Slight	Moderate.
CdB2	Corydon silt loam, 2 to 6 percent slopes, eroded.	Severe	Severe	Moderate	Severe	Severe	Slight	Moderate.
CmC3	Corydon silty clay loam, 6 to 12 percent slopes, severely eroded.	Very severe	Very severe	Severe	Severe	Very severe	Moderate	Moderate.
CnC	Corydon very rocky silt loam, 6 to 12 percent slopes.	Severe	Very severe	Severe	Very severe	Very severe	Moderate	Moderate.
CnD	Corydon very rocky silt loam, 12 to 20 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
CnE	Corydon very rocky silt loam, 20 to 30 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
CrC3	Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
CrD3	Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
CrE3	Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
CsA	Crider silt loam, 0 to 2 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
CsB	Crider silt loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
CsB2	Crider silt loam, 2 to 6 percent slopes, eroded.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
CsC	Crider silt loam, 6 to 12 percent slopes.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
CsC2	Crider silt loam, 6 to 12 percent slopes, eroded.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
CsC3	Crider silt loam, 6 to 12 percent slopes, severely eroded.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
CsD2	Crider silt loam, 12 to 20 percent slopes, eroded.	Moderate	Severe	Severe	Severe	Severe	Very slight	Severe.
DcA	Dickson silt loam, 0 to 2 percent slopes.	Very severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.

TABLE 7.—*Degree of limitation of soils for specified nonagricutural uses*—Continued

Map symbol	Soil	Residential			Industrial sites	Highways, railroads, or airstrips	Recreation areas	
		Open type (one house per acre)	Subdivision (septic tank)	Subdivision (city sewage system)			Natural	Developed
DcB	Dickson silt loam, 2 to 6 percent slopes.	Severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.
Dn	Dunning silty clay loam	Very severe	Very severe	Very severe	Very severe	Very severe	Slight	Severe.
EkA	Elk silt loam, 0 to 2 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
EkB	Elk silt loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
En	Ennis cherty silt loam	Very severe	Very severe	Very severe	Very severe	Very severe	Slight	Severe.
FaD	Fairmount flaggy silty clay, 12 to 20 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
FaD3	Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
FaE	Fairmount flaggy silty clay, 20 to 30 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
FaE3	Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
FaF	Fairmount flaggy silty clay, 30 to 50 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
Gm	Ginat silt loam	Very severe	Very severe	Severe	Severe	Severe	Severe	Very severe.
Gu	Guthrie silt loam	Very severe	Very severe	Severe	Severe	Severe	Severe	Very severe.
HgD	Holston gravelly silt loam, 12 to 20 percent slopes.	Severe	Severe	Severe	Severe	Severe	Slight	Severe.
HgE	Holston gravelly silt loam, 20 to 30 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
Hn	Huntington fine sandy loam.	Very severe	Very severe	Very severe	Very severe	Very severe	Very slight	Severe.
Hs	Huntington silt loam	Very severe	Very severe	Very severe	Very severe	Very severe	Very slight	Severe.
LaB	Lakin loamy fine sand, 2 to 6 percent slopes.	Slight	Slight	Slight	Slight	Moderate	Moderate	Slight.
LaC	Lakin loamy fine sand, 6 to 12 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Moderate	Moderate.
LaD	Lakin loamy fine sand, 12 to 25 percent slopes.	Moderate	Moderate	Moderate	Severe	Severe	Moderate	Severe.
Lb	Lawrence silt loam	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
Ld	Lindside silt loam	Very severe	Very severe	Very severe	Very severe	Very severe	Very slight	Severe.
LeD	Litz silt loam, 12 to 20 percent slopes.	Very severe	Very severe	Very severe	Very severe	Severe	Moderate	Severe.
LmE	Litz-Muskingum silt loams, 20 to 30 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Severe.
LmF	Litz-Muskingum silt loams, 30 to 50 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
LnB	Loring silt loam, 2 to 6 percent slopes.	Moderate	Moderate	Slight	Moderate	Moderate	Very slight	Very slight.
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate
LoC2	Loring-Crider silt loams, 6 to 12 percent slopes, eroded.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
LsC2	Lowell silt loam, 6 to 12 percent slopes, eroded.	Moderate	Severe	Moderate	Severe	Severe	Very slight	Moderate.
MdB2	Markland silt loam, 2 to 6 percent slopes, eroded.	Moderate	Severe	Moderate	Severe	Severe	Slight	Slight.
MdC2	Markland silt loam, 6 to 12 percent slopes, eroded.	Severe	Very severe	Severe	Severe	Severe	Slight	Moderate.
MdE	Markland silt loam, 12 to 30 percent slopes.	Severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
Mg	McGary silt loam	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
Mm	Melvin silt loam	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
Mn	Melvin silty clay loam	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
Mo	Melvin silt loam, overwash	Very severe	Very severe	Very severe	Very severe	Very severe	Slight	Severe.
MpB	Memphis silt loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.

TABLE 7.—*Degree of limitation of soils for specified nonagricultural uses*—Continued

Map symbol	Soil	Residential			Industrial sites	Highways, railroads, or airstrips	Recreation areas	
		Open type (one house per acre)	Subdivision (septic tank)	Subdivision (city sewage system)			Natural	Developed
MpC2	Memphis silt loam, 6 to 12 percent slopes, eroded.	Slight	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
MpD2	Memphis silt loam, 12 to 20 percent slopes, eroded.	Moderate	Severe	Severe	Severe	Severe	Very slight	Severe.
MpE2	Memphis silt loam, 20 to 30 percent slopes, eroded.	Severe	Very severe	Very severe	Very severe	Very severe	Very slight	Very severe.
MuF	Muskingum stony soils, 30 to 50 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
Ne	Newark silt loam	Very severe	Very severe	Very severe	Very severe	Very severe	Slight	Very severe.
OcD	Otway silty clay, 12 to 20 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Moderate	Very severe.
OcD3	Otway silty clay, 12 to 20 percent slopes, severely eroded.	Very severe	Very severe	Very severe	Very severe	Very severe	Very severe	Very severe.
Pd	Purdy silt loam	Very severe	Very severe	Severe	Severe	Severe	Severe	Very severe.
Rb	Robertsville silt loam	Very severe	Very severe	Severe	Severe	Severe	Severe	Very severe.
RcE	Rockcastle silt loam, 15 to 30 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
RuA	Russellville silt loam, 0 to 2 percent slopes.	Moderate	Severe	Slight	Moderate	Moderate	Very slight	Very slight.
RuB	Russellville silt loam, 2 to 6 percent slopes.	Moderate	Moderate	Slight	Moderate	Moderate	Very slight	Very slight.
RuB2	Russellville silt loam, 2 to 6 percent slopes, eroded.	Moderate	Moderate	Slight	Moderate	Moderate	Very slight	Very slight.
RuC2	Russellville silt loam, 6 to 12 percent slopes, eroded.	Severe	Severe	Moderate	Moderate	Moderate	Very slight	Moderate.
ScA	Sciotoville silt loam, 0 to 2 percent slopes.	Very severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.
ScB	Sciotoville silt loam, 2 to 6 percent slopes.	Severe	Very severe	Moderate	Moderate	Moderate	Slight	Slight.
ScC2	Sciotoville silt loam, 6 to 12 percent slopes, eroded.	Severe	Severe	Moderate	Moderate	Moderate	Slight	Moderate.
SfA	Sequatchie fine sandy loam, 0 to 2 percent slopes.	Slight	Slight	Slight	Slight	Moderate	Very slight	Very slight.
SfB	Sequatchie fine sandy loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Slight	Moderate	Very slight	Very slight.
SfC2	Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded.	Slight	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
ShB	Shelbyville silt loam, 2 to 6 percent slopes.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Very slight.
Ta	Taft silt loam	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
Ty	Tyler silt loam	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
Wb	Weinbach silt loam	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.
WcF	Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes.	Very severe	Very severe	Very severe	Very severe	Very severe	Severe	Very severe.
WeA	Wheeling silt loam, 0 to 2 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
WeB	Wheeling silt loam, 2 to 6 percent slopes.	Slight	Slight	Slight	Moderate	Moderate	Very slight	Very slight.
WeC2	Wheeling silt loam, 6 to 12 percent slopes, eroded.	Moderate	Moderate	Moderate	Moderate	Moderate	Very slight	Moderate.
WeD2	Wheeling silt loam, 12 to 20 percent slopes, eroded.	Moderate	Severe	Severe	Severe	Severe	Very slight	Severe.
WeE2	Wheeling silt loam, 20 to 30 percent slopes, eroded.	Severe	Very severe	Very severe	Very severe	Very severe	Very slight	Very severe.
WmB	Woolper silty clay loam, 2 to 6 percent slopes.	Moderate	Severe	Moderate	Severe	Severe	Very slight	Slight.

TABLE 7.—*Degree of limitation of soils for specified nonagricultural uses*—Continued

Map symbol	Soil	Residential			Industrial sites	Highways, railroads, or airstrips	Recreation areas	
		Open type (one house per acre)	Subdivision (septic tank)	Subdivision (city sewage system)			Natural	Developed
WmC2	Woolper silty clay loam, 6 to 12 percent slopes, eroded.	Severe	Very severe	Moderate	Severe	Severe	Very slight	Moderate.
ZaB	Zanesville silt loam, 2 to 6 percent slopes.	Moderate	Moderate	Slight	Moderate	Moderate	Very slight	Very slight.
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded.	Severe	Severe	Moderate	Moderate	Moderate	Very slight	Moderate.
ZaD2	Zanesville silt loam, 12 to 20 percent slopes, eroded.	Severe	Very severe	Severe	Severe	Severe	Very slight	Severe.
Zp	Zipp silty clay	Very severe	Very severe	Severe	Severe	Severe	Moderate	Severe.

Topography

Topography in Jefferson County has largely been determined by past geologic erosion. The rate of erosion, in turn, has been determined by the type of sedimentary bedrock and by climatic conditions. The range in topography is from nearly level along the Ohio River and in the slack-water area to rolling in the limestone areas to steep in the highly dissected knobs. The elevation ranges from about 400 feet above sea level along the Ohio River to more than 900 feet on top of the highest hill. The slope range is mostly 2 to 20 percent, although it is commonly 30 to 50 percent in the Knob Hills, and 0 to 2 percent in the slack-water area.

Topography greatly affects the water content of a soil. If the topography is steep, only a small amount of water infiltrates and percolates through the soil and a considerable amount is lost through runoff. As a result, geologic erosion is rapid and the soil material is removed almost as rapidly as it is formed. Soils that form in steep areas, the Westmoreland soils for example, seldom mature but remain lithosolic and do not develop distinct characteristics.

If the topography is nearly level, a large amount of water infiltrates the soil and percolates downward through it. Little or no soil material is lost through geologic erosion, and there is a continuing accumulation of weathered soil material. The finer material is carried downward and in many places forms a fragipan, as in the Lawrence soils.

If the topography is rolling, the rate of geologic erosion is slightly less than the rate of soil formation, and a normal soil forms and will mature. In Jefferson County, the most extensive soils, those of the Crider and Beasley series, formed in rolling areas.

Topography also influences the formation of soils through its effect on temperature and plant cover. The direction a slope faces, for example, affects the amount of sunlight the soil receives. The amount of sunlight, in turn, affects the temperature of the soil and the type of plants that the soil will support. The microbiological activity within the soil also is affected by the temperature of the soil.

Climate

Climate affects soil formation primarily through the influences of rainfall and temperature. The rate of soil formation increases as the amount of rainfall increases, or as the temperature rises.

Rainfall percolating downward through the soil leaches carbonates, bases, and clays, all of which accumulate in the lower part of the soil. This process of translocation of soil materials within the profile is of prime importance in the formation of soil horizons. The amount of rainfall also affects the kind and abundance of plants that will grow and thus indirectly affects the organic-matter content of a soil. Organic matter, to be sure, imparts a significant influence to the formation of a soil.

Higher temperatures influence plant growth, microbiological activity, and chemical reaction. Thus they increase the rate of soil formation. Extended periods of freezing temperatures slow or stop soil development. In Jefferson County, the soils seldom freeze to a depth of more than a few inches and rarely stay frozen for more than 2 weeks at a time.

Time

The influence of the active factors of soil formation—climate and living organisms—is largely determined by the length of time that these factors have been taking part in altering and developing raw soil material into definite kinds of soil. Other factors being equal, the most developed and mature soils are those that have been exposed to rainfall, temperature, plants, and micro-organisms for the greatest length of time.

The soils in Jefferson County vary greatly in age, as is indicated by translocation of colloids, leaching of carbonates, accumulation of organic matter, reduction and transfer of iron, and weathering of minerals. The soils on bottoms along the streams have little or no development and are considered young soils. Most of those on stream terraces are of moderate age, and some of the soils on uplands have full profile development and are of mature age.

If other soil-forming factors are of extreme dominance, time has little influence. For example, if topography is

772-184—66——7

extremely steep, the rate of geologic erosion is apt to be more rapid than the rate of soil formation, and a soil will not develop to maturity.

Zonal order

During much of the period in which the soils were forming and before the soils were cleared by frontiersmen, the native vegetation in the county was mostly hardwoods. The proportion of the various species differed, as did the density of the stands and the rate of growth, mainly because of differences in parent material and in topography. But the forest cover was similar and thus caused only minor differences among the soils in this county, though it had a great influence on specific characteristics common to all the soils.

Trees remove nutrients from the soil, in places to a depth of several feet, but they add organic matter to the soil in the form of leaves, stems, and woody tissue that fall to the surface. This accumulation of organic matter on the surface is one of the first stages of soil development.

Macro-organisms, such as burrowing animals, have had a minor effect on most of the soils in the county. Micro-organisms, however, are important because they have helped to decompose the organic matter, they have continually mixed the soil, and they have affected chemical changes in the soil. The activity of these micro-organisms has been affected by the temperature and the moisture content of the soils.

Morphology and Classification of the Soils

One of the objectives of soil classification is to make it possible to remember more easily the general nature of soils (*5*). This objective can be achieved by placing the soils in a few groups, each group having selected characteristics in common.

The system of soil classification that has been developed and used in the United States since 1938 consists of six major groups, or categories (*16*). Beginning with the highest and most inclusive, the categories are the order, the suborder, the great soil group, the family, the series, and the type. In the highest category, soils are grouped into three orders—zonal, intrazonal, and azonal—whereas thousands of soil types are recognized in the lowest category. The suborder and family categories are seldom used and are not discussed in this report. Attention has been given mainly to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and soil orders.

The lower categories of taxonomic soil classification, the series and the type, are explained in the section "How This Soil Survey Was Made." The soil phase, a subdivision of the soil type made on the basis of factors significant in management but not significant in taxonomic classification, is also explained in that section.

In table 8 the soil series of this county are arranged by orders and great soil groups, and some distinguishing characteristics of each soil series are shown. In the pages that follow, the characteristics of each order, great soil group, and series are described. A representative profile of a soil in each series and the permissible range of characteristics for each series are given.

Zonal order

The zonal order consists of soils wherein the active factors of soil formation—climate and living organisms—achieve their maximum expression, unimpeded by the passive, or local factors (*17*). Zonal soils develop normally on undulating topography, under good drainage, and from parent materials that are not extreme in either texture or composition. The parent materials must have enough weatherable minerals to allow translocation of alumino-silicate clay. They are not dominated by extreme quantities of either quartz sand or salts and carbonates. Zonal soils are generally characterized by well-differentiated horizons. Degree of differentiation commonly is moderate to strong but is weak in some strongly sloping soils or in young soils, or in both.

The zonal soils in Jefferson County are classified in three of the great soil groups—Red-Yellow Podzolic, Gray-Brown Podzolic, and Sol Brun Acide.

RED-YELLOW PODZOLIC SOILS

This great soil group consists of well-developed zonal soils that are acid in reaction (*21*). These soils have a thin organic A0 horizon over a thin organic-mineral A1 horizon that, in turn, is over a light-colored, bleached A2 horizon. Their B horizon is red, yellowish red, or yellow and contains more clay than the other horizons. Coarse, reticulate streaks or mottles of red, yellow, brown, and light gray are common in the lower horizons of those soils that developed from thick parent materials. Parent materials are all more or less siliceous.

The Crider and Holston series are representative of the central concept of this great soil group. Most of the Crider soils have been cleared, and these have a dark-brown Ap horizon that is a mixture of the original A0, A1, and A2 horizons. Crider and Holston soils in wooded areas have distinct A0, A1, and A2 horizons. Laboratory data show that Crider soils have a concentration of clay in their B2 horizon. Further evidence of clay translocation is indicated by the clay films around the soil peds in the B horizon, which has moderate structural development and noticeable horizonation. Base saturation of two Crider samples varied somewhat but averaged between 60 and 65 percent in the B horizon.

Soils of the Captina, Dickson, and Russellville series also are Red-Yellow Podzolic soils, but they have a well-developed, compact, brittle fragipan at a depth of 22 to 30 inches. Laboratory data show that the highest percentage of clay is in the fragipan horizon. Also a mechanical analysis of the gray streaks of soil material between the polygons of the fragipan shows that these streaks are higher in clay than the composite sample of the fragipan horizon. Thus, there is indication of translocation of finer soil material from the A and B2 horizons. Base saturation of the A horizon of two Russellville profiles was more than 50 percent and gradually decreased with depth. It was close to 25 percent at a depth of 42 inches.

Red-Yellow Podzolic soils that intergrade toward Lithosols are those of the Litz series. Normally, Litz soils have a thin B horizon, which is characteristic of Lithosols; otherwise, these soils are typical Red-Yellow Podzolic soils.

The soils of the Zanesville series are Red-Yellow Pod-

TABLE 8.—*Characteristics and genetic relationship of soil series*

Order, great soil group, and soil series	Brief profile description [1]	Position	Soil drainage class	Slope range	Parent material	Degree of profile development [2]
Zonal Order						
Red-Yellow Podzolic soils:						
1. Central concept—				*Percent*		
Crider	Dark-brown silt loam over brown to reddish-brown silty clay loam; yellowish-red silty clay loam is at a depth of 30 to 41 inches.	Uplands	Well drained	0 to 20	Loess over residuum derived from high-grade limestone.	Moderate.
Holston	Pale-brown gravelly silt loam over yellowish-brown silt loam.	Foot slopes	Well drained	12 to 30	Local alluvium of sandstone and shale origin.	Moderate.
2. With a fragipan—						
Dickson	Dark grayish-brown silt loam over yellowish-brown silty clay loam; a mottled, compact, brittle fragipan is at a depth of 24 inches.	Uplands	Moderately well drained.	0 to 6	Loess over residuum derived from high-grade limestone.	Strong.
Captina	Dark-brown silt loam over dark yellowish-brown silty clay loam; a mottled, compact, brittle fragipan is at a depth of 24 inches.	Terraces	Moderately well drained.	0 to 12	Alluvium mainly of limestone origin.	Strong.
Russellville	Dark-brown silt loam over brown to strong-brown silty clay loam; a compact, brittle fragipan is at a depth of 26 to 36 inches.	Uplands	Well drained or moderately well drained.	0 to 12	Loess over residuum derived from high-grade limestone.	Strong.
3. Intergrade toward Gray-Brown Podzolic soils with a fragipan—						
Zanesville	Brown silt loam over brown or strong-brown silty clay loam; a mottled, brittle, compact fragipan is at a depth of 28 to 34 inches.	Uplands and foot slopes.	Well drained or moderately well drained.	2 to 20	Loess over residuum derived from sandstone and shale.	Strong.
4. Intergrade toward Lithosols—						
Litz	Dark grayish-brown silt loam over yellowish-brown light silty clay loam; shale, siltstone, and some sandstone are at a depth of 20 to 30 inches.	Uplands	Well drained or somewhat excessively drained.	12 to 50	Residuum derived from shale, siltstone, and some sandstone.	Moderate to weak.
Gray-Brown Podzolic soils:						
1. Central concept—						
Beasley	Dark grayish-brown to brown silt loam over yellowish-brown silty clay loam that grades to yellowish-brown to olive-brown silty clay at a depth of about 30 inches.	Uplands	Well drained	2 to 20	Residuum derived from calcareous shale and limestone.	Strong.
Elk	Dark-brown silt loam over brown silty clay loam.	Terraces	Well drained	0 to 6	Alluvium mainly of limestone origin.	Moderate to strong.
Lowell	Brown silt loam over yellowish-brown to brown silty clay loam; silty clay is at a depth of 20 to 29 inches.	Uplands	Well drained	6 to 12	Residuum derived from thin-bedded limestone and some siltstone.	Strong.
Markland	Dark grayish-brown silt loam over yellowish-brown silty clay loam that grades to mottled pale-brown and grayish-brown, plastic silty clay at a depth of about 14 to 20 inches.	Terraces	Well drained or moderately well drained.	2 to 30	Water-deposited silts and clays.	Moderate.

See footnotes at end of table.

TABLE 8.—*Characteristics and genetic relationship of soil series*—Continued

Order, great soil group, and soil series	Brief profile description [1]	Position	Soil drainage class	Slope range	Parent material	Degree of profile development [2]
Zonal Order—Continued						
Gray-Brown Podzolic soils—Continued						
1. Central concept—Con.				*Percent*		
McGary	Dark grayish-brown silt loam over mottled light olive-brown, yellowish-brown, and light-gray, plastic silty clay or clay.	Terraces	Somewhat poorly drained.	0 to 4	Water deposited silts and clays.	Moderate.
Memphis	Brown silt loam over yellowish-brown to brown silt loam or silty clay loam.	Uplands	Well drained	2 to 30	Loess	Moderate.
Shelbyville	Dark-brown silt loam over brown to yellowish-brown silty clay loam; a concretionary zone is at a depth of 28 to 34 inches.	Uplands	Well drained	2 to 6	Residuum derived from thin-bedded limestone.	Strong.
Woolper	Dark-brown silty clay loam over dark yellowish-brown silty clay; mottled at a depth of 26 to 30 inches.	Foot slopes	Well drained or moderately well drained.	2 to 12	Local alluvium of limestone origin.	Moderate.
2. With a fragipan—						
Loring	Brown silt loam over strong-brown or brown silt loam or silty clay loam; a mottled, brittle, compact fragipan is at a depth of 28 to 38 inches.	Uplands	Well drained or moderately well drained.	2 to 12	Loess	Moderate to strong.
Sciotoville	Dark-brown silt loam over yellowish-brown silt loam that, in turn, is over silty clay loam; a mottled, compact, brittle fragipan is at a depth of 22 to 28 inches.	Terraces	Moderately well drained.	0 to 12	General alluvium of mixed origin.	Moderate to strong.
3. Intergrade toward Alluvial soils—						
Ashton	Dark-brown silt loam over dark yellowish-brown silt loam.	Terraces and foot slopes.	Well drained	0 to 6	Alluvium mainly of limestone origin.	Weak.
Sequatchie	Dark-brown fine sandy loam over brown to strong-brown fine sandy loam.	Terraces	Well drained	0 to 12	General alluvium of mixed origin.	Weak.
4. Intergrade toward Red-Yellow Podzolic soils—						
Westmoreland	Pale-brown silt loam over yellowish-brown to strong-brown silt loam or silty clay loam; shaly limestone is at a depth of 14 to 24 inches.	Uplands	Somewhat excessively drained.	30 to 50	Residuum derived from shaly limestone.	Weak.
Wheeling	Dark-brown silt loam over brown to dark yellowish-brown silt loam or silty clay loam.	Terraces	Well drained	0 to 30	General alluvium of mixed origin.	Moderate.
5. Intergrade toward Lithosols—						
Corydon	Dark-brown silt loam over reddish-brown silty clay; limestone bedrock is at a depth of 2 to 3 feet; limestone outcrops are numerous.	Uplands	Well drained	2 to 30	Residuum from high-grade limestone.	Weak to moderate.
Sols Bruns Acides:						
1. Intergrade toward Lithosols—						
Muskingum	Dark-gray to grayish-brown silt loam over yellowish-brown silt loam; shale, siltstone, and some sandstone are at a depth of 20 to 30 inches.	Uplands	Somewhat excessively drained.	20 to 50	Residuum derived from shale, siltstone, and some sandstone.	Weak.

Rockcastle	Grayish-brown silt loam over variegated olive-gray, light olive-brown, and grayish-brown silty clay or clay; bedrock is at a depth of 8 to 24 inches.	Uplands	Somewhat excessively drained.	15 to 30	Residuum derived from acid shale.	Weak.
Intrazonal Order						
Humic Gley soils:						
1. Central concept—						
Dunning	Very dark gray to black silty clay loam over mottled very dark gray and olive-brown silty clay loam to silty clay.	Bottoms	Very poorly drained.	0 to 2	Alluvium mainly of limestone origin.	Very weak.
Low-Humic Gley soils:						
1. Central concept—						
Ginat	Mottled grayish-brown and gray silt loam over mottled light-gray, grayish-brown, and yellowish-brown silty clay loam; a brittle, compact fragipan is at a depth of 16 to 18 inches.	Terraces	Poorly drained	0 to 2	General alluvium of mixed origin.	Moderate to strong.
Melvin	Dark grayish-brown silt loam over mottled gray and grayish-brown silt loam.	Bottoms	Poorly drained	0 to 2	Alluvium mainly of limestone origin.	Very weak.
Zipp	Dark-gray silty clay over mottled gray, yellowish brown, and olive, plastic clay.	Low terraces or bottoms.	Poorly drained	0 to 2	Water deposited silts and clays.	Weak.
Planosols:						
1. With a fragipan—						
Guthrie	Mottled grayish-brown and light brownish-gray silt loam over mottled gray, yellowish-brown, and light brownish-gray silt loam or silty clay loam; a fragipan is at a depth of 12 to 22 inches.	Uplands	Poorly drained	0 to 2	Loess over residuum derived from high-grade limestone.	Strong.
Lawrence	Dark grayish-brown silt loam over mottled yellowish-brown, light brownish-gray, and light-gray silt loam or silty clay loam; a brittle, compact fragipan is at a depth of 14 to 30 inches.	Uplands	Somewhat poorly drained.	0 to 4	Loess over residuum derived from high-grade limestone.	Strong.
Purdy	Dark grayish-brown silt loam over mottled light-gray and pale-brown silty clay loam; a brittle, compact fragipan is at a depth of 14 to 16 inches.	Terraces	Poorly drained	0 to 2	Alluvium mainly of sandstone and shale origin.	Moderate to strong.
Robertsville	Dark grayish-brown silt loam over mottled gray, light brownish-gray, and yellowish-brown silt loam or silty clay loam; a fragipan is at a depth of 14 to 16 inches.	Terraces	Poorly drained	0 to 2	Alluvium mainly of limestone origin.	Moderate to strong.
Taft	Dark grayish-brown silt loam over mottled brownish-gray, light yellowish-brown, and olive-brown silty clay loam; a fragipan is at a depth of 16 to 18 inches.	Terraces	Somewhat poorly drained.	0 to 4	Alluvium mainly of limestone origin.	Moderate to strong.
Tyler	Grayish-brown silt loam over mottled light-gray, yellowish-brown, and brown silt loam or silty clay loam; a fragipan is at a depth of 18 to 20 inches.	Terraces	Somewhat poorly drained.	0 to 4	Alluvium mainly of sandstone and shale origin.	Moderate to strong.
Weinbach	Grayish-brown silt loam over mottled yellowish-brown and grayish-brown silt loam; a fragipan is at a depth of 16 to 18 inches.	Terraces	Somewhat poorly drained.	0 to 4	General alluvium of mixed origin.	Moderate to strong.
Rendzinas:						
1. Central concept—						
Fairmount	Very dark grayish-brown silty clay over brown to dark grayish-brown silty clay to silty clay loam; bedrock generally is at a depth of 18 to 24 inches.	Uplands	Somewhat excessively drained.	12 to 50	Residuum derived from thin-bedded limestone and calcareous shale.	Weak to moderate.
Otway	Very dark grayish-brown silty clay over olive silty clay or clay; calcareous marl is at a depth of 8 to 15 inches.	Uplands	Somewhat excessively drained.	12 to 20	Residuum derived from calcareous shale.	Weak.

See footnotes at end of table.

TABLE 8.—*Characteristics and genetic relationship of soil series*—Continued

Order, great soil group, and soil series	Brief profile description [1]	Position	Soil drainage class	Slope range	Parent material	Degree of profile development [2]
Azonal Order						
Alluvial soils:						
1. Central concept—				*Percent*		
Ennis	Dark grayish-brown cherty silt loam over grayish-brown to brown cherty silt loam.	Bottoms	Well drained	0 to 4	Alluvium of cherty limestone, sandstone, and shale origin.	Very weak.
Huntington	Dark-brown silt loam over brown silt loam	Bottoms	Well drained	0 to 2	Alluvium mainly of limestone origin.	Very weak.
Lindside	Brown silt loam over brown silt loam; grayish-brown mottles are at a depth of 22 to 26 inches.	Bottoms	Moderately well drained.	0 to 2	Alluvium mainly of limestone origin.	Very weak.
Newark	Dark grayish-brown silt loam over dark grayish-brown silt loam; olive-brown and gray mottles are at a depth of 10 to 16 inches.	Bottoms	Somewhat poorly drained.	0 to 2	Alluvium mainly of limestone origin.	Very weak.
Regosols:						
1. Central concept—						
Lakin	Dark-brown to brown loamy fine sand over yellowish-brown or brown loamy fine sand.	Terraces	Excessively drained.	2 to 25	Mixed loess and general alluvium.	Weak to very weak.

[1] These descriptions are of soils that are not eroded or only slightly eroded.

[2] As measured by the number of important genetic horizons and the degree of contrast between them.

zolic soils that intergrade toward Gray-Brown Podzolic soils with a fragipan.

Crider series.—The Crider series consists of well-drained soils that developed in shallow loess over limestone residuum. These soils are associated with Russellville soils. The lower part of their subsoil is browner than that of Russellville soils, and it is free of mottles. Crider soils have no fragipan, whereas Russellville soils do.

Crider soils are extensive in the eastern half of the county. They are less extensive in the Knob Hills where they occur on narrow ridgetops in association with Loring soils. The dominant type is silt loam; spots of silty clay loam occur in the most severely eroded areas.

Crider soils are used both for generalized and specialized farming. They respond well to fertilizer and to management in general. Good or excellent yields of any crop, including corn, tobacco, small grain, hay, and pasture crops, can be obtained on these soils.

A profile that is representative of the series is described in the subsection "Laboratory Data."

Holston series.—The soils of this series are well drained; they developed in local alluvium that washed from soils dominantly of sandstone and shale origin. Holston soils are associated with Zanesville soils. They are more gravelly, coarser textured, and better drained than Zanesville soils.

In Jefferson County, Holston soils are confined to the Knob Hills in the southwestern part of the county. They are on foot slopes below areas of the Westmoreland-Litz-Muskingum complex and adjacent to Zanesville soils. Their acreage is moderate.

Profile (representative of the series) of Holston gravelly silt loam, 15 percent slope, in a wooded area 1 mile southeast of the junction of Minor Lane and South Park Road:

A0—¼ inch to 0, thin mat of partially decomposed organic matter.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) gravelly silt loam; weak, fine, granular structure; very friable; many small fragments of sandstone; very strongly acid; abrupt, smooth boundary; 1 to 4 inches thick.

A2—2 to 12 inches, pale-brown (10YR 6/3) to light yellowish-brown (10YR 6/4) gravelly silt loam; weak, fine, subangular blocky structure; friable; many small fragments of sandstone; extremely acid; clear, wavy boundary; 9 to 12 inches thick.

B2—12 to 36 inches, yellowish-brown (10YR 5/4) to brown (10YR 5/3) silt loam; moderate, medium, subangular blocky structure; friable; abundant, small, rock fragments (their size increases with depth); extremely acid; gradual, smooth boundary; 18 to 36 inches thick.

C—36 to 42 inches +, variegated yellowish-brown, strong-brown, and brownish-gray silt loam; abundant rock fragments; extremely acid.

Range in characteristics: In plowed areas, an Ap horizon takes the place of the A0 and A1 horizons. The Ap horizon is generally brown (10YR 5/3 or 4/3) and contains few or no fragments. In some areas, the B2 horizon is brown (7.5YR 4/4) and nongravelly, and in places it is silty clay loam.

Dickson series.—The soils of this series developed in residuum derived from limestone, but their upper horizons show varying degrees of influence from loess.

Dickson soils are associated with the somewhat poorly drained Lawrence soils and the moderately well drained or well drained Russellville soils. Dickson soils are better drained than Lawrence soils; their fragipan is at a greater depth (21 to 31 inches); and the upper part of their subsoil is browner. Dickson soils are not so brown or so well drained as Russellville soils, and their fragipan is at a lesser depth.

In Jefferson County, Dickson soils are widely distributed in level or nearly level areas throughout the eastern half of the county. Mostly, however, they occur in the south-central section between Jeffersontown and Okolona. They are important agriculturally; fair or good yields of corn, soybeans, hay, and pasture crops can be obtained. Silt loam is the only type mapped in the county.

Profile (representative of the series) of Dickson silt loam, 2 percent slope, in a cultivated field north of the intersection of Flat Rock Road and Popedale Road:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid; clear, smooth boundary; 5 to 8 inches thick.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) to brown (10YR 4/3) silt loam; weak, medium or coarse, angular blocky structure; friable; slightly sticky when wet; few, soft, small, dark-brown concretions; medium acid; clear, smooth boundary; 4 to 6 inches thick.

B2—12 to 22 inches, yellowish-brown (10YR 5/4 to 5/6) light silty clay loam; few, fine, distinct, light-gray (10YR 7/2) and light brownish-gray (2.5Y 6/2) mottles; moderate, medium, angular blocky structure; friable; slightly sticky when wet; few, small, dark-brown concretions; few clay films; strongly acid; clear, wavy boundary; 7 to 13 inches thick.

B3m1—22 to 33 inches, mottled light brownish-gray (2.5Y 6/2 to 10YR 6/2) and brown (10YR 5/3) silty clay loam; moderate, medium, angular blocky structure; firm; compact and brittle; common, small and medium, dark-brown concretions; very strongly acid; gradual boundary; 9 to 15 inches thick.

B3m2—33 to 48 inches, mottled grayish-brown (2.5Y 5/2 to 6/2), strong-brown (7.5YR 5/6), and brown (10YR 4/3) silty clay loam; massive; very firm; compact and brittle; sticky and plastic when wet, hard when dry; some black concretionary material; strongly acid; gradual, irregular boundary; 10 to 18 inches thick.

B3b—48 inches +, red (2.5YR 4/6) or dark-red (2.5YR 3/6) silty clay; common, medium, distinct, gray (N 6/0) mottles; moderate, medium, angular blocky structure; firm, abundant, small, black concretions; medium acid.

Range in characteristics: The Ap horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 4/3 or 3/3). In some areas the B2 horizon and the upper part of the B3m1 horizon consist of silt loam. The depth to the fragipan ranges from 18 to 28 inches. The B3m1 horizon, in places, has strong-brown (7.5YR 5/6) or light yellowish-brown (10YR 6/4) mottles. The depth to the B3b horizon ranges from 32 to 50 inches. In a few sites a C horizon replaces the B3b horizon.

Captina series.—The Captina series consists of moderately well drained soils that have a fragipan. These soils developed in mixed alluvial materials that are chiefly of limestone origin.

Captina soils are closely associated with the well-drained Elk soils and the somewhat poorly drained Taft and Tyler soils. They differ from Elk soils in being gray and mottled in the lower part of their subsoil and in having a fragipan at a depth of 18 to 26 inches. They differ from Taft and Tyler soils in being better drained, in having a browner surface layer, and in having a fragipan at a greater depth.

Captina soils occur mostly on terraces along Floyds Fork and other small streams. They are also on foot slopes. These soils are agriculturally important. Medium or high yields of most crops can be obtained. Silt loam is the only type mapped in Jefferson County.

Profile (representative of the series) of Captina silt loam, 2 percent slope, in a cultivated field about 200 yards north of U.S. Highway No. 31E and Floyds Fork:

Ap—0 to 5 inches, dark-brown (10YR 4/3 or 3/3) silt loam; weak, fine, granular structure; very friable; medium acid; abrupt, smooth boundary; 4 to 6 inches thick.

A2—5 to 11 inches, brown (10YR 4/3 or 5/3) or dark yellowish-brown (10YR 4/4) silt loam; weak, medium, granular structure; friable; few, small, black concretions; strongly acid; clear, smooth boundary; 4 to 7 inches thick.

B2—11 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, faint, pale-brown (10YR 6/3) and grayish-brown (2.5Y 5/2) mottles; moderate, fine or medium, subangular blocky structure; friable; slightly sticky when wet; few clay films; common, small, dark-brown and black concretions; very strongly acid; gradual, wavy boundary; 9 to 19 inches thick.

B3m—21 to 38 inches, mottled yellowish-brown (10YR 5/4), pale-brown (10YR 6/3), and light brownish-gray (2.5Y 6/2) silty clay loam to silt loam; moderate, medium or coarse, angular blocky structure; firm, compact, brittle; slightly sticky and plastic when wet, hard when dry; abundant, medium, dark-brown and black concretions; very strongly acid or extremely acid; gradual, wavy boundary; 16 to 26 inches thick.

C—38 to 60 inches +, mottled yellowish-brown (10YR 5/6 to 5/8) and gray (5Y 5/1) silty clay loam or silty clay; massive; firm; sticky and plastic when wet, very hard when dry; abundant, dark-brown and black concretionary material; very strongly acid or extremely acid; 14 to 30 inches thick.

Range in characteristics: The A horizon ranges from 8 to 13 inches in thickness and is dark grayish brown (10YR 4/2) in some areas. The B2 horizon is light yellowish brown (10YR 6/4) in some areas. The depth to the B3m horizon ranges from 18 to 32 inches. Some fine sand is noticeable throughout the profile in a few sites. The alluvium (parent material) ranges from 30 to 60 inches in thickness.

Russellville series.—The soils of this series are well drained or moderately well drained and have a fragipan. They developed in a thin mantle of loess overlying residuum derived from high-grade limestone or calcareous shale.

These soils are closely associated with Crider and Dickson soils. They resemble Crider soils in the upper part of their profile, but they differ from them in having a fragipan at a depth of 28 to 36 inches. Crider soils are better drained than Russellville soils. Russellville soils, however, are better drained than Dickson soils, and they have a browner B horizon and a fragipan at a greater depth.

In Jefferson County, Russellville soils range from level to sloping and occupy considerable acreage in the limestone area. The dominant type is silt loam; spots of silty clay loam occur in severely eroded areas. Russellville soils are of agricultural importance in the county.

Profile (representative of the series) of Russellville silt loam, 3 percent slope, in a cultivated field on Buren Bandy farm, 1 mile east of Fern Creek on Fern Creek Road:

Ap—0 to 7 inches, dark-brown (10YR 4/3 or 3/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary; 5 to 10 inches thick.

B21—7 to 15 inches, brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; few clay films; few, small, black concretions; strongly acid; clear, smooth boundary; 6 to 11 inches thick.

B22—15 to 30 inches, brown (7.5YR 4/4) light silty clay loam; few, fine, distinct, brown (10YR 5/3) mottles; moderate, medium, subangular blocky structure; firm; slightly sticky when wet, slightly hard when dry; some, small, dark-brown concretions; strongly acid; clear, wavy boundary; 8 to 16 inches thick.

B3m—30 to 42 inches, mottled brown (7.5YR 4/4), yellowish-brown (10YR 5/4), and grayish-brown (10YR 5/2) silty clay loam; moderate, medium and coarse, angular blocky structure; firm, compact; sticky and plastic when wet, hard when dry; numerous, small, black concretions; very strongly acid; clear, smooth boundary; 10 to 20 inches thick.

C—42 to 56 inches +, mottled yellowish-brown (10YR 5/4), reddish-brown (5YR 4/4), and grayish-brown (2.5Y 5/2) silty clay or silty clay loam; massive; abundant black concretionary material; slightly acid.

Range in characteristics: The Ap horizon ranges from dark brown (10YR 4/3 or 3/3) to dark grayish brown (10YR 4/2). All horizons down to the B3m consist of silt loam in some profiles. The depth to the fragipan ranges from 23 to 38 inches. The depth to bedrock ranges from 5 to 9 feet. In the marl area, where Russellville soils occur in geographic association with Beasley soils, the lower part of the B3m horizon and the C horizon have more olive and less red mottles. Also in this area, the C horizon is generally neutral or alkaline in reaction.

Zanesville series.—This series consists of well drained or moderately well drained soils that developed in loesslike material overlying local alluvium and residuum derived from sandstone and shale. Normally the local alluvium between the loess and the underlying residuum ranges from a few inches to about 24 inches in thickness. These soils have a fragipan at a depth of about 30 inches.

Zanesville soils are associated with Holston soils. They are finer textured than Holston soils and contain little or no gravel.

In Jefferson County, Zanesville soils are confined to foot slopes of the Knob Hills in the southwestern part of the county. Nearly all areas are cultivated.

Profile (representative of the series) of Zanesville silt loam, 10 percent slope, in a pasture at junction of Manslick and Keys Ferry Roads:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; friable; slightly acid; gradual, smooth boundary; 6 to 9 inches thick.

B21—7 to 18 inches, brown (7.5YR 4/4) or strong-brown (7.5YR 5/6) heavy silt loam; moderate, medium, subangular blocky structure; friable; several, small, black concretions; strongly acid; gradual, smooth boundary; 9 to 13 inches thick.

B22—18 to 29 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; several clay films; many, small, black concretions; very strongly acid; clear, smooth boundary; 8 to 14 inches thick.

B3m—29 to 40 inches +, yellowish-brown (10YR 5/6) silty clay loam; common, medium, faint, grayish-brown (10YR 5/2) mottles and common, medium, distinct, gray (10YR 6/1) mottles; moderate, medium and coarse, angular blocky structure; firm; compact and brittle; very strongly acid.

Range in characteristics: The Ap horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2). In some places the fragipan is only a few inches thick and is weakly developed. The depth to shale residuum ranges from 30 to 48 inches.

Litz series.—This series consists of shallow soils that developed in residuum derived from shale, siltstone, and some sandstone. The upper layers, in places, developed in a mantle of loess that varies in thickness and is as much as 20 inches thick.

Litz soils are associated with Muskingum, Rockcastle, and Holston soils. Their B horizon is more developed than that of Muskingum soils, and it is argillaceous. Their surface layer and subsoil are coarser textured than those of Rockcastle soils. They differ from Holston soils in that they developed in residuum rather than alluvium.

In Jefferson County, Litz soils are strongly sloping or steep, and they occur in the Knob Hills in the southwestern part of the county. Their acreage is moderate, and their agricultural value is small. Their best use is for trees. The only type recognized is the silt loam.

Profile (representative of the series) of Litz silt loam, 20 percent slope, in woods off Jefferson Hill Road, about a mile and a half south of Keys Ferry Road:

A0—½ inch to 0, partially decomposed organic matter.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary; 1 to 3 inches thick.

A2—2 to 5 inches, grayish-brown (10YR 5/2) silt loam; moderate, fine, granular structure; very friable; strongly acid; clear, smooth boundary; 2 to 6 inches thick.

B2—5 to 12 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, subangular blocky structure; friable; few clay films; very strongly acid; gradual, smooth boundary; 5 to 9 inches thick.

B3—12 to 16 inches, yellowish-brown (10YR 5/6) silt loam; few, medium, distinct, light olive-brown (2.5Y 5/4) and light-gray (2.5Y 6/2) variegations; weak, medium, subangular blocky structure; very strongly acid; gradual, smooth boundary; 2 to 8 inches thick.

C—16 to 28 inches, weathered shale and siltstone; yellowish-brown silt loam in interstices.

Dr—28 inches +, hard shale and siltstone.

Range in characteristics: The B horizon contains a few rock fragments in places. The depth to bedrock ranges from about 20 to 30 inches.

GRAY-BROWN PODZOLIC SOILS

This great soil group consists of zonal soils that developed in a moist, temperate climate under deciduous forest (*21*). Gray-Brown Podzolic soils have a thin organic cover over a thin organic-mineral horizon that, in turn, is over a grayish-brown, leached horizon. Below the leached horizon is a brown, illuviated horizon.

In Jefferson County the Beasley, Elk, Lowell, Markland, McGary, Memphis, Shelbyville, and Woolper series are representative of the central concept of this great soil group. All the soils of these series have moderate to strong profile development, as is indicated by the translocation of clay from the A and B1 horizons to the B2 horizon; all have moderate to strong structural development, clay films, and definite horizonation. Those soils that are cleared and cultivated (nearly all are) have a brown Ap horizon, which is a mixture of the original A0 and A1 horizons and the upper part of the A2 horizon. In many of the soil profiles examined, the A2 horizon extended below normal plowing depth and was easily recognized because of its thickness. The A2 horizon is highly leached and is much lighter in color than the overlying Ap horizon. The B horizon is brown to yellowish brown. Shelbyville soils and, in places, Lowell soils have concretionary material in the lower part of their B horizon. This material is an indication of an old buried A horizon or of poorly drained conditions at some time during the development of these soils. The base saturation of two Beasley samples was over 60 percent in the A horizon and steadily decreased downward through the profile.

Soils of the Loring and Sciotoville series also are Gray-Brown Podzolic soils, but they have a well-developed, compact, brittle fragipan at a depth of 24 to 30 inches or more. The B3m horizon of these soils is mottled brown, olive gray, reddish brown, and gray. Base saturation of the Loring soil drops in the fragipan but goes up in the C horizon.

Gray-Brown Podzolic soils that intergrade toward Alluvial soils are those of the Ashton and Sequatchie series. Ashton and Sequatchie soils developed in relatively young alluvium, and they have weak profile development. Sufficient time has not elapsed for leaching of their A horizon, translocation of finer materials, and development of strong structure.

Gray-Brown Podzolic soils that intergrade toward Red-Yellow Podzolic soils are those of the Westmoreland and Wheeling series. Base saturation of Wheeling soils ranges from about 50 to 80 percent in the A horizon but steadily decreases and ranges from about 25 to 40 percent in the B3 horizon.

The soils of the Corydon series are Gray-Brown Podzolic soils that intergrade toward Lithosols.

Beasley series.—This series consists of soils that developed in part from limestone residuum and in part from calcareous shale residuum. Generally loess materials influenced the development of the upper horizons.

Those soils on uplands are well drained and are extensive on the gently sloping to strongly sloping ridges above the steeper slopes occupied by Otway and Fairmount soils. Those on the broad, nearly level ridges are associated with the moderately well drained or well drained Russellville soils. Beasley soils have finer texture and stronger structure than Russellville soils, and they are more firm and less acid and have no fragipan. Beasley soils differ from Otway soils in being deeper, coarser textured, and less alkaline and in having a definite, well-developed B horizon.

Beasley soils are extensive in the eastern part of Jefferson County, and they are agriculturally important. Because the lower part of their subsoil is alkaline, they generally are excellent for alfalfa and other deep-rooted legumes. Silt loam is the dominant type; silty clay loam occurs in severely eroded areas.

Composite profile (representative of the series) of Beasley silt loam:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary; 5 to 7 inches thick.

B1—6 to 12 inches, yellowish-brown (10YR 5/4) silty clay loam; weak or moderate, medium, angular blocky structure; friable or firm; slightly sticky when wet, slightly hard when dry; patchy, thin clay skins; some, small, black concretions; medium acid; clear; smooth boundary; 4 to 10 inches thick.

B2—12 to 24 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6) silty clay; moderate or strong, medium, angular blocky structure; firm, sticky, and plastic when wet; common clay films; few, small, black concretions; medium acid; gradual, smooth boundary; 9 to 14 inches thick.

B3—24 to 31 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay; many, fine, faint, brown (7.5YR 4/4) and light olive-brown (2.5YR 5/4) mottles; moderate or strong, medium, angular blocky structure; very firm; common clay films; numerous, small, black concretions; slightly acid; clear, wavy boundary; 5 to 10 inches thick.

C—31 to 45 inches, yellowish-brown (10YR 5/6) clay; many, fine and medium, distinct, light olive-brown (2.5Y 5/4), reddish-brown (5YR 3/4), and olive-gray (5Y 5/2) mottles; coarse, angular blocky structure or massive; extremely firm, very sticky, and very plastic when wet; hard when dry; lime nodules and marl in lower part; mildly alkaline or calcareous in upper part, and grades to calcareous shale; 10 to 26 inches thick.

Dr—45 inches +, calcareous shale (marl).

Range in characteristics: Depth to the calcareous shale (marl) ranges from 24 to 45 inches. The B horizons are thinner and less acid where the depth to calcareous shale is less. Some profiles do not have a B1 horizon. The B2 horizon is brown (7.5YR 4/4) or yellowish red (5YR 4/6) in places. It consists of silty clay loam in many places. Depth to the B2 horizon ranges from 10 to 30 inches. The B3 horizon may be less mottled and in many places is neutral in reaction. The C horizon is light olive brown (2.5Y 5/6) in a few places and may contain some sand.

Elk series.[7]—This series consists of well-drained soils that developed in alluvium washed from soils of limestone origin. These soils are closely associated with Captina, Taft, Robertsville, and Ashton soils. They differ from Captina soils in being browner in color and in not having a fragipan. Elk soils are much better drained than Taft and Robertsville soils. They differ from Ashton soils in having a more strongly developed profile.

In Jefferson County, Elk soils are most extensive along Floyds Fork and are of agricultural importance. Good to excellent crop yields can be obtained. Silt loam is the dominant type; silty clay loam occurs in severely eroded areas.

Profile (representative of the series) of Elk silt loam, 3 percent slope, in a cultivated field along Floyds Fork just west of Aiken Road bridge:

Ap—0 to 7 inches, dark-brown (10YR 3/3 or 4/3) silt loam; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary; 5 to 10 inches thick.

B1—7 to 16 inches, brown (10YR 4/3) silt loam; weak to moderate, fine, subangular blocky structure; friable; few, very small, black concretions; medium acid or strongly acid; gradual, smooth boundary; 6 to 11 inches thick.

B21—16 to 27 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine or medium, subangular blocky structure; friable or firm; sticky and slightly plastic when wet; common, small, black concretions; strongly acid or very strongly acid; gradual, smooth boundary; 7 to 17 inches thick.

B22—27 to 42 inches, brown (7.5YR 4/4) silty clay loam; few, fine, faint, brown (10YR 5/3) mottles; moderate or strong, medium, angular blocky structure; firm, prominent clay films; slightly plastic when wet; numerous, small, black concretions; strongly acid or very strongly acid; clear, smooth boundary; 11 to 18 inches thick.

B3—42 inches +, yellowish-brown (10YR 5/4 to 5/6) silty clay loam or silty clay; moderate or strong, medium, angular blocky structure; firm; noticeable clay films; numerous, small and medium, black concretions; very strongly acid.

Range in characteristics: In places the B horizons are strong brown (7.5YR 5/6) or yellowish brown. A few reddish-brown and gray mottles may occur in the B22 horizon, but especially in the B3 horizon. The concretions in the lower horizons vary in abundance. The B22 horizon is silty clay in some places. Depth to bedrock is commonly 4 to 8 feet or more.

Lowell series.—This series consists of well-drained soils that developed in residuum derived from thin-bedded limestone of the Ordovician formation.

These soils are associated with Shelbyville, Beasley, and Fairmount soils. They differ from Shelbyville soils in having a thinner A horizon, a finer textured B horizon, and a less prominent concretionary zone. They differ from Fairmount soils in having a lighter colored A horizon, a coarser textured A horizon and upper B horizon, a more developed and deeper profile, and a lower pH. They differ from Beasley soils in that they developed mainly in limestone residuum and have an acid lower profile.

Lowell soils are inextensive in the county but nevertheless are agriculturally important. They are sloping mostly, and they occur in the extreme eastern part. Silt loam is the predominant type, but silty clay loam occurs, to a very minor extent, in severely eroded areas.

Profile (representative of the series) of Lowell silt loam, 9 percent slope, in a pasture on Clark Station Road, a fourth of a mile west of Clark:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; abrupt, smooth boundary; 5 to 7 inches thick.

B1—6 to 11 inches, dark yellowish-brown (10YR 4/4) to brown (7.5YR 4/4) silty clay loam; weak to moderate, fine subangular blocky structure; friable to firm; slightly acid; clear boundary; 3 to 6 inches thick.

B21—11 to 20 inches, brown (7.5YR 4/4) to yellowish-brown (10YR 5/4) silty clay loam; moderate to strong, medium, angular blocky structure; firm; noticeable clay films; many, small, hard, dark-brown and black concretions; medium acid; 8 to 10 inches thick.

B22—20 to 29 inches, yellowish-brown (10YR 5/6) silty clay; strong, fine and medium, angular blocky structure; very firm; distinct clay films; abundant, small (1 to 3 millimeters), black concretions; medium acid; 8 to 10 inches thick.

B3—29 to 40 inches, dark yellowish-brown (10YR 3/4) clay; many, fine, distinct, yellowish-brown (10YR 5/4 to 5/6) mottles; moderate, coarse, angular blocky structure or massive; very firm; some clay films; abundant black concretions and concretionary material; medium acid; 9 to 13 inches thick.

C—40 to 42 inches +, dark yellowish-brown (10YR 4/4) clay; many, medium, distinct, grayish and olive-brown mottles; massive; extremely firm; many, small, hard, black concretions; slightly acid.

Range in characteristics: The Ap horizon ranges from brown (10YR 4/3) to dark brown (10YR 3/3). The B horizon is silt loam in some places. The number of concretions in the B horizon varies from few in some places to abundant in other places. The B2 horizon is dark yellowish brown (10YR 4/4) in places and may be strongly acid. The C horizon contains many small frag-

[7] Recent studies indicate that soils that have been classified in the Elk and Wheeling series have some characteristics that overlap. Consequently, modifications in the concepts and definitions of these two series will be required. Such modifications, when made, may affect the classification of Elk and Wheeling soils in Jefferson County.

ments of limestone in some profiles. The depth to bedrock ranges from 44 to 60 inches.

Markland series.—The Markland series consists of well drained or moderately well drained soils that developed in water-deposited, calcareous silt and clay. These soils are closely associated with the somewhat poorly drained McGary soils. Markland soils are better drained than McGary soils, and they have a browner, less mottled subsoil.

In Jefferson County, these soils are scattered throughout the slack-water area between Buechel and Valley Station, but their acreage is small. They are mostly on gently sloping to strongly sloping terraces. They produce favorable yields of most locally grown crops. Silt loam is the dominant type, but silty clay loam occurs in severely eroded areas.

Profile (representative of the series) of Markland silt loam, 5 percent slope, in an idle field 300 yards northwest of the junction of National Turnpike and Ash Bottom Road:

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable to very friable; medium acid; abrupt, smooth boundary; 4 to 6 inches thick.

A2—4 to 8 inches, pale-brown (10YR 6/3) to brown (10YR 5/3) silt loam; weak to moderate, fine, angular blocky structure; friable; few clay films; few, small, black concretions; strongly acid; clear, smooth boundary; 3 to 5 inches thick.

B21—8 to 12 inches, yellowish-brown (10YR 5/6) silty clay loam; common, fine, distinct, pale-brown (10YR 6/3) mottles; strong, fine and medium, angular blocky structure; firm; slightly sticky and plastic when wet; medium acid; clear, wavy boundary; 3 to 6 inches thick.

B22—12 to 22 inches, brown (7.5YR 4/4) silty clay; common, fine, faint, pale-brown (10YR 6/3) and grayish-brown (2.5Y 5/2) mottles; strong, fine and medium, angular blocky structure or very coarse, prismatic structure; many clay films; firm; sticky and plastic when wet, very hard when dry; slightly acid; gradual, wavy boundary; 7 to 14 inches thick.

B3—22 to 29 inches, dark yellowish-brown (10YR 4/4) clay; many, fine, distinct, grayish-brown (2.5Y 5/2) and pale-brown (10YR 6/3) mottles; strong, fine and medium, angular blocky structure; many clay films; firm; sticky and very plastic when wet, very hard when dry; some, small, dark concretions; neutral; gradual boundary; 6 to 13 inches thick.

C—29 to 45 inches +, yellowish-brown (10YR 5/4 to 5/6) silty clay; many, fine, faint, grayish-brown (2.5YR 5/2), gray (5Y 4/1), and pale-brown (10YR 6/3) mottles; weak, medium, angular blocky structure or massive; firm; plastic when wet, hard when dry; some, small, lime concretions or nodules; neutral to mildly alkaline.

Range in characteristics: In places the Ap horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2), and in some profiles the B22 horizon has many grayish-brown (10YR 5/2) mottles. In places the B2 horizon contains thin (1 inch or less), stratified layers of silt loam or silty clay loam. In other places the B21 horizon is silty clay. The depth to the alkaline material ranges from 22 to 34 inches.

McGary series.—This series consists of somewhat poorly drained soils that developed in water-deposited, calcareous silt and clay.

These soils are closely associated with Markland and Zipp soils. They are intermediate in drainage between the moderately well drained and well drained Markland soils and the poorly drained Zipp soils. Furthermore, they are slightly finer textured, lighter colored, and more mottled than Markland soils, and they are slightly coarser textured, less gray, and less alkaline than Zipp soils.

In Jefferson County, McGary soils are on nearly level terraces and are scattered throughout the slack-water area between Buechel and Valley Station. They are of minor agricultural importance because of their limited acreage and their poor drainage. They are best used for growing soybeans, hay, and grasses.

Profile (representative of the series) of McGary silt loam, 1 percent slope, in a cultivated field on the Outer Belt Highway a half mile east of the old Third Street Road:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2 to 10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary; 5 to 9 inches thick.

Bg1—7 to 14 inches, dark grayish-brown (2.5Y 4/2 to 10YR 4/2) silty clay loam; many, fine, faint, pale-brown (10YR 6/3) and brown (7.5YR 4/4) mottles; moderate, medium or coarse, angular blocky structure; firm; slightly plastic when wet, hard when dry; slightly acid; abrupt, smooth boundary; 6 to 9 inches thick.

B2—14 to 23 inches, light olive-brown (2.5Y 5/4) silty clay or clay; many, fine, distinct, yellowish-brown (10YR 5/6) mottles and faint, grayish-brown (2.5Y 5/2) mottles; strong, medium, angular blocky structure; many clay films; firm and slightly compact; very sticky and very plastic when wet, very hard when dry; some, small, dark concretions; neutral; gradual, smooth boundary; 6 to 14 inches thick.

Bg3—23 to 34 inches, grayish-brown (2.5Y 5/2) clay; many, fine, distinct, light-gray (N 6/0) and yellowish-brown (10YR 5/6) mottles; strong, medium, angular blocky structure; very plastic when wet, very hard when dry; some small lime nodules; neutral or mildly alkaline; gradual boundary; 9 to 13 inches thick.

Cg—34 to 72 inches +, mottled yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) and grayish-brown (2.5Y 5/2 to 10YR 5/2) silty clay; weak, medium, angular blocky structure or massive; firm and compact; slightly sticky and plastic when wet; mildly alkaline.

Range in characteristics: The depth to the calcareous zone ranges from 24 to 36 inches. The Bg3 horizon is silty clay in places. The B horizons, in some profiles, contain thin stratified layers of silt loam or silty clay loam. The dominant color of the mottles in a few profiles is dark yellowish brown (10YR 4/4). The structure in the lower part of the profile is prismatic in places.

Memphis series.—This series consists of well-drained soils that developed in thick beds of loess. These soils are underlain by sandstone and shale or by limestone at a depth of 6 feet or more.

Memphis soils are associated with Crider and Loring soils. Memphis soils developed in a thicker mantle of loess than Crider soils, and they are not so red in the lower part of their subsoil. They are better drained than Loring soils, and they have no fragipan.

Memphis soils are moderately extensive in this county and are of agricultural importance. They occur mostly in the western part on moderately high ridges that border the Ohio Valley. Silt loam is the dominant type; silty clay loam occurs in severely eroded areas.

Composite profile (representative of the series) of Memphis silt loam:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure and weak, medium, subangular blocky structure; very friable; strongly acid; gradual, smooth boundary; 5 to 9 inches thick.

B1—6 to 14 inches, strong-brown (7.5Y 5/6) or yellowish-brown (10YR 5/4) silt loam; weak to moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary; 6 to 10 inches thick.

B2—14 to 32 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; many clay films; friable or firm; few, small, dark concretions; medium acid; gradual, smooth boundary; 12 to 24 inches thick.

C—32 to 55 inches +, brown (7.5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable when moist; patchy clay films; few, small, black concretions and concretionary stains on ped surfaces; medium acid; 20 to 36 inches thick.

Range in characteristics: In some places the lower horizons contain very small fragments of mica. The loess ranges from 3½ to 14 feet in thickness. The loess overlies residual materials and is deepest on the western slopes nearest the Ohio Valley. The B2 horizon ranges from light silty clay loam to silt loam, and the underlying horizons range to silty clay. The C horizon ranges from silt loam to silt.

Shelbyville series.—The Shelbyville series consists of well-drained soils that developed in residuum derived from thin-bedded, argillaceous limestone.

These soils are geographically associated with Beasley and Crider soils. They differ from both Beasley and Crider soils in that they have a distinct concretionary horizon. Furthermore, they are yellowish brown instead of reddish brown like Crider soils. Their texture is slightly coarser than that of Beasley soils, and the lower part of their B horizon is more acid and not so gray, but browner.

In Jefferson County, Shelbyville soils are confined to gently sloping areas in the extreme eastern part. Their acreage is inextensive. If properly managed, these soils can produce good yields of all the locally grown crops. Silt loam is the only type mapped.

Profile (representative of the series) of Shelbyville silt loam, 3 percent slope, in a pastured field on Clark Station Road, 200 yards west of Clark:

Ap—0 to 5 inches, dark-brown (10YR 3/3 or 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary; 3 to 8 inches thick.

A2—5 to 13 inches, brown (10YR 4/3 or 7.5YR 4/4) silt loam; weak or moderate, medium or coarse, subangular blocky structure; friable; few, small, black concretions; medium acid; clear, smooth boundary; 6 to 10 inches thick.

B1—13 to 22 inches, brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, angular and subangular blocky structure; friable or firm; slightly sticky when wet; thin, patchy, clay skins; occasional, small, black concretions; medium acid; gradual, smooth boundary; 7 to 15 inches thick.

B2—22 to 31 inches, yellowish-brown (10YR 5/4) silty clay loam; many, fine, faint, brown (7.5YR 4/4 or 10YR 4/3) mottles; moderate or strong, medium, angular blocky structure; firm and slightly compact; slightly sticky when wet; continuous, clay skins; numerous, small, black concretions; medium acid; gradual, wavy boundary; 6 to 10 inches thick.

B3cn—31 to 42 inches, mottled yellowish-brown (10YR 5/6), brown (10YR 5/3), and dark reddish-brown (5YR 3/4) silty clay; moderate, medium, angular blocky structure; firm; slightly sticky when wet; patchy clay skins; abundant black concretions and concretionary material; medium acid; clear, slightly wavy boundary; 6 to 16 inches thick.

C—42 to 48 inches, mottled yellowish-brown (10YR 5/4 to 5/6), yellowish-red (5YR 4/6), and yellow (2.5Y 7/6) clay; massive; firm; sticky when wet, hard when dry; numerous, small, black concretions; some weathered limestone fragments in lower part; slightly acid to mildly alkaline.

Range in characteristics: The lower B horizons are strongly acid in a few places. The C horizon has pale-yellow (5Y 7/3) or gray (N 5/0) mottles in places. The depth to the concretionary horizon (the B3cn) ranges from 28 to 34 inches. The depth to bedrock ranges from 4 to more than 7 feet.

Woolper series.—The Woolper series consists of well drained or moderately well drained soils that developed in old local alluvium. This alluvium washed from the uplands occupied by Beasley, Fairmount, and Otway soils.

Woolper soils are associated with Ashton soils. They are finer textured and grayer than Ashton soils, and they have a higher pH and a more strongly developed B horizon. They are not so well developed as Beasley soils, and they are finer textured and have a more grayish-brown B horizon.

In Jefferson County, Woolper soils are widely scattered on foot slopes in the marl area. Their acreage is small, and thus their agricultural importance is minor. Silty clay loam is the dominant type; silty clay occurs in severely eroded areas.

Profile (representative of the series) of Woolper silty clay loam, 3 and 4 percent slopes, in a grassed area on Broad Run Road, a half mile north of Floyds Fork Bridge:

Ap—0 to 5 inches, dark-brown (10YR 4/3 or 3/3) to dark grayish-brown (10YR 4/2) silty clay loam; weak, fine, granular structure; friable; neutral; smooth, clear boundary; 4 to 7 inches thick.

B1—5 to 12 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, angular blocky structure; friable or firm; slightly acid or medium acid; smooth, gradual boundary; 6 to 12 inches thick.

B2—12 to 23 inches, dark yellowish-brown (10YR 4/4) or yellowish-brown (10YR 5/4) silty clay; moderate or strong, fine, angular blocky structure; firm; plastic when wet; continuous, thick, clay skins; numerous, small, black concretions; slightly acid or neutral; smooth, gradual boundary; 7 to 14 inches thick.

B3—23 to 35 inches, dark yellowish-brown (10YR 4/4) silty clay; common, medium, faint, yellowish-brown (10YR 3/4) mottles; strong, fine and medium, angular blocky structure; firm; sticky and plastic when wet; patchy, thick clay skins; some black concretionary material; slightly acid or neutral; gradual, slightly wavy boundary; 9 to 14 inches thick.

Cb—35 to 51 inches +, mottled gray (N 6/0 or N 5/0), dark-brown (10YR 4/3 or 3/3), yellowish-brown (10YR 5/6), and grayish-brown (2.5Y 5/2) silty clay or clay; massive; firm; numerous, small, black concretions and concretionary material; slightly acid to mildly alkaline.

Range in characteristics: The Ap horizon ranges from dark brown (10YR 4/3 or 3/3) to very dark grayish brown (10YR 3/2). The horizons vary considerably in thickness. The subsoil is neutral to medium acid, depending on the reaction of the soils in the surrounding uplands. In places, the lower part of the subsoil contains fragments of limestone. The concretions in the profile vary in number from place to place.

Loring series.—This series consists of well drained and moderately well drained soils that have a fragipan. These soils developed in deep loess underlain by residuum derived from sandstone and shale or from limestone.

Loring soils are closely associated with Memphis and Crider soils. They differ from Memphis soils in being less well drained and in having a mottled and more yellow lower B horizon and a fragipan. They differ from Crider soils in that they developed in much deeper loess that was not influenced by underlying residuum.

In Jefferson County, Loring soils are gently sloping or sloping and occur in the western part on moderately high ridges that border the Ohio Valley. They are moderately extensive but are of local agricultural importance only. The silt loam is the dominant type.

Composite profile (representative of the series) of Loring silt loam:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary; 5 to 8 inches thick.

B21—6 to 23 inches, brown (7.5YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; medium acid or strongly acid; clear, wavy boundary; 12 to 20 inches thick.

B22—23 to 34 inches, brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silt loam; few, fine, faint, yellowish-brown (10YR 5/4) mottles; moderate, medium or coarse, subangular blocky structure; friable; few clay films; few, small, dark concretions; medium acid or strongly acid; clear, wavy boundary; 6 to 9 inches thick.

B3m—34 to 45 inches, dark yellowish-brown (10YR 4/4) or brown (7.5YR 4/4) silt loam; many medium, distinct, light brownish-gray mottles; medium, coarse, subangular blocky structure; firm, compact; slightly plastic when wet, very hard when dry; clay skins are continuous on macrostructure faces; black concretionary stains on ped surfaces; medium acid or strongly acid; gradual, smooth boundary; 8 to 15 inches thick.

C—45 to 90 inches, mottled dark-brown (7.5YR 4/4), light brownish-gray (2.5Y 6/2), and yellowish-brown (10YR 5/6) silt; weak, medium or coarse, angular blocky structure; friable; very strongly acid; 3 to 5 inches thick.

Du—90 inches +, olive-gray Rosewood shale.

Range in characteristics: In some profiles the B21 horizon has reddish-brown (5YR 4/4) clay films. In places the B22 horizon is yellowish-brown (10YR 5/4 to 5/6). The B22 and B3m horizons may be silty clay loam. The C horizon ranges from silt to silty clay. The depth to the fragipan ranges from 28 to 38 inches. The loess is 42 to 90 inches thick over acid shale. In places, the lower horizons contain mica. The depth to shale ranges from 6 to 10 feet.

Sciotoville series.—This series consists of moderately well drained soils on terraces. These soils developed in mixed general alluvium that washed from the upper part of the Ohio River drainage area. An abundance of very fine mica is common throughout their profile.

Sciotoville soils are associated with and are intermediate in drainage between the well-drained Wheeling soils and the somewhat poorly drained Weinbach soils. They are slightly finer textured, less brown, more gray, and more mottled than Wheeling soils, and they have a fragipan. They are slightly coarser textured and less mottled than Weinbach soils, and their fragipan is at a greater depth.

In Jefferson County, Sciotoville soils are widely scattered on nearly level or sloping terraces in the Ohio Valley. They are agriculturally important soils, for they produce good yields of most field and vegetable crops. Silt loam is the dominant type; silty clay loam occurs in severely eroded areas.

Profile (representative of the series) of Sciotoville silt loam, 2 percent slope, in a cultivated field, 1 mile west of St. Denis on Kramer's Lane at railroad spur:

Ap—0 to 7 inches, dark-brown (10YR 4/3 or 3/3) silt loam; weak, medium, granular structure; friable; abundant very fine particles of mica; slightly acid; clear, smooth boundary; 6 to 8 inches thick.

B21—7 to 17 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium or coarse, subangular blocky structure; friable; few, small, black concretions; abundant fine mica; strongly acid; gradual, smooth boundary; 8 to 13 inches thick.

B22—17 to 25 inches, yellowish-brown (10YR 5/6) silty clay loam; many, fine, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; friable; slightly sticky when wet; abundant fine mica; very strongly acid; gradual, wavy boundary; 6 to 9 inches thick.

B3m—25 to 38 inches, yellowish-brown (10YR 5/6) to dark yellowish-brown (10YR 4/4) silty clay loam; many, fine, distinct, grayish-brown (2.5YR 5/2) mottles and few dark grayish-brown (10YR 4/2) mottles; moderate, coarse, subangular blocky structure; firm, compact, and brittle; some, small, dark-brown and black concretions; abundant fine mica; strongly acid; gradual, wavy boundary; 12 to 16 inches thick.

C—38 to 58 inches +, mottled brown (10YR 4/3), grayish-brown (2.5Y 5/2), and dark yellowish-brown (10YR 4/4) silty clay loam; weak, coarse, angular blocky structure; firm; plastic when wet; some black concretionary material; much fine mica; strongly acid.

Range in characteristics: The Ap horizon is dark grayish brown (10YR 4/2) in places. The B22 horizon ranges from silty clay loam to heavy silty clay loam, especially in the Pond Creek area in the extreme southwestern corner of the county. Here the reaction is slightly acid or nearly neutral. The C horizon consists of stratified silt loam, silty clay loam, and fine sandy loam in places. The depth to the fragipan ranges from 22 to 30 inches. The small concretions in the lower horizons vary in number. In places there are none; in other places there are many.

Ashton series.—The soils of this series are well drained. They developed in alluvium that washed mostly from soils of limestone origin. Ashton soils are associated with Crider, Corydon, Wheeling, Elk, and Huntington soils. They are intermediate in characteristics between Wheeling (or Elk) soils and Huntington soils. They differ from Crider soils in having a less red, coarser textured, and more weakly developed subsoil.

Ashton soils occur on terraces mainly in the Ohio Valley and along Floyds Fork, and they are widely scattered on foot slopes in the limestone area. Their acreage is moderate. These are productive soils, and they are suited to a wide range of crops.

Profile (representative of the series) of Ashton silt loam, 6 percent slope, in a cultivated field on Eastwood-Fisherville Road about 300 yards south of Long Run Branch:

Ap—0 to 8 inches, dark-brown (10YR 3/3 or 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear boundary; 7 to 9 inches thick.

B1—8 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; few, very fine, dark-brown to black concretions; slightly acid; gradual boundary; 5 to 7 inches thick.

B2—14 to 33 inches, dark yellowish-brown (10YR 4/4) to brown (7.5YR 4/4) heavy silt loam; weak to moderate, medium, subangular blocky structure; friable or slightly firm; few, faint clay films; many to abundant, fine, black concretions; medium acid; gradual boundary; 14 to 24 inches thick.

C—33 to 42 inches +, dark yellowish-brown (10YR 4/4) silt loam; common, fine, faint, brown (10YR 5/3) variegations; massive; firm; abundant, very fine, black concretions; medium acid.

Range in characteristics: The thickness of the solum ranges from 28 to 40 inches. The small dark concretions in the B2 horizon vary in number. They are few in some places and very abundant in other places. The texture of the B2 and C horizons may be silty clay loam. In places the C horizon is dark brown (7.5YR 4/4) and has few or no variegations. The variegations in the C horizon are reddish brown (5YR 4/4) in places. Mapped with Ashton silt loam are some young soils on low terraces. These soils are characteristically similar to the Ashton soil.

Sequatchie series.—The soils of this series are well drained. They developed in mixed alluvium that washed from the upper part of the Ohio River drainage area.

These soils are closely associated with Wheeling and Sciotoville soils. They are more sandy than Wheeling soils and have weaker development. They are better drained and redder than Sciotoville soils, and they have few or no mottles and no fragipan.

Sequatchie soils are widely scattered throughout the Ohio Valley. Their acreage is moderate. These are good soils for agriculture; they are especially well suited to early vegetable crops and to melons.

A profile that is representative of the series is described in the subsection "Laboratory Data."

Westmoreland series.—This series consists of steep, shallow soils that formed in residuum derived from shaly Warsaw limestone. These soils are geographically associated with Muskingum soils. They differ from Muskingum soils in that they have weaker profile development, are slightly acid, and developed from limestone residuum.

In Jefferson County, Westmoreland soils occupy forest areas in the Knob Hills. They make up about 45 percent of the Westmoreland-Litz-Muskingum complex. Silt loam is the dominant type.

Profile (representative of the series) of Westmoreland silt loam, 25 percent slope, in a wooded area on Jefferson Hill Road, a half mile north of Hilltop Road:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; several small fragments of weathered limestone and siltstone; slightly acid; abrupt, smooth boundary; 1 to 3 inches thick.

A2—2 to 6 inches, pale-brown (10YR 6/3) silt loam; weak to moderate, fine granular structure; friable; many fragments of weathered limestone and siltstone; slightly acid; clear, smooth boundary; 3 to 6 inches thick.

BC—6 to 13 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, medium, subangular blocky structure; friable; many weathered fragments of limestone and siltstone; slightly acid; clear, smooth boundary; 6 to 8 inches thick.

C—13 to 18 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, medium, angular blocky structure or massive; firm; abundant fragments of weathered limestone and siltstone; slightly acid.

Dr—18 inches +, Warsaw limestone interbedded with siltstone and shale.

Range in characteristics: In some places, the A horizon is shaly silt loam, and in other places the upper part of the solum is free of rock fragments. The Ap horizon is brown (10YR 4/3) in some profiles. The C horizon may be silt loam. The depth to rock ranges from 14 to 24 inches.

Wheeling series.[8]—The soils of this series are well drained. They developed in mixed general alluvium that washed from the upper part of the Ohio River drainage area. An abundance of fine mica, visible in sunlight, is common throughout their profile.

These soils are closely associated with and have characteristics intermediate between those of the excessively drained Lakin soils and the moderately well drained Sciotoville soils. Wheeling soils differ from Lakin soils in that they are finer textured, more brown, and in many places reddish, and moderately permeable. They are better drained and redder than Sciotoville soils, and they have few or no mottles and no fragipan.

Wheeling soils are widely distributed along the Ohio River. Their acreage is fairly extensive. Good to excellant yields of most field crops, as well as of many vegetable crops, can be obtained on these soils.

Composite profile (representative of the series) of Wheeling silt loam:

Ap—0 to 5 inches, dark-brown (10YR 4/3 or 3/3) silt loam; moderate, fine, granular structure; very friable; slightly acid or medium acid; clear, smooth boundary; 4 to 7 inches thick.

B1—5 to 11 inches, dark yellowish-brown (10YR 4/4 or 3/4) silt loam; weak, medium, subangular blocky structure; friable; medium acid or strongly acid; clear, smooth boundary; 3 to 6 inches thick.

B21—11 to 23 inches, brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable or firm; few, very small, black concretions; medium acid or strongly acid; gradual, smooth boundary; 7 to 21 inches thick.

B22—23 to 36 inches, brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) silt loam or silty clay loam; moderate, medium or coarse, subangular blocky structure; friable or firm; continuous clay films; some, small, black concretions and black concretionary material; very strongly acid; gradual, smooth boundary; 9 to 14 inches thick.

B3—36 to 52 inches +, dark yellowish-brown (10YR 4/4) to brown (7.5YR 4/4) silt loam; many, fine, distinct, light olive-brown (2.5Y 5/4) and reddish-brown (5YR 4/4 or 3/4) mottles; moderate, coarse or very coarse, subangular blocky structure; friable; some, small, black concretions; very strongly acid; 1 to 3 feet thick.

Range in characteristics: The B2 horizon ranges from yellowish brown (10YR 5/4 to 5/6) to yellowish red (5YR 5/6). The B3 horizon may contain few or no mottles. In some scattered sites, the lower part of the B3 horizon is loam. The C horizon (not described in representative profile) is at a depth of 4 to 5 feet. In some places, stratified sands occur at a depth of 22 to 48 inches. In these places, the proportion of silt and clay is less than that in the rest of the profile. In the extreme southwest corner of the county, the B horizons range from silt loam to heavy silty clay loam because of the fine sediments carried and deposited by Pond Creek. In the Pond Creek area, the reaction is slightly acid or nearly neutral.

Corydon series.—The Corydon series consists of well-drained soils that developed in residuum derived from

[8] Recent studies indicate that soils that have been classified in the Elk and Wheeling series have some characteristics that overlap. Consequently, modifications in the concepts and definitions of these two series will be required. Such modifications, when made, may affect the classification of Elk and Wheeling soils in Jefferson County.

Silurian limestone. Some of these soils are very rocky and are adjacent to areas of Rock land. Limestone outcrops are numerous.

Corydon soils are associated with Crider and Fairmount soils. They are shallower, redder, and finer textured than Crider soils; and they show a predominant limestone influence. Corydon soils differ from Fairmount soils in that they are slightly coarser textured and redder and in that they developed from massive, pure limestone instead of flaggy, interbedded limestone and calcareous shale.

In Jefferson County, Corydon soils are geographically associated with Crider soils. They are widely distributed in the gently sloping to moderately steep areas that are dissected by streams in the northern part of the county. Some areas are important agriculturally as pasture land; other areas are best suited to trees.

Profile (representative of the series) of Corydon silt loam, 20 percent slope, in a pasture 1 mile south of Prospect on U.S. Highway No. 42 and half a mile down from the Cooke Farm driveway:

Ap—0 to 6 inches, dark-brown (7.5YR 3/2) silt loam; weak, medium, granular structure; friable; slightly acid; abrupt, smooth boundary; 5 to 9 inches thick.

B21—6 to 12 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/3) silty clay loam; moderate, medium, angular blocky structure; friable or firm; small fragments of limestone in places; medium acid; clear, smooth boundary; 4 to 7 inches thick.

B22—12 to 19 inches, reddish-brown (5YR 4/4) silty clay; moderate or strong, fine and medium, angular blocky structure; firm; plastic when wet, hard when dry; continuous clay films; small fragments of limestone in places; few, small, black concretions; slightly acid; smooth, gradual boundary; 5 to 8 inches thick.

B3—19 to 26 inches, reddish-brown (5YR 4/4) to dark reddish-brown (2.5YR 3/4) clay; strong, fine and medium, angular blocky structure; very firm; very sticky and very plastic when wet, very hard when dry; few, small, black concretions and some, small, limestone fragments; continuous clay films; neutral; clear, smooth boundary; 6 to 10 inches thick.

C—26 to 28 inches, variegated reddish-brown (5YR 4/4), strong-brown (7.5YR 5/6), and brownish-gray (2.5YR 5/2) clay; massive; firm, abundant limestone fragments in all stages of weathering; slightly effervescent with weak hydrochloric acid; 2 to 5 inches thick.

Dr—28 inches +, Louisville limestone.

Range in characteristics: The Ap horizon ranges from dark brown (7.5YR 3/2) to dark brown (10YR 3/3 or 4/3). In some places the B21 horizon is less red and the B3 horizon is dark red (2.5YR 3/6). The depth to bedrock ranges from 18 to 38 inches. Limestone outcrops in many places. In some places there are no limestone fragments in any of the horizons.

SOLS BRUNS ACIDES

This great soil group consists of zonal soils that are acid in reaction and strongly leached. These soils have either a dark-colored surface layer or a color B horizon, or both.

Sols Bruns Acides in Jefferson County are the soils of the Muskingum and Rockcastle series, though these soils intergrade toward Lithosols. Muskingum soils are somewhat excessively drained. Generally silt loam extends down to the parent material in their profile, but the lower part of their profile is loam in some places. Rockcastle soils also are somewhat excessively drained. They have weakly developed soil characteristics.

Muskingum series.—This series consists of shallow soils that formed principally in residuum derived mainly from shale, siltstone, and some sandstone. In many places the A horizon and the upper part of the B horizon formed in a mantle of loess that is as much as 20 inches thick. The solum is thin and only slightly developed.

Muskingum soils are associated with Rockcastle, Holston, and Litz soils. They differ from Rockcastle soils in having a much coarser textured surface layer and subsoil. They differ from Holston soils in that they are shallow and they developed in residuum rather than alluvium. They differ from Litz soils in having a more weakly developed B horizon that is cambic rather than argillic.

In Jefferson County, Muskingum soils are on moderately steep or steep slopes of the Knob Hills in the southwestern part of the county. They are of moderate extent and, for the most part, have been left wooded. They are best suited to trees. Silt loam is the only type recognized.

Profile (representative of the series) of Muskingum silt loam, 35 percent slope, in an area 300 yards east of the old wellhouse on Scott Gap Road, about a half mile south of Blevins Gap Road:

A00—2 inches to 0, loose, hardwood leaves.

A1—0 to 3 inches, dark-gray (10YR 4/1) silt loam; moderate, fine, granular structure; very friable; few small (up to 10 millimeters) fragments of shale; strongly acid; abrupt, smooth boundary; 2 to 5 inches thick.

A2—3 to 6 inches, grayish-brown (10YR 5/2) silt loam; moderate, fine, granular structure; very friable; few small fragments of shale; strongly acid; clear, smooth boundary; 3 to 5 inches thick.

B—6 to 18 inches, yellowish-brown (10YR 5/4) silt loam; few variegations of strong brown (7.5YR 5/6); weak, fine or medium, subangular blocky structure; friable; some (up to 10 percent by volume) shale, siltstone, and sandstone fragments (less than ¼ inch); very strongly acid; gradual, smooth boundary; 8 to 17 inches thick.

C—18 to 25 inches, mixed yellowish-brown silt loam and olive-gray, weathered shale and siltstone; very strongly acid; 4 to 9 inches thick.

Dr—25 inches +, hard shale and siltstone.

Range in characteristics: The rock fragments range from 0 to 10 percent by volume. The depth to bedrock ranges from about 20 to 36 inches.

Rockcastle series.—This series consists of steep, shallow soils that developed in residuum derived from heavy, acidic New Providence shale. In places the upper horizons developed in loess that is as much as 16 inches thick.

Rockcastle soils are closely associated with Muskingum and Westmoreland soils. They are lighter in color and heavier in texture than Westmoreland soils, and they are more acid. They are more developed than Muskingum soils, and they are finer in texture, stronger in structure, and grayer in color. Also, they have little or no sandstone influence.

In this county, Rockcastle soils occur mostly in the Knob Hills. Their acreage is moderate. These soils are used mainly for timber production. A small area has been cleared and is used for pasture. Silt loam is the only type mapped.

Profile (representative of the series) of Rockcastle silt loam, 18 percent slope, in a wooded area on Blevins Gap Road, a half mile south of Penile, Ky.:

A1—0 to 1½ inches, dark grayish-brown (10YR 4/2) silt loam; weak to moderate, medium, granular structure; very friable; few shale fragments; strongly acid; abrupt, smooth boundary; ½ inch to 2 inches thick.

AC—1½ to 8 inches, grayish-brown (2.5Y 5/2) silt loam; few variegations of pale brown (10YR 6/3); moderate, medium, angular blocky structure; firm; slightly sticky when wet; some shale fragments; strongly acid or very strongly acid; clear, smooth boundary; 5 to 14 inches thick.

C11—8 to 19 inches, variegated olive-gray (5Y 5/2), light olive-brown (2.5Y 5/4), and light grayish-brown (2.5Y 6/2) silty clay; moderate, medium, angular blocky structure; firm; very plastic when wet, very hard when dry; numerous shale fragments; strongly acid or very strongly acid; clear, smooth boundary; 5 to 14 inches thick.

C12—19 to 26 inches, gray (5Y 5/1) silty clay or clay; many, medium, distinct, grayish-brown (2.5Y 4/2) mottles; massive; firm; very plastic when wet, very hard when dry; abundant fragments of soft shale; very strongly acid; 7 to 12 inches thick.

Dr—26 inches +, New Providence shale.

Range in characteristics: The A horizon ranges from silt loam to silty clay loam. The influence of the loess varies. Where the mantle of loess is thickest, the upper horizons are browner and lighter textured. The depth to shale bedrock ranges from 8 to 36 inches.

Intrazonal order

The intrazonal order consists of soils that have more or less well-developed horizons, which reflect the dominant influence of topography or parent material over the normal effects of climate and living organisms, especially vegetation (*17*). Flat or depressed topography and parent materials high in salts or carbonates, for example, can have a greater effect on soil formation than climate and vegetation.

The intrazonal soils in Jefferson County are classified in four of the great soil groups—Humic Gley, Low-Humic Gley, Planosol, and Rendzina.

HUMIC GLEY SOILS

This great soil group consists of intrazonal soils that developed in marshes and swamps under very poor drainage. Because of an accumulation of considerable organic matter, these soils are characterized by a thick, dark-colored mineral (nonpeaty) surface horizon. They have a gleyed subsoil, as is indicated by their gray color and their contrasting mottles.

Soils of the Dunning series are the only Humic Gley soils so classified in Jefferson County. Dunning soils developed in alluvium that once was slightly depressed and ponded. They have a thick, very dark gray to black A1 horizon, and their substratum has little development or none.

Dunning series.—This series consists of very poorly drained soils of the first bottoms. These soils formed in alluvial material that washed principally from soils of limestone origin. They have a thick A1 horizon that is very dark gray or nearly black when moist.

Dunning soils are closely associated with Huntington, Lindside, Newark, and Melvin soils. They are more poorly drained and more alkaline than Melvin soils, and they are finer textured. Also, they have a much darker colored and thicker A horizon than that of Melvin soils.

In Jefferson County, Dunning soils are widely scattered along the Ohio River and along the small streams in the limestone area. They occur as small level areas, for the most part, and are in some slight depressions. Their acreage is inextensive, and they are of local agricultural importance only. If drained, they can produce good to excellent yields of the locally grown crops.

Profile (representative of the series) of Dunning silty clay loam, 1 percent slope, in a cultivated field on Goldsmith Lane near the new school by Beargrass Creek:

A11—0 to 9 inches, very dark gray (10YR 3/1) silty clay loam; weak, fine and medium, granular structure; friable or firm; slightly sticky and plastic when wet; neutral; gradual, smooth boundary; 8 to 12 inches thick.

A12—9 to 15 inches, black (10YR 2/1) silty clay loam; common, fine, distinct, light olive-brown (2.5Y 5/4) mottles; weak, fine and medium, granular structure; firm; neutral; clear, smooth boundary; 4 to 10 inches thick.

Cg1—15 to 24 inches, very dark gray (10YR 3/1) silty clay loam; many, fine, distinct, olive-brown (2.5Y 4/4) mottles; massive; firm; sticky and plastic when wet; mildly alkaline; gradual boundary; 8 to 14 inches thick.

Cg2—24 to 32 inches +, dark-gray (5Y 4/1) silty clay loam; many, fine, distinct, olive-brown (2.5Y 4/4) and light olive-brown (2.5Y 5/4) mottles; massive; firm; sticky and plastic when wet; alkaline; 10 to 30 inches thick.

Range in characteristics: The A horizon ranges from 12 to 22 inches in thickness and from very dark grayish brown (10YR 3/2) to black (10YR 2/1) in color. The Cg horizon, in places, consists of silty clay. The Cg1 horizon may have dark-gray (5Y 4/1) or light olive-brown (2.5Y 5/4) mottles.

LOW-HUMIC GLEY SOILS

This great soil group consists of intrazonal soils that developed in swamps under poorly drained conditions (*21*). These soils are characterized by a very thin surface horizon and a gray subsoil that has contrasting mottles. They lack the thick, dark-colored surface horizon that is characteristic of Humic Gley soils.

Ginat, Melvin, and Zipp soils are representative of the Low-Humic Gley group in Jefferson County. Melvin and Zipp soils show little or no profile development. They have a strongly mottled substratum. Ginat soils show moderate to strong profile development.

Ginat series.—This series consists of poorly drained soils that developed in alluvium of limestone, sandstone, and shale origin. The alluvium washed from the upper part of the Ohio River drainage basin.

The soils of this series are closely associated with those of the Weinbach series. Ginat soils are more poorly drained than Weinbach soils; they have a lighter colored and grayer surface horizon, and the upper part of their B horizon is mottled and gleyed.

Ginat soils are extensive on the wide, level terraces along the Ohio River. Because they are poorly drained, these soils are agriculturally important only as producers of hay and pasture.

Profile (representative of the series) of Ginat silt loam, 1 percent slope, in an idle field off Johnsontown Road and 300 yards east of Lower River Road:

A1—0 to 2 inches, dark-gray (10YR 4/1) silt loam; friable; much organic matter and many organic stains; slightly acid; abrupt, smooth boundary; 1 to 3 inches thick.

A2—2 to 7 inches, mottled dark grayish-brown (2.5Y 4/2) and gray (10YR 4/1) silt loam; weak, fine, granular structure; friable; numerous, small, dark-brown concretions; slightly acid; clear, smooth boundary; 4 to 9 inches thick.

B2g—7 to 17 inches, light-gray to gray (5Y 6/1) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm but slightly plastic when wet and slightly hard when dry; few, small, dark-brown concretions; medium acid; gradual, wavy boundary; 8 to 14 inches thick.

B3m—17 to 35 inches, finely mottled light-gray to gray (5Y 6/1), reddish-brown (5Y 4/4), and grayish-brown (2.5Y 5/2) silty clay loam; moderate, medium or coarse, subangular or angular blocky structure; firm, compact, and brittle; some dark concretions; medium acid; gradual boundary; 8 to 20 inches thick.

C—35 to 50 inches +, mottled yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) to gray (N 5/1) silty clay; massive; firm; compact; some, small, dark-brown concretions; strongly acid.

Range in characteristics: The B2g horizon is silt loam in places, and the B3m horizon is light silty clay in some profiles. The mottles vary somewhat in color and abundance.

Melvin series.—This series consists of poorly drained soils on bottoms. These soils formed in alluvium that washed mainly from soils of limestone origin but also from soils of sandstone and shale origin.

Melvin soils are closely associated with Newark and Dunning soils. They are intermediate in drainage between the somewhat poorly drained Newark soils and the very poorly drained Dunning soils. Furthermore, they are more gray, more mottled, and more gleyed in the upper part of their C horizon than Newark soils. They are lighter colored than Dunning soils and are more gleyed. Also, they lack a deep, dark-colored A horizon like that of Dunning soils.

In Jefferson County, Melvin soils are widely scattered along most of the streams. They are of moderate agricultural importance. Their best use is for hay and pasture, but they must be drained. Silt loam is the dominant type; silty clay loam occurs in a few places.

Profile (representative of the series) of Melvin silt loam, 0 to 1 percent slopes, in pasture on Blankenbaker Road, a half mile north of Rehl Road:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary; 5 to 14 inches thick.

C1g—8 to 20 inches, mottled gray (N 5/0) and grayish-brown (2.5Y 5/2) silt loam; weak, fine and medium, granular structure; friable or firm; slightly sticky and plastic when wet; numerous, small, dark-brown and black concretions; slightly acid; gradual boundary; 6 to 12 inches thick.

C2g—20 to 40 inches +, grayish-brown (2.5Y 5/2) light silty clay loam; many, fine, faint, gray (N 5/0) mottles and few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; slightly firm; slightly plastic when wet; numerous, small, dark-brown and black concretions; neutral.

Range in characteristics: The water table during much of the year is at a depth between 12 and 24 inches. These soils along the Ohio River generally contain fine mica throughout their profile. There may be very few concretions or none at all in some profiles. The Ap horizon may be dark gray (5Y 4/1), and the Cg horizon may be less mottled with gray (N 5/0). In places the lower horizons range from silt loam to nearly silty clay and contain gravelly or sandy material. In places the surface is covered by a 7- to 12-inch overwash of brown (10YR 4/3) or dark grayish-brown silt loam.

Zipp series.—This series consists of poorly drained soils that developed in water-deposited, calcareous silt and clay. These soils are closely associated with McGary and Markland soils. They are grayer, lighter in color, more gleyed, and more poorly drained than McGary soils, and they are more alkaline in the upper part of their B horizon.

In Jefferson County, Zipp soils are on broad flats in the old slack-water area between Beuchel and Valley Station. Because they are nearly level and very slowly permeable, they generally need artificial drainage if they are to be used for crops. But even if they are drained, they produce only moderate yields. Corn, soybeans, and hay are suitable crops. Silty clay is the only type mapped.

Profile (representative of the series) of Zipp silty clay, 0 to 1 percent slopes, in a cultivated field on the Outer Belt Highway, a mile east of Ash Bottom Road:

Ap—0 to 7 inches, dark-gray (10YR 4/1 to N 4/0) to very dark gray (10YR 3/1 to 5Y 3/1) silty clay; moderate, fine or medium, angular blocky stucture; firm; sticky and plastic when wet, hard when dry; few, small, dark-brown concretions; slightly acid or neutral; clear, smooth boundary; 5 to 9 inches thick.

Bg1—7 to 11 inches, dark-gray (N 4/0 to 5Y 4/1) clay; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; strong, medium, or coarse, angular blocky structure; firm; sticky and plastic when wet, very hard when dry; thick, continuous clay skins; many, small, dark-brown and black concretions; some organic stains on ped surfaces; moderately alkaline; gradual, smooth boundary; 4 to 5 inches thick.

Bg2—11 to 21 inches, gray (5Y 5/1 or N 5/0) clay; many, fine or medium, brown (10YR 5/3 or 4/3), yellowish-brown (10YR 5/8), and olive-gray (5Y 5/2) mottles; strong, medium or coarse, angular blocky structure; very firm; very plastic when wet, extremely hard when dry; thick, continuous clay skins; some, small, black concretions; mildly alkaline to strongly alkaline; 6 to 14 inches thick.

Bg3—21 to 32 inches, mottled gray (N 5/0), yellowish-brown (10YR 5/8), grayish-brown (2.5Y 5/2), and olive (5Y 5/3) clay; mottles are fine or medium; strong, medium or coarse, angular blocky structure; very firm; very plastic when wet, very hard when dry; thick, continuous clay skins; numerous, fine, black concretions; slightly acid to moderately alkaline; gradual boundary; 8 to 16 inches thick.

C—32 to 48 inches +, mottled gray (N 5/0), brown (10YR 5/3), yellowish-brown (10YR 5/6 to 5/8), and olive-brown (2.5Y 4/4) clay; mottles are fine or medium; weak, medium, angular blocky structure or massive; very firm; very sticky and very plastic when wet, very hard when dry; thick, very patchy clay skins; few, small, black concretions; mildly alkaline to strongly alkaline; 1 to 3 feet thick.

Range in characteristics: The horizons vary in thickness. The mottles vary in number and in value and chroma. The reaction is slightly acid or medium acid to a depth of about 24 inches in some places, but generally it is alkaline below a depth of about 18 inches.

PLANOSOLS

This great soil group consists of intrazonal soils that developed under poor or somewhat poor drainage in flat or depressed areas (*21*). These soils have a thin surface horizon over a pale, mottled subsoil that contains a large amount of clay or a subsoil that is underlain by a very firm, compact, brittle, silty fragipan.

Representative of Planosols that have a fragipan are the soils of the Guthrie, Lawrence, Purdy, Robertsville, Taft, Tyler, and Weinbach series. These soils are nearly level, and they are poorly drained. They show moderate to strong profile development. Their fragipan is below a depth of about 12 to 18 inches.

Guthrie series.—This series consists of poorly drained soils that developed in shallow loess over limestone residuum.

Guthrie soils are associated with the somewhat poorly drained Lawrence soils, from which they differ in being more poorly drained and in having a more gleyed, more mottled subsoil and a slightly shallower fragipan.

In Jefferson County, Guthrie soils occur mostly in the level central area of the broad ridges that are in the eastern part of the county. Their acreage is small. Much of the acreage is wooded, or is used as unimproved pasture, or is idle. These soils are best used for hay and pasture crops, for they produce only low yields of most row crops, even if drained. Silt loam is the only type mapped in this county.

Profile (representative of the series) of Guthrie silt loam, 0 to 1 percent slopes, in a forest about 300 yards east of Bluelick Road near the Bullitt County line:

A0—½ inch to 0, dry leaves and other organic matter in various stages of decomposition; smooth, abrupt boundary; ¼ to 1 inch thick.

A1—0 to 2 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; very friable; abundant organic matter; slightly acid; abrupt, smooth boundary; 1 to 3 inches thick.

A2—2 to 8 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, faint, light brownish-gray (2.5Y 6/2) and brown (10YR 5/3) mottles; weak, fine, granular structure; friable; few brown and black concretions; strongly acid; gradual boundary; 4 to 7 inches thick.

B2g—8 to 18 inches, light-gray (5Y 6/1 to 2.5Y 7/2) silt loam; many, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak to moderate, medium, subangular blocky structure; friable; some, medium, hard, dark-brown concretions; strongly acid or very strongly acid; diffuse boundary; 8 to 14 inches thick.

B3m—18 to 36 inches, mottled gray (N 6/0), yellowish-brown (10YR 5/4), and light brownish-gray (2.5Y 6/2) silty clay loam; moderate, fine or medium, subangular blocky structure; firm; compact and brittle; some, medium, hard, dark-brown concretions; very strongly acid; gradual boundary; 12 to 24 inches thick.

C—36 to 46 inches, mottled gray (N 6/0 to 5Y 5/1) and yellowish-brown (10YR 5/6) silty clay; moderate, medium, angular blocky structure; firm; compact; some dark-brown concretions; medium acid; 8 to 20 inches thick.

Range in characteristics: The A1 horizon, in some profiles, is dark gray (5Y 4/1). If plowed, the Ap horizon could be light brownish-gray (10YR 6/2) with mottles. The B horizon ranges from silt loam to silty clay loam. The mottles in this horizon vary considerably in color. The fragipan is at a depth of 12 to 22 inches and is weakly developed in places. Depth to bedrock ranges from 5 to 9 feet.

Lawrence series.—This series consists of somewhat poorly drained soils that have a fragipan. These soils developed on uplands in shallow loess over limestone residuum.

Lawrence soils are associated with the moderately well drained Dickson soils and the poorly drained Guthrie soils. They have a lighter colored surface layer and subsoil and a more shallow fragipan than Dickson soils, and they are less mottled and less gleyed than Guthrie soils.

In Jefferson County, Lawrence soils occur mostly in the central part of broad, level ridges that are in the eastern part of the county. Many areas are still wooded. These soils are best suited to pasture or hay crops. They produce only low or medium yields of corn, tobacco, and small grain. Lawrence silt loam is the only type mapped.

Profile (representative of the series) of Lawrence silt loam, 1 percent slope, in a pasture 100 yards west of the boundary of Fern Creek High School:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; friable; medium acid or strongly acid; abrupt, smooth boundary; 4 to 8 inches thick.

B2—7 to 16 inches, light yellowish-brown (2.5Y 6/4) silt loam; many, fine, distinct, yellowish-brown (10YR 5/6) and pale-brown (10YR 6/3) mottles; moderate, medium, subangular blocky structure; friable; some medium, dark concretions; very strongly acid; clear, wavy boundary; 6 to 11 inches thick.

B3m1—16 to 21 inches, mottled olive-yellow (2.5Y 6/6), yellowish-brown (10YR 5/6), and light brownish-gray (2.5Y 6/2) silty clay loam; weak, coarse, angular blocky structure breaks to moderate, medium, angular blocky structure; firm, slightly compact, and brittle; numerous, small, dark-brown concretions; very strongly acid; clear, wavy boundary; 4 to 7 inches thick.

B3m1—16 to 21 inches, mottled olive-yellow (2.5Y 6/6), brownish-gray (2.5Y 6/2), and brown (7.5YR 4/4) silty clay loam; moderate or strong, medium or coarse, angular blocky structure; very firm, compact, and brittle; sticky when wet, very hard when dry; black concretions on ped surfaces; very strongly acid; gradual boundary; 8 to 16 inches thick.

C—35 to 52 inches +, mottled yellowish-brown (10YR 5/6), light brownish-gray (2.5Y 6/2), and gray (N 6/0) silty clay loam or silty clay; massive; firm; sticky when wet, very hard when dry; abundant black concretions and stains; medium acid or strongly acid; 14 to 50 inches thick.

Range in characteristics: The extent and the color of mottles in the B horizon vary considerably. The depth to the fragipan ranges from 14 to 30 inches. The depth to bedrock ranges from 5 to 9 feet. The B3m horizon consists of silt loam in places.

Purdy series.—This series consists of poorly drained soils that have a fragipan. These soils developed in alluvium that washed mainly from soils of sandstone and shale origin.

Purdy soils are closely associated with Tyler, Robertsville, and Captina soils. They are more poorly drained, slightly finer textured, and lighter colored than Tyler soils, and they have a grayer surface layer that is mottled. They differ from Robertsville soils in that they are more pale and lighter colored and have little or no limestone influence. Purdy soils are more poorly drained and more gray than Captina soils.

In Jefferson County, Purdy soils are on terraces along small streams in the Knob Hills. Their acreage is inextensive, and their agricultural importance is minor, for they produce only fair yields of most crops, even with surface drainage. They are best suited to legumes and grasses. Silt loam is the only type mapped.

Profile (representative of the series) of Purdy silt loam, 1 percent slope, in an idle field, 100 yards from a church that is a half mile north of Fairdale:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, distinct, gray (5Y 6/1) mottles; weak, fine, granular structure; friable; few, small, dark-brown concertions; medium acid or strongly acid; clear boundary; 5 to 9 inches thick.

B2—8 to 18 inches, pale-brown (10YR 6/3) silty clay loam; many, medium, distinct, gray to light-gray (N 5/0 to N 6/0) mottles; moderate, medium, angular blocky structure; firm; slightly plastic when wet; few clay films; numerous, small, reddish-brown concretions and few, coarse, dark-brown concretions; strongly acid; diffuse boundary; 6 to 14 inches thick.

B3m—18 to 33 inches, mottled gray (5Y 6/1 and N 6/0), light grayish-brown (2.5Y 6/2), and dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine and medium, angular blocky structure; firm; compact and brittle; plastic when wet, hard when dry; abundant, small, dark-brown and black concretions; strongly acid or very strongly acid; 12 to 20 inches thick.

C—33 to 45 inches +, light-gray to gray (N 6/0) silty clay; common, fine, prominent, dark yellowish-brown (10YR 4/4) and some yellowish-red (5YR 5/8) mottles; weak, coarse, angular structure or massive; firm; sticky and plastic when wet, very hard when dry; few, coarse, dark-brown concretions and some brown concretionary material; strongly acid or very strongly acid.

Range in characteristics: The depth to the fragipan ranges from 14 to 26 inches. In places the Ap horizon is grayish brown (10YR 5/2) and has only a few mottles. The B horizon is silt loam in places, and the C horizon ranges from silty clay loam to clay.

Robertsville series.—This series consists of poorly drained soils that have a fragipan. These soils developed in old alluvium that washed mainly from soils of limestone origin.

Robertsville soils are closely associated with Taft, Captina, Purdy, and Melvin soils. They are more poorly drained than Taft soils and have a lighter colored and more mottled subsoil, and the depth to their fragipan is less. They have a more developed profile, including a definite fragipan horizon, than Melvin soils and have slightly finer texture. They differ from Purdy soils in that they are less pale and have little or no sandstone or shale influence. They are not so well drained as Captina soils.

In this county, Robertsville soils are widely scattered on low terraces along small streams in the limestone area. Their acreage is moderately large, but their agricultural importance is minor. If they are not drained, these soils produce low yields. Silt loam is the only type mapped.

Profile (representative of the series) of Robertsville silt loam, 0 to 1 percent slopes, in a pasture on Fern Valley Road, 200 yards west of Preston Highway:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) to grayish-brown (2.5Y 5/2) silt loam; common, fine, faint, pale-brown (10YR 6/3) mottles; weak, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary; 4 to 8 inches thick.

B2g—6 to 15 inches, gray (5Y 6/1) silt loam; many, fine, distinct, light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/6) mottles; weak, coarse, angular blocky structure; firm; some, small, dark-brown concretions; very strongly acid; gradual, smooth boundary; 10 to 18 inches thick.

B3m—15 to 38 inches, mottled gray (5Y 5/1), light-gray (2.5YR 7/2), and yellowish-brown (10YR 5/6) silty clay loam; weak, coarse, angular blocky structure; firm, brittle, and compact; sticky and very plastic when wet, hard when dry; some, small, dark-brown concretions; very strongly acid; gradual boundary; 14 to 24 inches thick.

C—38 to 55 inches +, yellowish-brown (10YR 5/6) silty clay loam; many, prominent, light-gray (N 7/0 to N 6/0) mottles and some brown (10YR 5/3) mottles; massive; firm; plastic when wet, hard when dry; occasional, small, hard, black concretions; very strongly acid.

Range in characteristics: The fragipan ranges from 12 to 20 inches in depth. It is weakly developed in places. In spots the A and B horizons are somewhat browner than in the representative profile.

Taft series.—This series consists of somewhat poorly drained soils that have a fragipan. These soils developed in alluvium that washed from soils of limestone origin.

Taft soils are closely associated with and are intermediate in drainage between the moderately well drained Captina soils and the poorly drained Robertsville soils. In addition to being mottled and gleyed, Taft soils are grayer than Captina soils, and the depth to their fragipan is less. Taft soils are not so gray as Robertsville soils.

In this county, Taft soils are on low terraces along the larger streams in the limestone area. Their acreage is moderate, and their agricultural importance is minor. They are best suited to hay and pasture. Silt loam is the only type mapped.

Profile (representative of the series) of Taft silt loam, 1 to 2 percent slopes, in a cultivated field on the Kentucky Turnpike, 200 yards south of Minor Lane:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) silt loam; few, fine, faint, dark-brown (10YR 4/3 and 3/3) mottles; weak, fine, granular structure; friable; medium acid; abrupt, wavy boundary; 4 to 8 inches thick.

B1—6 to 11 inches, grayish-brown (10YR 5/2) silt loam; common, fine, faint, light olive-brown (2.5Y 5/4 to 5/6) mottles; moderate, medium and coarse, angular blocky structure; firm; numerous, small, dark concretions; strongly acid; gradual, wavy boundary; 4 to 7 inches thick.

B2—11 to 17 inches, silty clay loam; common, fine, faint, light brownish-gray (2.5Y 6/2) and light yellowish-brown (2.5Y 6/4) mottles and many, fine, distinct, brown (10YR 5/3) mottles; moderate, medium and coarse, angular blocky structure; firm; sticky when wet; few clay films; numerous, small, brown concretions and few, coarse, hard, dark-brown concretions (up to a fourth of an inch in diameter); strongly acid; clear, wavy boundary; 4 to 10 inches thick.

B3m—17 to 33 inches, gray (N 5/0) to light brownish-gray (2.5Y 5/2) silty clay loam; many, fine, distinct, light olive-brown (2.5Y 5/6) and yellowish-brown (10YR 5/4) mottles; moderate, coarse, angular blocky structure; firm; compact and brittle; sticky when wet; numerous, small, brown and black concretions and some concretionary material; strongly acid; gradual, smooth boundary; 12 to 18 inches thick.

Cg—33 to 40 inches +, gray (N 5/0 to 5Y 5/1 or 6/1) silty clay; many, fine and medium, yellowish-brown (10YR 5/4) and grayish-brown (2.5Y 6/2) mottles; massive; firm; sticky and plastic when wet, very hard when dry; numerous, small and medium, black concretions with common black stains; medium acid or strongly acid.

Range in characteristics: The Ap horizon is brown (10YR 5/3) in places. The B2 horizon has mostly brown (10YR 5/3) to light brownish-gray (10YR 6/2) mottles. The B3 horizon, or fragipan, may be weakly developed. The Cg horizon is silty clay loam in some places.

Tyler series.—This series consists of somewhat poorly drained soils that have a fragipan. These soils developed in alluvium that washed mainly from soils of shale and sandstone origin.

Tyler soils are associated with and are intermediate in drainage between the moderately well drained Captina soils and the poorly drained Purdy soils. They have a more grayish A horizon than that of Captina soils and a more mottled and gleyed upper B horizon. Also, the depth to their fragipan is less. They are browner than Purdy soils and more faintly mottled in the upper horizons, and they have a slightly finer textured B horizon.

In Jefferson County, Tyler soils occur along small creeks.

Their total acreage is not extensive. They are best suited to legumes and grasses. Silt loam is the only type mapped.

Profile (representatives of the series) of Tyler silt loam, 0 to 1 percent slopes, in a cultivated field east of Valley View Church and 100 yards east of Farm Lane and the Louisville, Henderson, and St. Louis Railroad:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam; common, fine, faint, dark grayish-brown (10YR 4/2) mottles; weak, fine, granular structure; friable; some, small, dark-brown concretions; medium acid; clear, smooth boundary; 6 to 10 inches thick.

B2g—8 to 20 inches, mottled light-gray (2.5Y 7/2 to 10YR 6/1) and yellowish-brown (10YR 5/4) silt loam; weak to moderate, medium, subangular blocky structure; friable; slightly compact; numerous, small, dark-brown concretions; very strongly acid; diffuse boundary; 8 to 16 inches thick.

B3m—20 to 44 inches +, light-gray (N 6/0) silty clay loam; common, fine, faint, brown (10YR 5/3) and light olive-brown (2.5Y 5/4) mottles; moderate, medium, angular blocky structure; firm, compact, and brittle; clay films on ped surfaces; few, small, dark-brown concretions; strongly acid.

Range in characteristics: The Ap horizon is brown (10YR 5/3) in places, and the B3m horizon is silty clay in some profiles. The fragipan ranges from 17 to 24 inches in depth, and it is weakly developed in places.

Weinbach series.—This series consists of somewhat poorly drained soils that developed in mixed general alluvium. The alluvium washed from soils of the Ohio River drainage area. Very fine particles of mica are common.

Weinbach soils are closely associated with and are intermediate in drainage between the moderately well drained Sciotoville soils and the poorly drained Ginat soils. They are less brown and more gray than Sciotoville soils and are more mottled. Also, the depth to their fragipan is less. They are browner and less mottled than Ginat soils, and their fragipan is slightly deeper.

In Jefferson County, Weinbach soils are widely distributed on nearly level terraces along the Ohio River. Their acreage is large, but their agricultural importance is minor. These soils are best suited to hay and pasture.

Profile (representative of the series) of Weinbach silt loam, 0 to 1 percent slopes, in a grassed area on Lower River Road, 300 yards south of Ashby Lane:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary; 7 to 10 inches thick.

B1—7 to 17 inches, mottled yellowish-brown (10YR 5/6) and light brownish- gray (2.5Y 6/2)) silt loam; moderate, medium, subangular blocky structure; friable; few, small, dark concretions; abundant very fine particles of mica; strongly acid; clear, smooth boundary; 6 to 12 inches thick.

B2m—17 to 34 inches, mottled yellowish-brown (10YR 5/6) to light yellowish-brown (2.5Y 6/4) and grayish-brown (2.5Y 5/2) silt loam; moderate, fine or medium, subangular blocky structure; firm and compact; slightly plastic when wet, hard when dry; abundant particles of very fine mica; numerous, medium or coarse (up to one-fourth inch in diameter), dark-brown concretions; strongly acid; gradual, smooth boundary; 13 to 22 inches thick.

B3m—34 to 45 inches, mottled dark yellowish-brown (10YR 4/4) and grayish-brown (10YR 5/2 to 2.5YR 5/2) silt loam; moderate, medium, angular to subangular blocky structure; firm, brittle, and compact; slightly sticky and plastic when wet; some, hard, coarse, dark-brown concretions; medium acid; 10 to 16 inches thick.

C—45 inches +, dark-brown (7.5YR 4/4) (interior of peds) and dark yellowish-brown (10YR 4/4) (surface of peds) silty clay; strong, coarse (2 or 3 inches in diameter), blocky structure; very firm and compact.

Range in characteristics: The Ap horizon is brown (10 YR 5/3 or 4/3) in places. The B horizon ranges from silt loam to silty clay loam, especially in the extreme southwestern corner of the county. In some places, stratified sand, silt, and clay occur below a depth of 45 inches; some pebbles also may occur. The depth to the fragipan ranges from 15 to 24 inches.

RENDZINA SOILS

This great soil group consists of humus-carbonate intrazonal soils that developed in parent materials high in, and retentive of, calcium and magnesium (*21*). These soils are characterized by a thick, dark-colored surface horizon, a structural B horizon, rather thin solum, clayey texture, and high reaction. They commonly are rolling to steep and contain rock fragments.

The Fairmount and Otway series are representative of the central concept of this great soil group. Both Fairmount and Otway soils are somewhat excessively drained. They have weak to moderate profile development. The B horizon is very thin or absent in Otway soils but generally is evident, though seldom thick, in Fairmount soils. Mechanical analysis of two Fairmount profiles showed the highest percentage of clay in the A horizon; the percentage of clay gradually decreased with depth. Free carbonates were present in all horizons analyzed.

Fairmount series.—The Fairmount series consists of somewhat excessively drained, shallow soils that developed in residuum derived from thin-bedded limestone and from calcareous shale.

These soils are closely associated with Otway and Beasley soils. They differ from Beasley soils in having a finer texture, a higher pH, a darker colored surface horizon, an abundance of limestone fragments, and weaker horizonation. Fairmount soils have fragments of limestone on their surface and are flaggy throughout, whereas Otway soils contain few or no fragments of limestone and are underlain primarily by marl.

Fairmount soils are extensive in the eastern and southeastern parts of the county. These soils are mostly s'rongly sloping or steep. Those areas where limestone fragments are not too abundant and bedrock is not too near the surface are agriculturally important as pasture. Silty clay is the dominant soil type; silty clay loam and clay types are minor inclusions.

Profile (representative of the series) of Fairmount silty clay, 20 percent slope, in a wooded area half a mile east of Hopewell Road near Taylorsville Road:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silty clay; strong, fine, granular structure; firm; several limestone fragments; neutral; abrupt, smooth boundary; 2 to 4 inches thick.

A3—3 to 8 inches, dark grayish-brown (10YR 4/2) silty clay to silty clay loam; strong, fine, angular blocky structure; firm; slightly sticky and slightly plastic when wet; many limestone fragments; neutral or mildly alkaline; clear, smooth boundary; 4 to 6 inches thick.

B—8 to 15 inches, brown (10YR 4/3) to dark grayish-brown (10YR 4/2) silty clay to silty clay loam; strong, fine or medium, angular blocky structure; very firm; very sticky and very plastic when wet; very hard when dry; distinct pressure faces; numerous fragments of argillaceous limestone; many lime nodules; mildly alkaline; clear, smooth boundary; 5 to 10 inches thick.

C11—15 to 26 inches, brown (10YR 4/3) silty clay loam to silty clay; light yellowish-brown (2.5Y 6/4) variegations; strong, medium, angular blocky structure; very firm; very sticky and very plastic when wet; very hard when dry; distinct pressure faces; numerous limestone fragments; many lime nodules; calcareous; 8 to 14 inches thick.

C12—26 to 32 inches, variegated light yellowish-brown (2.5Y 6/4), light olive-brown (2.5Y 5/4), and light olive-gray (5Y 6/2) silty clay loam; massive; many limestone fragments; calcareous.

Dr—32 inches +, thin-bedded limestone.

Range in characteristics: The limestone fragments on the surface and throughout the profile vary in abundance. The A1 horizon is very dark gray (10YR 3/1) in some places. The A3 horizon ranges from very dark grayish brown (10YR 3/2) to dark gray (10YR 4/1). The B horizon is dominantly grayish brown (2.5Y 5/2) or light olive gray (5Y 6/2). The depth to the C horizon ranges from 6 to 24 inches. The depth to bedrock ranges from 12 to 40 inches. Bedrock outcrops in places.

Otway series.—This series consists of somewhat excessively drained, shallow soils that developed in residuum derived from calcareous shale.

Otway soils are closely associated with Beasley and Fairmount soils. They differ from Beasley soils in that they are much more shallow, have no B horizon or only a weakly developed one, are of finer texture, and have a higher pH. They resemble Fairmount soils in many ways, but they contain little or no limestone, and they have a C horizon of weathered marl.

In this county, Otway soils are on strong slopes in the southeastern part. Their acreage is not extensive, and their agricultural importance is minor. Silty clay is the only type.

Profile (representative of the series) of Otway silty clay, 6 percent slope, in a grassed area on Thixton Lane, 100 yards east of Zoneton Road:

Ap—0 to 4 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate, fine, granular structure; friable or firm when moist, slightly sticky and slightly plastic when wet; mildly alkaline; clear, smooth boundary; 3 to 5 inches thick.

B2—4 to 10 inches, olive (5Y 5/3) silty clay or clay; strong, fine and medium, angular blocky structure; very firm when moist, sticky and plastic when wet: thick, continuous clay skins; mildly alkaline; gradual, smooth boundary; 4 to 9 inches thick.

C1—10 to 15 inches, light olive-gray (5Y 6/2) clay; many, medium, faint, olive (5Y 5/3) and light olive-brown (2.5Y 5/6) mottles; strong, fine, angular blocky structure; very firm when moist, very plastic when wet, very hard when dry; thick continous clay skins; many lime nodules; slight effervescence with weak hydrochloric acid; clear, smooth boundary; 4 to 12 inches thick.

C2—15 inches +, light olive-gray (5Y 6/2), weathered calcareous shale (marl); common, medium, distinct, olive-yellow (2.5Y 6/8) and light-gray (5Y 7/1) mottles; violent reaction with weak hydrochloric acid.

Range in characteristics: The Ap horizon ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2). The B and C horizons may be brown (10YR 4/3) or light olive brown (2.5Y 5/4). The C horizons may have darker colored mottles in some places. The depth to the calcareous shale ranges from 8 to 16 inches.

Azonal order

The azonal order consists of soils that have little or no horizon development because of their youth, steep topography, or parent materials very low in weatherable minerals, or all three (*17*).

The azonal soils in Jefferson County are classified in two of the great soil groups—Alluvial and Regosol.

ALLUVIAL SOILS

This great soil group consists of azonal soils that formed in recent deposits of alluvium (*21*). These soils have little or no horizon development and are considered youthful in all respects.

The Ennis, Huntington, Lindside, and Newark series represent the central concept of this great soil group. The soils of these series occur in nearly level, relatively recent alluvial areas; they are somewhat poorly drained to well drained. Generally these soils differ from raw deposits only in that their A horizon has been modified mainly by an accumulation of organic matter.

Ennis series.—The Ennis series consists of well-drained soils on bottom lands. These soils are composed of recent alluvial materials that washed from upland soils of cherty limestone, shale, and sandstone origin. They contain many small fragments of cherty limestone, shale, and sandstone. These fragments increase considerably with depth.

Ennis soils are associated with Huntington soils. They differ from Huntington soils in having a lower pH and an abundance of small fragments of rock throughout their profile.

In Jefferson County, Ennis soils are on nearly level bottoms along small streams. If they are managed properly, these soils can produce good yields of all the locally grown crops. Some scattered areas may be too cherty for cultivation. Cherty silt loam is the only type recognized in the county.

Profile (representative of the series) of Ennis cherty silt loam, 1 percent slope, in a cultivated field that is east of the junction of Bearcamp Road and Blevins Gap Road:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) to brown (10YR 5/3) cherty silt loam; weak, fine, granular structure; very friable; numerous, small fragments of cherty limestone and sandstone; slightly acid or medium acid; gradual boundary; 6 to 12 inches thick.

C11—9 to 17 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) cherty silt loam; very friable or loose; abundant small fragments of cherty limestone; some fragments of sandstone and shale; numerous, small, dark concretions; slightly acid or medium acid; diffuse boundary; 6 to 14 inches thick.

C12—17 to 44 inches, brown (10YR 4/3) gravelly silty clay loam to silt loam; common, light brownish-gray (2.5Y 6/2) mottles; abundant (approximately 50 percent of the horizon), medium or coarse (up to 3 inches in diameter) fragments of shale, sandstone, and chert; slightly compact in place, loose when disturbed; numerous black concretions and much concretionary material; slightly acid or medium acid; 2 to 4 feet thick.

Range in characteristics: The coarse fragments vary in number. They are many in some places and very abundant in other places. In some places, the C horizon is darker brown than the C horizon of the representative profile. It is even reddish brown in some sites. The C12 horizon has reddish-brown (5YR 4/4) mottles in some profiles. The depth to the chert bed ranges from 8 to 54 inches or more.

Huntington series.—This series consists of well-drained soils that are on first bottoms. These soils formed in recent alluvium that washed mainly from soils of limestone origin. Along the Ohio River, they show a considerable influence from other alluvial materials and contain sand in varying amounts, as well as abundant fine particles of mica.

Huntington soils occur in close association with Lindside, Newark, and Melvin soils. They are better drained than Lindside soils and are less mottled. Also, they are browner in the lower part of their profile.

These soils are widely distributed along most streams of the county. They are agriculturally important soils, for they are productive. Yields may be reduced in the lower lying areas because of occasional flooding. Silt loam is the predominant type, but fine sandy loam also is recognized.

Profile (representative of the series) of Huntington silt loam, 0 to 1 percent slopes, in a cultivated field 1 mile south of Taylorsville Road on south Pope Lick:

Ap—0 to 11 inches, dark-brown (10YR 3/3 or 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; gradual boundary; 8 to 14 inches thick.

C1—11 to 34 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; neutral; diffuse boundary; 15 to 30 inches thick.

C2—34 to 48 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) silt loam; neutral.

Range in characteristics: The C2 horizon ranges from silt loam to silty clay loam, and it may be stratified. In places it has gray or grayish-brown mottles. This soil is slightly acid in some areas. In the Ohio Valley, fine mica occurs throughout the profile. In the region of Fairmount and Beasley soils, the subsoil is slightly finer textured. The depth to bedrock ranges from shallow (18 to 30 inches) in the eastern part of the county to deep along the Ohio River.

Lindside series.—This series consists of moderately well drained soils of the first bottoms. These soils formed in recent alluvium that washed mostly from soils of limestone origin. Along the Ohio River, they show considerable influence from other alluvial materials and have an abundance of very fine mica throughout their profile.

Lindside soils are closely associated with the well-drained Huntington soils and the somewhat poorly drained Newark soils, and their characteristics are intermediate between those of Huntington soils and those of Newark soils. Lindside soils have a lighter brown C horizon than that of Huntington soils, and the lower part of their C horizon is mottled. They have browner, more mottled, and more gleyed horizons than those of Newark soils.

In Jefferson County, Lindside soils are scattered along most of the streams. Their acreage is moderate, and they are of local agricultural importance only. Lindside silt loam is the only type mapped.

Profile (representative of the series) of Lindside silt loam, 1 percent slope, in a cultivated field on Moorman Lane at Mill Creek:

Ap—0 to 10 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; few, small, dark concretions; slightly acid or neutral; clear, smooth boundary; 8 to 12 inches thick.

C1—10 to 23 inches, brown (10YR 5/3) silt loam; few, fine, faint, grayish-brown (2.5Y 5/2) mottles; very weak, medium, subangular blocky structure or massive; friable; numerous, small, dark-brown and black concretions; slightly acid; gradual, smooth boundary; 8 to 16 inches thick.

C2—23 to 38 inches +, grayish-brown (2.5Y 5/2) silt loam; yellowish-brown and light olive-gray mottles; massive; friable; numerous, small, soft, dark-brown and black concretions; slightly acid.

Range in characteristics: In some places the Ap horizon is brown (10YR 5/3), and in other places it is dark brown (10YR 3/3). The depth to the mottled C2 horizon ranges from 18 to 24 inches. The lower horizons contain few or no concretions in some areas, especially along the Ohio River.

Newark series.—This series consists of somewhat poorly drained soils on bottoms. These soils formed in alluvium that washed mainly from soils of limestone origin but also from soils of sandstone and shale origin.

Newark soils are closely associated with Lindside and Melvin soils. They are intermediate in drainage between the moderately well drained Lindside soils and the poorly drained Melvin soils. They have a lighter colored and grayer surface layer than Lindside soils, and their mottled and gleyed horizons are shallower. They have a browner surface layer than Melvin soils, and their mottled and gleyed horizons are deeper.

In Jefferson County, Newark soils for the most part are widely scattered throughout the limestone valleys. They are of moderate agricultural importance. If drained they produce good yields of the locally grown crops. Silt loam is the only type mapped.

Profiles (representative of the series) of Newark silt loam, 0 to 1 percent slopes, in a cultivated field on Morman Road, 100 yards east of Mill Creek:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; few, soft, dark-brown concretions; slightly acid or neutral; smooth, clear boundary; 5 to 12 inches thick.

C1—9 to 17 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, faint, olive-brown (2.5Y 4/4) mottles; weak, fine, granular structure; friable; several, small, dark-brown concretions; slightly acid or medium acid; gradual boundary; 8 to 24 inches thick.

C2g—17 to 31 inches, dark grayish-brown (2.5Y 4/2) silt loam; many, fine, gray, brown, or olive mottles; massive; friable; several, medium, dark concretions; medium acid; gradual boundary; 8 to 16 inches thick.

C3g—31 to 48 inches +, dark grayish-brown (10YR 4/2) light silty clay loam to silt loam; many gray mottles and few yellowish-brown mottles; massive; friable or firm; numerous dark concretions; medium acid.

Range in characteristics: In some places the Ap horizon is brown (10YR 5/3). The C horizon may be silty clay loam and more firm. The concretions in the lower horizons vary in number. Newark soils along the Ohio River have fine mica throughout their profile, and Newark soils along small streams have a few limestone fragments in the lower part of their subsoil.

REGOSOLS

This great soil group consists of azonal soils that are composed of deep, unconsolidated rock (soft mineral deposits) in which few or no clearly expressed soil characteristics have developed (*12*). These soils form mostly in recent deposits of sand, loess, Coastal Plain materials, and glacial drift.

Lakin soils are the only Regosols in Jefferson County. These soils are deep and consist almost entirely of sandy material. They contain only a very small amount of clay. The clay films are thin and discontinuous or absent. Profile development is weak to very weak; and the structure of the subsoil is weak.

Lakin series.—This series consists of excessively drained soils on terraces along the edge of the Ohio River flood plain. These soils developed in mixed alluvium but in places show loess influence. Their relief is generally hummocky, suggesting sand dunes.

Lakin soils are associated with Wheeling soils. They are at higher elevations than the Wheeling soils, and they are coarser textured and have weaker horizonation. In relief, too, they differ from Wheeling soils.

In Jefferson County, Lakin soils occur mostly in the Valley Station area and near Prospect. Their acreage is moderate. These soils are generally droughty and seldom produce better than medium yields of most crops. Lakin loamy fine sand is the only type mapped.

Profile (representative of the series) of Lakin loamy fine sand, 8 percent slope, in a cultivated field off Valley Station Road, 300 yards east of Valley Station High School:

Ap—0 to 7 inches, dark-brown (10YR 3/3) loamy fine sand; weak, fine granular structure or structureless; very friable to loose when moist; slightly acid; abrupt, smooth boundary.

B1—7 to 16 inches, brown (10YR 5/3) loamy fine sand; weak, medium, subangular blocky structure; very friable when moist; few worm casts; slightly acid; clear, smooth boundary.

B2—16 to 41 inches, stratified bands of brown or dark-brown (7.5YR 4/4) loamy fine sand (1½ to 2 inches thick) and of brown (10YR 5/3) fine sand (2 to 4 inches thick); structureless; fine sand is loose when moist; loamy fine sand is friable when moist and slightly hard when dry; slightly acid; gradual, smooth boundary.

C1—41 to 78 inches, stratified bands of dark-brown (7.5YR 3/2) loamy fine sand (1½ to 2 inches thick) and of yellowish-brown (10YR 5/4) fine sand (4 to 6 inches thick); structureless; fine sand is loose when moist; loamy fine sand is friable when moist and slightly hard when dry; medium acid; wavy, diffuse boundary.

C4—78 inches +, brown (10YR 5/3) fine sand; structureless; loose; medium acid.

Range in characteristics: The B1 horizon is brown (7.5YR 4/4) in some profiles. The extent of the bands in the B2 horizon varies; the bands of loamy fine sand make up 10 to 50 percent of that horizon. The acidity ranges from slightly acid to strongly acid.

Laboratory data

Soil classification, to a great extent, is based on the relationship between the horizons and the specific soil characteristics that can be observed, inferred, or determined by close field examination. Physical, chemical, and mineralogical data resulting from laboratory analyses, however, can be useful to the soil scientist in classifying the soils. These data strengthen or support many field decisions that concern the placement of soils in the higher categories of classification.

Laboratory data are helpful in estimating moisture-supplying capacity, acidity, base-exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. More recently, laboratory data have proved helpful in rating soils for nonagricultural uses, that is, for residential, industrial, recreational, or transportational use.

Several factors are involved in selecting soils for laboratory analyses. Soils that are extensive and most important in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information on these particular soils. Generally, soils for which there is little or no laboratory data are given higher priority.

In Jefferson County, soils of the Beasley, Crider, Fairmount, Loring, Memphis, Sequatchie, Russellville, and Wheeling series were selected for analyses. Except for Memphis silt loam and Sequatchie fine sandy loam, two samples of each soil type were selected in order to discover differences (not observable in field examination), if any, within similar soils. The two samples of each soil type were as nearly identical as possible, and these were taken from sites more than 1 mile but less than 20 miles apart. At most sites, pits were dug by hand to a depth of about 6 feet. As many as 10 horizons or subhorizons were sampled in order to discover any minor changes within a short vertical distance. Special care was taken to avoid contamination from one horizon to another.

Tables 9, 10, 11, and 12 show the results of the laboratory analyses of the soil samples, or profiles, that were collected. The analyses were made by the Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md. Following are descriptions of the profiles that were analyzed. Unless indicated otherwise, the colors given in the descriptions are those of a moist soil.

Profile of **Beasley silt loam** (S57Ky56–9), 3 percent slope, in a cultivated field (rye) in the Outer Bluegrass region:

Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, granular structure; very friable; abundant small roots; many worm casts; slightly acid; abrupt, smooth boundary.

A3—7 to 11 inches, brown (10YR 4/3) silt loam; weak, coarse, subangular blocky structure to weak, fine, granular structure; friable; many small roots; many worm casts; neutral; abrupt, smooth boundary.

B1—11 to 15 inches, brown (10YR 4/3) to yellowish-brown (10YR 5/4) silty clay loam; weak to moderate, fine and medium, angular blocky structure; friable or firm; common worm casts; many old root channels filled with grayish-brown silt loam; slightly acid; clear, smooth boundary.

B21—15 to 21 inches, yellowish-brown (10YR 5/6) silty clay; moderate, fine, angular blocky structure; thin, patchy clay skins; firm when moist, slightly plastic when wet, slightly hard when dry; several, small, round, hard, black concretions; slightly acid; gradual, smooth boundary.

B22—21 to 26 inches, yellowish-brown (10YR 5/6) clay; strong, fine, angular blocky structure; continuous clay skins; very firm; very sticky and very plastic when wet, hard when dry; irregularly shaped, coarse, black concretions are common; strongly acid; gradual, wavy boundary.

B3—26 to 32 inches, variegated yellowish-brown (10YR 5/6), light olive-brown (2.5Y 5/4), and olive-brown (2.5Y 4/4) clay; strong, fine and medium, angular blocky structure; thick, patchy clay skins; very firm when moist, very plastic when wet, very hard when dry; abundant, fine, irregular, dark concretions; neutral; clear smooth boundary.

This profile varies slightly from the modal in friability, and it has more yellow hue than normal in the upper part of the B horizon. There is no coarse-textured material to a depth of 32 inches.

TABLE 9.—*Chemical and physical*

[The analyses were made by the Soil Survey Laboratory, SCS,

Soil, survey number, and location of sample	Horizon	Depth	Particle size distribution, in millimeters: Very coarse sand (2–1)	Coarse sand (1–0.5)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (<0.002)	International: II (0.2–0.02)	International: III (0.02–0.002)
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Beasley silt loam: No. S57Ky56–9; 1 mile SE. of U.S. Highway No. 60 on Beckley Station Road.	Ap	0–7	0.8	1.2	1.0	1.6	1.7	72.3	21.4	31.8	42.9
	A3	7–11	.5	.8	.8	1.4	2.0	73.3	21.2	32.2	43.7
	B1	11–15	1.1	1.1	.8	1.3	1.8	68.9	25.0	26.8	44.6
	B21	15–21	.6	.8	.6	.9	1.4	47.0	48.7	15.6	33.3
	B22	21–26	0	.2	.3	1.0	2.0	33.4	63.1	10.3	25.8
	B3	26–32	0	.1	.2	.6	2.2	42.9	54.0	16.8	28.8
Beasley silt loam: No. S57Ky56–15; ¼ mile W. of Clark Station Road, 3 miles S. of U.S. Highway No. 60, and 2½ miles N. of railway crossing on Long Run Road. (Iron oxide concretions in sand fraction and small amount of fossiliferous material in the C2 horizon.)	Ap	0–7	.2	.5	.4	.4	1.0	78.6	18.9	27.9	52.0
	B21	7–13	.1	.3	.4	.6	.8	61.7	35.1	20.6	43.3
	B22	13–18	.1	.4	.6	1.2	1.3	53.6	42.8	15.9	39.6
	B23	18–25	0	.5	.6	1.2	1.3	47.7	48.7	12.6	37.1
	B3	25–30	.2	.8	.6	1.3	1.5	38.0	57.6	9.6	30.6
	C1	30–36	.5	.3	.3	.7	.8	27.8	69.6	4.6	24.4
	C2	36–60	1.5	2.0	1.4	2.6	1.8	39.1	51.6	7.9	34.4
Crider silt loam: No. S57Ky56–16; corner of Westport Road and Murphy Lane. (Sand fraction consists almost entirely of iron oxide concretions.)	Ap	0–7	.2	.4	.2	.4	1.5	80.6	16.7	35.2	47.1
	B1	7–16	.1	.2	.2	.3	1.1	72.9	25.2	27.1	47.1
	B21	16–23	.2	.4	.2	.3	1.0	27.6	25.3	27.9	46.0
	B22	23–28	.7	.9	.4	.4	.9	72.5	24.2	25.1	48.5
	B3u	28–38	1.6	1.7	.5	.5	.8	69.5	25.4	22.5	48.1
	B2b1	38–49	1.2	1.4	.4	.5	.6	57.5	38.4	16.8	41.6
	B2b2	49–59	1.2	1.4	.4	.4	.5	58.3	37.8	16.1	42.9
	B2b3	59–69	1.6	1.7	.4	.5	.5	56.1	39.2	14.2	42.7
	B2b4	69–80	1.4	1.7	.5	.6	.6	54.6	40.6	14.8	40.8
	B2b5	80–113+	1.7	1.7	.5	.7	.6	50.7	44.1	14.8	37.0
Crider silt loam: No. S57Ky56–17; 0.4 mile N. of Westport Road on Goose Creek Road. (Sand fraction contains large number of iron oxide concretions.)	Ap	0–7	.2	.3	.1	.2	1.2	81.4	16.6	37.9	44.8
	B1	7–15	.1	.2	.1	.1	1.1	73.6	24.8	31.3	43.4
	B21	15–22	.1	.2	.1	.1	1.0	70.6	27.9	30.0	41.7
	B22	22–30	.3	.5	.2	.2	.9	71.1	26.8	28.5	43.6
	B23	30–36	1.4	1.4	.4	.4	.9	71.0	24.5	24.8	47.4
	B3u	36–44	2.4	1.8	.4	.4	.6	64.7	29.7	20.3	45.3
	B2b1	44–57	1.2	1.6	.4	.4	.6	56.9	38.9	17.6	40.1
	B2b2	57–72	1.0	1.0	.3	.3	.5	59.9	37.0	18.9	41.7
Fairmount flaggy silty clay loam: No. S59Ky56–1; ¾ mile up Old Mans Run from Floyds Fork.	Ap	0–5	.4	.4	.2	.2	.3	42.4	56.1	4.2	38.7
	A3	5–9	5.4	2.7	1.1	1.2	.9	43.9	44.8	5.8	39.5
	B21	9–15	5.8	4.2	1.4	1.7	1.6	45.3	40.0	9.5	38.3
	B22	15–23	4.1	2.3	.6	.9	1.1	51.1	39.9	8.6	44.1
	C11	23–37	9.7	5.6	1.9	2.5	2.6	45.5	32.2	11.0	38.5
	C12	37–43	5.6	4.6	2.4	3.5	3.5	45.6	34.8	13.9	37.0
Fairmount flaggy silty clay loam: No. S59Ky56–2; ¾ mile W. of junction of Dawson Hill Road and Broad Back Run Road.	A1	0–4	.4	.4	.2	.3	.6	46.9	51.2	12.5	35.1
	A3	4–8	5.6	2.8	1.0	1.7	1.8	49.2	37.9	12.7	39.3
	B2	8–13	3.5	3.6	1.9	3.6	4.2	53.3	29.9	17.9	41.8
	Cca	13–20	3.6	2.8	1.3	2.0	2.3	47.1	40.9	12.3	38.3
	C	20–38+	3.8	4.7	2.0	3.0	2.7	52.6	31.2	12.2	44.7
Loring silt loam: No. S59Ky56–3; 1 mile NW. of junction of old Third Street Road and Arnoldtown Road.	Ap	0–6	.1	.2	.2	.3	2.6	83.5	13.1	46.9	39.3
	B1	6–13	0	0	.1	.2	2.4	72.7	24.6	34.4	40.8
	B21	13–24	0	0	0	.2	3.1	74.6	22.1	44.5	33.2
	B22	24–32	0	.1	.1	.3	3.7	78.3	17.5	49.1	33.0
	B3m1	32–37	.1	.1	.3	.6	7.6	76.7	14.6	51.2	33.5
	B3m2	37–48	0	.2	.2	.4	3.4	77.6	18.2	48.6	32.6
	B3m3	48–53	0	.1	.1	.3	2.4	77.9	19.2	47.4	33.1
	B3m4	53–60	0	.1	.1	.2	1.5	70.9	27.2	31.7	40.8
	C	60–80	0	.1	.1	.2	1.7	79.1	18.8	38.1	42.7

See footnotes at end of table.

characteristics of some representative soils

Beltsville, Md.; dashes in place of an entry indicate that data are not available]

Reaction	Organic carbon	Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held at tension of— 1/10 atmosphere	Moisture held at tension of— 1/3 atmosphere	Moisture held at tension of— 15 atmospheres	Cation exchange capacity (sum)	Extractable cations (milliequivalents per 100 grams of soil) Ca	Mg	Na	K	H	Base saturation (sum)
pH	*Pct.*	*Pct.*		*Pct.*	*Gm./cc.*	*Pct.*	*Pct.*	*Pct.*	*Meq./100 gm.*						*Pct.*
6. 6	1. 16	0. 143	8	2. 7	-------	-------	-------	10. 0	19. 0	10. 2	2. 9	0. 08	1. 60	04. 2	78
6. 7	1. 10	. 134	8	2. 7	-------	-------	-------	9. 7	16. 8	9. 7	2. 6	. 06	. 80	3. 6	78
6. 2	. 54	. 077	7	3. 0	-------	-------	-------	10. 3	14. 9	6. 8	2. 4	. 09	. 47	5. 1	66
5. 0	. 32	-------	------	5. 6	-------	-------	-------	19. 0	27. 4	10. 7	4. 9	. 08	. 51	11. 2	59
5. 0	. 23	-------	------	3. 9	-------	-------	-------	22. 7	35. 8	15. 1	8. 2	. 12	. 45	12. 0	67
7. 0	. 24	-------	------	. 5	-------	-------	-------	20. 7	29. 5	17. 3	9. 3	. 11	. 36	2. 4	92
5. 9	1. 04	. 096	11	1. 9	1. 40	22. 9	21. 4	7. 9	13. 3	6. 5	1. 9	. 03	. 19	4. 7	65
4. 7	. 24	-------	------	1. 7	1. 38	25. 6	24. 1	14. 4	19. 9	7. 9	1. 5	. 04	. 32	10. 1	49
4. 4	. 16	-------	------	1. 4	1. 38	25. 8	24. 5	16. 7	26. 2	7. 8	1. 1	. 05	. 34	15. 9	37
4. 6	. 15	-------	------	1. 5	1. 15	30. 4	28. 2	15. 1	28. 9	11. 6	. 9	. 06	. 38	16. 0	45
5. 0	. 16	-------	------	1. 3	1. 13	32. 2	30. 8	21. 1	40. 1	27. 1	1. 3	. 08	. 43	11. 2	72
6. 8	. 24	-------	------	1. 9	1. 26	35. 1	34. 1	24. 6	49. 3	42. 6	1. 6	. 12	. 45	4. 5	91
7. 6	. 20	-------	------	2. 3	-------	-------	-------	18. 8	[1]	[1]	[1]	[1]	[1]	[1]	-------
5. 6	. 86	. 094	8	1. 8	1. 36	24. 0	22. 3	7. 2	13. 8	4. 7	1. 4	. 02	. 30	7. 4	46
5. 6	. 32	-------	------	2. 3	1. 36	24. 6	22. 9	10. 0	14. 1	7. 6	. 9	. 02	. 28	5. 3	62
5. 6	. 28	-------	------	2. 4	1. 18	28. 2	25. 4	10. 2	14. 6	7. 7	1. 3	. 03	. 27	5. 3	64
5. 6	. 22	-------	------	2. 2	1. 28	27. 7	25. 5	10. 0	13. 5	7. 2	1. 4	. 04	. 19	4. 7	65
6. 0	. 12	-------	------	2. 6	1. 26	27. 0	24. 9	10. 5	13. 9	7. 0	1. 6	. 04	. 26	5. 0	64
5. 9	. 07	-------	------	1. 8	1. 34	26. 4	24. 7	14. 6	17. 7	8. 1	3. 3	. 04	. 42	5. 8	67
5. 9	. 08	-------	------	1. 6	1. 34	26. 2	24. 8	15. 0	17. 0	7. 4	3. 3	. 04	. 44	5. 8	66
6. 0	. 06	-------	------	3. 1	1. 35	26. 7	25. 3	15. 1	17. 1	6. 8	4. 2	. 04	. 44	5. 6	67
5. 8	. 04	-------	------	2. 1	1. 38	26. 7	25. 5	15. 9	18. 9	6. 8	4. 3	. 04	. 46	7. 3	61
5. 1	. 04	-------	------	2. 0	-------	-------	-------	17. 4	17. 1	4. 8	3. 5	. 05	. 46	8. 3	52
5. 2	. 76	. 096	8	1. 8	1. 26	25. 9	22. 1	6. 4	12. 2	3. 7	1. 0	. 02	. 32	7. 2	41
5. 5	. 33	-------	------	2. 2	1. 24	26. 4	24. 0	9. 4	12. 9	6. 0	1. 3	. 04	. 24	5. 3	59
5. 3	. 22	-------	------	2. 9	1. 28	27. 8	25. 7	11. 3	15. 5	6. 6	2. 7	. 05	. 29	5. 9	62
4. 8	. 16	-------	------	2. 9	1. 23	29. 0	26. 4	10. 9	16. 2	4. 9	3. 3	. 05	. 30	7. 7	53
4. 6	. 11	-------	------	2. 6	1. 24	28. 6	25. 8	10. 1	15. 4	4. 0	2. 8	. 04	. 26	8. 3	46
4. 7	. 06	-------	------	3. 1	1. 37	24. 7	23. 4	11. 2	16. 3	3. 5	3. 1	. 04	. 28	9. 4	42
4. 7	. 06	-------	------	3. 8	1. 25	27. 2	25. 4	14. 2	18. 2	3. 7	3. 3	. 05	. 30	10. 9	41
4. 5	. 05	-------	------	3. 9	1. 28	27. 0	25. 4	13. 9	15. 6	2. 9	3. 0	. 06	. 27	9. 4	40
6. 8	5. 42	. 497	11	3. 6	-------	-------	-------	25. 1	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 3	2. 81	. 329	8	3. 1	-------	-------	-------	20. 2	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 6	. 67	. 123	5	3. 0	-------	-------	-------	15. 4	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 5	. 50	. 078	6	3. 2	-------	-------	-------	15. 6	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 6	. 17	-------	------	2. 9	-------	-------	-------	13. 2	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 6	. 22	-------	------	2. 7	-------	-------	-------	13. 7	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 3	3. 91	. 459	8	2. 7	-------	-------	-------	25. 7	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 4	2. 21	. 251	9	1. 9	-------	-------	-------	17. 0	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 5	. 74	. 104	7	1. 1	-------	-------	-------	12. 6	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 7	. 51	. 083	6	1. 1	-------	-------	-------	14. 7	[1]	[1]	[1]	[1]	[1]	[1]	-------
7. 7	. 31	-------	------	1. 9	-------	-------	-------	18. 2	[1]	[1]	[1]	[1]	[1]	[1]	-------
6. 6	. 96	. 126	8	1. 4	-------	-------	17. 2	5. 7	10. 9	6. 1	1. 4	. 03	. 25	3. 1	72
5. 5	. 27	-------	------	2. 9	-------	-------	20. 2	10. 5	13. 6	5. 6	2. 3	. 07	. 19	5. 4	60
4. 5	. 14	-------	------	3. 4	-------	-------	24. 2	10. 5	15. 5	2. 4	3. 2	. 08	. 24	9. 6	38
4. 4	. 10	-------	------	3. 1	-------	-------	24. 0	8. 8	13. 9	1. 1	2. 9	. 09	. 20	9. 6	31
4. 4	. 06	-------	------	2. 8	-------	-------	21. 1	7. 5	11. 6	1. 0	1. 1	. 11	. 20	9. 2	21
4. 5	. 04	-------	------	2. 6	-------	-------	20. 0	9. 4	15. 7	2. 1	4. 4	. 28	. 24	8. 7	44
4. 8	. 04	-------	------	2. 5	-------	-------	23. 4	9. 9	16. 5	3. 4	6. 6	. 46	. 21	5. 8	65
5. 1	. 06	-------	------	2. 3	-------	-------	21. 1	12. 3	19. 9	5. 4	8. 7	. 74	. 23	4. 8	76
5. 6	. 04	-------	------	2. 2	-------	-------	22. 5	9. 4	16. 1	4. 6	6. 8	. 70	. 17	3. 8	76

TABLE 9.—*Chemical and physical characteristics*

Soil, survey number, and location of sample	Horizon	Depth	Particle size distribution, in millimeters								
			Very coarse sand (2–1)	Coarse sand (1–0.5)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (<0.002)	International II (0.2–0.02)	International III (0.02–0.002)
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Loring silt loam: No. S59Ky56–4; ¼ mile W. of NW. corner of Cardinal Hill Reservoir storage tank at end of Cardinal Hill Road.	Ap	0–7	0. 1	0. 2	0. 2	0. 3	3. 3	79. 2	16. 7	47. 2	35. 5
	B21	7–17	0	. 1	. 1	. 2	3. 1	71. 0	25. 5	42. 7	31. 6
	B22	17–23	0	. 1	. 1	. 2	4. 2	74. 2	21. 2	46. 6	31. 9
	B3	23–30	0	. 2	. 2	. 3	5. 3	73. 4	20. 6	51. 7	27. 2
	B3m1	30–34	0	. 6	. 7	1. 0	4. 5	85. 4	7. 8	58. 2	32. 1
	B3m2	34–44	0	. 3	. 4	. 7	5. 0	83. 8	9. 8	57. 8	31. 3
	B3m3	44–55	0	. 5	. 5	. 9	4. 0	84. 6	9. 5	57. 2	31. 9
	B3m4	55–64+	0	. 2	. 3	. 5	3. 0	77. 8	18. 2	48. 4	32. 6
Memphis silt loam: No. S57Ky56–12; ⅛ mile W. of St. Anthony's Church Road and corner of St. Paul Cemetery. (Small number of iron oxide concretions in sand fraction of B2b horizon and large number in sand fraction of Cb horizon).	Ap	0–8	0	. 2	. 2	. 6	3. 7	83. 6	11. 7	52. 2	35. 4
	B1	8–14	0	0	0	. 1	2. 7	76. 2	21. 0	43. 6	35. 3
	B21	14–23	0	0	0	. 2	2. 9	66. 1	30. 8	39. 4	29. 7
	B22	23–30	0	0	0	. 2	3. 6	71. 4	24. 8	44. 2	30. 9
	B23	30–39	0	0	0	. 2	6. 1	71. 7	22. 0	51. 0	26. 8
	B31	39–46	0	0	0	. 2	3. 5	76. 7	19. 6	48. 7	31. 5
	B32	46–52	0	0	0	. 1	3. 1	80. 4	16. 4	47. 2	36. 3
	C11	52–65	0	0	0	. 2	4. 8	82. 8	12. 2	55. 3	32. 2
	C12	65–86	0	0	0	. 1	3. 5	86. 5	9. 9	57. 9	32. 1
	B2b	86–100	. 2	. 1	. 1	. 2	1. 7	76. 4	21. 3	34. 7	43. 5
	Cb	100–104	. 3	. 2	. 2	. 3	. 8	68. 6	29. 6	22. 4	47. 1
Russellville silt loam: No. S57Ky56–18; ¾ mile E. of Fern Creek on Fern Creek Road. (Except in Ap horizon, sand fraction consists mostly of iron oxide concretions.)	Ap	0–8	. 1	. 3	. 2	. 3	1. 6	82. 2	15. 3	36. 2	47. 7
	B21	8–15	0	. 2	. 1	. 2	1. 1	76. 2	22. 2	30. 7	46. 7
	B22	15–21	0	. 2	. 1	. 2	1. 2	75. 6	22. 7	31. 3	45. 6
	B3	21–31	0	. 2	. 2	. 3	1. 1	78. 2	20. 0	31. 8	47. 7
	B3m1	31–37	. 4	. 6	. 3	. 4	. 9	77. 0	20. 4	28. 8	49. 4
	B3m2	37–44	1. 2	1. 5	. 5	. 6	. 8	72. 3	23. 1	23. 1	50. 4
	B3u	44–53	1. 2	2. 0	. 6	. 6	. 8	66. 8	28. 0	20. 9	47. 0
	B3b1	53–97	1. 3	1. 3	. 4	. 6	. 8	59. 0	36. 6	19. 2	41. 0
	B3b2	97–115+	1. 2	1. 4	. 5	. 8	. 8	49. 6	45. 7	13. 3	37. 5
Russellville silt loam: No. S57Ky56–14; ½ mile W. of Goose Creek Road on Westport Road. (Sand fraction contains large number of iron oxide concretions; sand fraction of Ap horizon also contains considerable organic matter not destroyed by H_2O_2 treatment.)	Ap	0–8	. 2	1. 0	. 7	. 9	2. 2	81. 5	13. 5	41. 7	42. 4
	B21	8–15	. 2	. 4	. 4	. 6	1. 4	72. 2	24. 8	30. 8	43. 1
	B22	15–21	. 1	. 4	. 4	. 7	1. 7	72. 9	23. 8	32. 9	42. 2
	B3	21–26	. 2	. 4	. 3	. 5	1. 4	73. 7	23. 5	32. 6	42. 8
	B3m1	26–32	1. 9	1. 1	. 4	. 4	1. 0	73. 5	21. 7	28. 2	46. 5
	B3m2	32–42	3. 4	1. 9	. 5	. 6	. 8	70. 8	22. 0	23. 8	48. 1
	B3m3	42–49	4. 0	2. 0	. 6	. 8	1. 0	65. 1	26. 5	21. 8	44. 7
	C11	49–64	2. 6	1. 6	. 5	. 9	1. 2	64. 8	28. 4	18. 4	48. 5
	C12	64–76	2. 9	2. 1	. 8	1. 4	1. 8	58. 2	32. 8	19. 7	41. 1
	D	76–110	3. 0	2. 6	. 8	1. 1	1. 2	54. 8	36. 5	17. 3	39. 4
Sequatchie fine sandy loam: No. S57Ky56–11; 1 mile S. of Greenwood Road on Cane Run Road.	Ap	0–7	0	. 3	2. 4	38. 6	18. 2	30. 8	9. 7	57. 8	15. 7
	B1	7–11	0	. 2	1. 7	34. 5	17. 4	32. 2	14. 0	53. 5	18. 3
	B21	11–18	0	. 3	1. 7	33. 3	17. 1	32. 0	15. 6	51. 5	18. 4
	B22	18–26	0	. 2	1. 9	38. 7	18. 6	27. 3	13. 3	56. 5	15. 0
	B23	26–32	0	. 2	2. 0	38. 5	20. 3	26. 1	12. 9	57. 5	13. 9
	B31	32–43	0	. 1	1. 3	33. 5	20. 7	30. 7	13. 7	57. 2	16. 1
	B32	43–53	0	. 1	2. 5	43. 3	16. 1	24. 5	13. 5	52. 1	13. 1
	C	53–67	0	. 1	1. 2	45. 9	17. 4	22. 3	13. 1	58. 0	10. 9
Wheeling silt loam: No. S57Ky56–10; 400 yards NW. of Lee's Lane and Cane Run Road, 60 yards S. of residence.	Ap	0–8	. 2	. 6	2. 8	14. 2	13. 2	54. 3	14. 7	41. 8	34. 3
	B21	8–16	0	. 3	1. 8	10. 7	11. 0	53. 0	23. 2	35. 1	35. 7
	B22	16–23	. 1	. 3	1. 2	11. 3	15. 7	45. 6	25. 8	41. 4	28. 1
	B23	23–29	. 1	. 3	1. 4	16. 0	20. 9	40. 1	21. 2	51. 6	21. 1
	B24	29–36	0	. 4	2. 8	21. 2	22. 7	34. 9	18. 0	54. 7	17. 7
	B31	36–45	0	. 5	4. 5	27. 5	22. 4	29. 6	15. 5	55. 6	13. 6
	B32	45–54	0	. 4	7. 3	29. 8	20. 6	27. 2	14. 7	51. 6	12. 7
	[2] C	54–72	. 1	1. 0	21. 0	57. 9	8. 8	7. 7	3. 5	34. 9	3. 9
	C	54–72	0	. 2	6. 1	47. 8	17. 6	15. 8	12. 5	52. 8	8. 5

See footnotes at end of table.

of some representative soils—Continued

Reaction	Organic carbon	Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held at tension of— 1/10 atmosphere	1/3 atmosphere	15 atmospheres	Cation exchange capacity (sum)	Extractable cations (milliequivalents per 100 grams of soil) Ca	Mg	Na	K	H	Base saturation (sum)
pH	*Pct.*	*Pct.*		*Pct.*	*Gm./cc.*	*Pct.*	*Pct.*	*Pct.*	*Meq./100 gm.*						*Pct.*
5.2	0.94	0.112	8	1.7	------	------	13.6	7.3	11.2	4.6	1.1	0.03	0.31	5.2	54
4.5	.14	------	------	3.4	------	------	25.7	11.2	15.1	2.8	2.6	.09	.25	9.4	38
4.5	.12	------	------	3.2	------	------	24.5	9.9	14.4	1.0	3.1	.06	.25	10.0	31
4.4	.06	------	------	3.2	------	------	25.5	8.8	13.5	.6	2.9	.07	.19	9.7	28
4.4	.06	------	------	2.4	------	------	24.6	6.3	10.1	.6	1.6	.08	.10	7.7	23
4.2	.04	------	------	2.2	------	------	23.6	6.9	10.4	.5	1.8	.08	.12	7.9	24
4.7	.06	------	------	2.4	------	------	19.8	6.8	16.4	7.1	2.6	.27	.12	6.3	62
5.1	.04	------	------	2.5	------	------	21.2	9.9	15.5	4.0	6.0	.64	.19	4.7	70
5.3	1.58	.110	14	1.4	1.22	------	17.9	5.4	13.4	4.8	1.6	.01	.34	6.7	51
4.8	.41	.050	8	2.3	1.32	------	19.1	8.1	12.0	2.7	2.3	.01	.46	6.5	46
4.4	.23	------	------	3.9	1.35	------	24.4	12.0	17.6	1.9	3.7	.03	.43	11.5	35
4.4	.11	------	------	3.5	1.18	------	25.6	10.5	16.4	1.1	4.4	.05	.28	10.6	35
4.3	.10	------	------	3.8	1.16	------	24.3	9.5	15.3	.6	4.3	.07	.25	10.1	34
4.4	.10	------	------	3.4	1.17	------	24.7	9.0	14.5	.5	3.9	.09	.25	9.8	32
4.5	.09	------	------	2.9	1.12	------	24.1	9.3	13.1	.3	3.5	.09	.20	9.0	31
4.6	.09	------	------	2.6	1.16	------	22.1	7.6	11.4	.3	3.1	.09	.15	7.8	32
4.6	.07	------	------	2.4	1.18	------	23.2	6.5	10.5	.6	2.9	.14	.12	6.7	36
5.6	.07	------	------	2.2	------	------	------	11.0	17.1	5.3	7.4	.63	.14	3.6	79
5.8	.08	------	------	2.3	------	------	------	13.6	22.3	7.7	9.6	.90	.16	3.8	84
6.0	.81	.089	9	1.5	1.26	27.3	24.9	7.1	11.2	5.2	.9	.04	.13	4.9	56
5.0	.20	------	------	1.9	1.18	28.0	24.7	8.0	11.3	4.6	1.4	.04	.16	5.1	55
4.6	.16	------	------	2.4	1.19	30.3	27.1	9.2	12.8	4.0	2.3	.06	.17	6.3	51
4.7	.10	------	------	2.6	1.28	28.3	26.0	8.6	13.5	3.6	2.6	.07	.19	7.0	48
4.5	.10	------	------	2.4	1.35	25.4	23.8	8.4	13.3	2.4	2.4	.08	.19	8.2	38
4.7	.05	------	------	2.3	1.36	23.2	21.3	8.7	13.6	1.5	2.3	.10	.19	9.5	30
4.3	.04	------	------	2.7	1.40	22.2	20.8	10.4	14.5	1.1	2.5	.13	.18	10.6	27
4.5	.05	------	------	3.5	1.33	25.5	24.1	13.4	16.7	1.6	3.4	.13	.19	11.4	32
4.6	.05	------	------	5.3	------	------	------	16.6	17.9	4.8	3.4	.14	.19	9.4	47
6.6	.88	.086	10	1.4	1.32	------	18.5	5.7	11.7	6.0	2.4	.02	.20	3.1	74
5.0	.25	------	------	2.6	1.27	------	21.2	9.9	13.8	4.5	2.4	.03	.22	6.7	52
4.6	.15	------	------	2.4	1.32	------	22.6	10.1	14.9	2.3	1.9	.04	.25	10.4	30
4.4	.12	------	------	2.2	1.30	------	22.3	10.3	16.0	1.6	2.7	.06	.26	11.4	29
4.5	.09	------	------	2.6	1.34	------	23.7	9.9	14.8	.9	2.4	.11	.23	11.2	24
4.4	.07	------	------	2.9	1.42	22.9	21.5	10.1	14.7	1.1	2.5	.14	.19	10.8	26
4.5	.05	------	------	3.8	1.38	22.5	20.7	11.5	15.5	1.9	3.0	.26	.15	10.2	34
4.5	.05	------	------	5.1	1.30	24.3	24.3	14.3	19.1	3.8	4.7	.40	.16	10.0	47
5.1	.05	------	------	4.1	1.39	24.6	23.3	14.7	18.9	6.4	6.5	.58	.15	5.3	72
6.3	.05	------	------	2.0	------	------	------	15.2	18.0	7.7	6.1	.70	.14	3.4	81
5.2	.53	.058	9	1.4	1.29	19.8	12.8	4.0	7.3	2.3	.4	.01	.23	4.4	40
5.3	.23	------	------	2.2	1.33	------	15.0	5.7	7.2	2.5	.7	.02	.12	3.9	46
4.6	.15	------	------	1.5	1.36	------	15.3	5.6	8.4	1.7	.6	.01	.14	6.0	28
4.6	.22	------	------	2.0	1.29	------	13.7	5.7	8.6	1.8	.6	.01	.14	6.0	30
4.7	.18	------	------	2.0	1.38	------	14.6	5.7	8.6	2.2	.6	.01	.12	5.7	34
4.8	.12	------	------	2.4	1.44	------	15.2	6.4	9.3	2.5	.9	.02	.16	5.7	39
4.5	.17	------	------	2.3	1.36	------	12.7	6.3	9.7	1.7	.7	.01	.17	7.1	27
4.4	.33	------	------	2.5	1.23	------	9.2	5.9	10.3	1.4	.7	.01	.15	8.0	22
5.4	1.12	.120	9	2.6	1.30	23.6	19.0	6.3	12.9	4.9	1.0	.01	.33	6.7	48
5.0	.34	.054	6	2.3	1.33	22.5	18.7	9.1	11.8	4.1	1.1	.02	.28	6.3	47
4.6	.19	------	------	3.0	1.43	21.9	19.0	10.3	12.8	3.2	1.0	.02	.43	8.2	36
4.4	.13	------	------	2.8	1.52	20.9	18.2	8.3	11.8	2.1	.6	.01	.32	8.8	25
4.4	.14	------	------	2.6	1.48	20.9	17.2	7.9	11.3	1.7	.7	.02	.25	8.6	24
4.4	.13	------	------	2.7	1.43	20.2	15.9	6.8	10.0	1.2	.7	.02	.23	7.8	22
4.4	.12	------	------	2.4	1.37	17.8	13.3	6.2	9.9	1.5	.7	.02	.22	7.5	24
4.6	.10	------	------	2.0	1.19	7.8	5.1	2.2	4.0	.6	.3	.02	.19	2.9	28
4.4	.15	------	------	2.6	1.40	17.3	13.3	5.6	8.4	1.1	.8	.02	.22	6.3	25

TABLE 9.—*Chemical and physical characteristics*

Soil, survey number, and location of sample	Horizon	Depth	Particle size distribution, in millimeters								
			Very coarse sand (2–1)	Coarse sand (1–0.5)	Medium sand (0.5–0.25)	Fine sand (0.25–0.10)	Very fine sand (0.10–0.05)	Silt (0.05–0.002)	Clay (<0.002)	Internationa	
										II (0.2–0.02)	III (0.02–0.002)
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Wheeling silt loam: No. S57Ky56–13; 400 yards E. of Dixie Highway, 400 yards N. of Medora Elementary School, and 400 yards W. of railroad.	Ap	0–8	0.2	0.6	1.2	3.4	8.7	65.8	20.1	36.7	39.8
	B1	8–12	0	.2	.7	2.0	7.9	62.6	26.6	32.8	38.9
	B21	12–21	0	.1	.2	1.7	12.4	59.2	26.4	40.5	32.4
	B22	21–32	0	0	.1	2.3	19.3	58.1	20.2	54.8	24.6
	B3	32–41	0	0	.1	1.5	20.3	60.1	18.0	59.8	21.8
	C11	41–49	0	0	.6	11.1	21.1	52.8	14.4	60.4	17.1
	C12	49–51	0	0	.6	6.6	28.5	56.8	7.5	74.4	14.1
	C13	51–55	0	.2	4.0	43.7	14.8	19.0	18.3	48.7	5.7
	C14	55–72	0	0	.1	10.5	31.1	51.0	7.3	80.3	11.2

[1] Free carbonates.
[2] The C horizon consisted of discontinuous, irregular bands of fine sand and fine sandy loam; these bands were sampled separately.

TABLE 10.—*Clay mineralogy of selected horizons of Beasley silt loam (S57Ky56–15)*

Horizon	Depth	Mineral composition [1]				
		Mt	Vm	Mi-Mt [2]	Mi	K [3]
	Inches					*Percent*
Ap	0 to 7	------	xx	x	x	5
B21	7 to 13	------	------	xx	x	5
C2	36 to 60	------	------	xxx	xx	5

[1] The amounts of minerals present are indicated as follows:
------ = Not detected. xx = Moderate.
x = Small. xxx = Large.
[2] Mica-montmorillonite interstratified material.
[3] By differential thermal analysis; all percentages are approximate.

TABLE 11.—*Mineralogical composition*[1] *of the coarse silt fraction (20 to 50 microns) of selected horizons of Beasley silt loam (S57Ky56–15)*

Horizon	Depth	Light minerals									Heavy minerals [2]					
		Quartz	Feldspar	Mica	Chlorite	Plant opal	Calcite	Tourmaline	Zircon	Biotite	Enstatite	Sphene	Hornblende	Epidote	Garnet	Rutile
	Inches															
B21	7 to 13	xxxx	xxx	xx	x	x	------	xx	xx	x	x	x	x	x	------	xx
C2	36 to 60	x	x	x	------	------	xxxx	x	x	xx	------	x	xx	x	x	------

[1] The amounts of minerals present are indicated as follows:
---- = Not detected. xxx = Large.
x = Small. xxxx = Predominant.
xx = Moderate.
[2] Heavy minerals make up approximately 10 to 15 percent of the whole sample.

of some representative soils—Continued

Reaction	Organic carbon	Nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)	Bulk density	Moisture held at tension of—			Cation exchange capacity (sum)	Extractable cations (milliequivalents per 100 grams of soil)					Base saturation (sum)
						1/10 atmosphere	1/3 atmosphere	15 atmospheres		Ca	Mg	Na	K	H	
pH	*Pct.*	*Pct.*		*Pct.*	*Gm./cc.*	*Pct.*	*Pct.*	*Pct.*	*Meq./100 gm.*						*Pct.*
7.0	1.31	0.124	10	1.8	1.36	--------	19.7	9.8	15.2	11.2	1.0	0.03	0.65	2.3	85
6.6	.24	--------	------	2.5	1.40	--------	21.6	10.5	13.2	8.5	1.0	.04	.34	3.3	75
5.0	.18	--------	------	2.5	1.24	--------	22.0	12.8	14.0	6.5	1.3	.03	.32	5.9	58
4.8	.14	--------	------	1.1	1.25	--------	21.6	10.6	12.9	4.5	1.4	.03	.30	6.7	48
4.5	.15	--------	------	1.8	1.25	--------	19.6	8.4	12.7	3.5	1.7	.02	.28	7.2	43
4.6	.09	--------	------	2.4	1.32	--------	18.3	7.1	10.2	2.0	1.4	.02	.24	6.5	36
4.8	.11	--------	------	2.2	1.26	--------	11.6	4.2	7.4	1.4	1.0	.02	.18	4.8	35
4.6	.09	--------	------	2.7	1.38	--------	14.3	7.6	10.8	2.3	1.9	.02	.26	6.3	42
4.7	.09	--------	------	2.2	1.26	--------	12.6	4.4	7.3	1.7	1.2	.02	.16	4.2	42

TABLE 12.—*Mineralogical composition of the sand fraction (greater than 50 microns) of selected horizons of Beasley silt loam (S57Ky56–15)*

Horizon	Depth	Aggregates [1]	Quartz	Mica [2]	Feldspar	Roots and tissues	Magnetite [3]	Burned wood	Calcite [4]
	In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
B21	7 to 13	55	20	15	2	3	2	1	(5)
C2	36 to 60	6	(5)	(5)	(5)	2	(5)	1	85

[1] Reddish and yellowish-brown concretions.
[2] Largely muscovite.
[3] Occurring mostly as inclusions in the concretions.
[4] Largely massive; few clear crystals; abundant minute fossils.
[5] Not detected.

Profile of **Beasley silt loam** (S57Ky56–15), 3 percent slope, on a ridgetop that is in grasses and in legumes (Korean lespedeza):

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; discontinuous remnants of an A2 horizon occur as dark grayish-brown (10YR 4/2) silt loam in lower part; pH 7.0; abrupt, smooth boundary.

B21—7 to 13 inches, reddish-brown (5YR 4/4) silty clay; strong brown (7.5YR 5/6) when crushed; moderate or strong, medium, subangular blocky structure; noticeable clay skins; firm or friable; few, small, soft, black concretions; pH 5.5; clear, wavy boundary.

B22—13 to 18 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/4) clay or silty clay; strong brown (7.5YR 5/6) when crushed; strong, medium, subangular blocky structure; pronounced clay skins; firm; few, small, soft, black concretions; pH 5.5; clear, wavy boundary.

B23—18 to 25 inches, yellowish-brown (10YR 5/4) clay; common, fine, distinct, brown (7.5YR 4/4) and reddish-brown (2.5YR 5/4) variegations; streaks of pale-brown silt on vertical faces; strong, medium or coarse, prismatic structure and strong, medium, angular blocky structure; common clay skins; slightly compact; very firm; common iron and manganese stains and concretions; pH 5.5; abrupt, smooth boundary.

B3—25 to 30 inches, light olive-brown (2.5Y 5/4) clay; common, fine, distinct, brown (7.5YR 5/4) variegations; weak, prismatic, macrostructure; moderate or strong, medium, angular blocky microstructure; common clay skins; very firm; plastic when wet; abundant, soft, black concretionary material; pH 6.0; abrupt, wavy boundary.

C1—30 to 36 inches, yellowish-brown (10YR 5/6) clay; variegated with dark-brown (10YR 3/3) concretionary stains; massive; extremely firm; very plastic and sticky; concretionary stains and small lime flecks are common; scattered, coarse (3 inches in diameter) limestone fragments; pH 7.5; abrupt, wavy boundary.

C2—36 to 60 inches, yellowish-brown (10YR 5/6), weathered, calcareous shale and limestone mixed with clay; massive; extremely firm; very plastic and sticky; dusky red (2.5YR 3/2) clay flows along faces of vertical cracks; pH 8.0. (No bulk density core taken of this horizon.)

There is a slight suggestion of a fragipan in the B23 horizon. Rocks more than 5 inches in diameter make up 2 percent of the C2 horizon, and rocks less than 5 inches in diameter make up 4 percent.

Profile of **Crider silt loam** (S57Ky56–16), 2 percent slope, on a broad ridgetop covered with clover and grass:

Ap—0 to 7 inches, dark-brown (10YR 3/3 or 4/3) silt loam; moderate, fine, granular structure; very friable; pH 6.0; abrupt, smooth boundary.

B1—7 to 16 inches, dark-brown (7.5YR 3/2) coarse silty clay loam; moderate or weak, medium, subangular blocky structure; few weak clay skins; friable; common medium pores; pH 6.5; gradual, wavy boundary.

B21—16 to 23 inches, brown (7.5YR 4/4) silty clay loam; moderate or weak, medium, subangular blocky structure; dark-brown (7.5YR 3/2), patchy clay skins; friable or firm; common medium and large pores; few, small, round, black concretions; pH 7.0; gradual, wavy boundary.

B22—23 to 28 inches, brown (7.5YR 4/4) silty clay loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular blocky structure; patchy clay skins; firm or friable; common medium pores; common black concretionary stains; pH 7.0; gradual, wavy boundary.

B3u—28 to 38 inches, dark reddish-brown (5YR 3/4) silty clay loam; few, fine, distinct, brown (10YR 5/3) variegations; moderate, medium, subangular blocky structure and moderate, fine, angular blocky structure; firm; few coats of pale-brown silt on vertical faces; common medium pores; small black concretions; few, small, dark-brown organic stains; pH 7.0; clear, wavy boundary.

B2b1—38 to 49 inches, dark-red (2.5YR 3/6) silty clay; few, fine, distinct, light yellowish-brown (10YR 6/4) variegations; moderate, fine, angular blocky structure; noticeable clay skins; firm; plastic and slightly sticky when wet; common, small, black concretions and concretionary stains; pH 7.0; diffuse, smooth boundary.

B2b2—49 to 59 inches, similar to B2b1 horizon except that texture is clay and concretions are more abundant.

B2b3—59 to 69 inches, dark yellowish-brown (10YR 3/4) clay; common, fine, distinct, brown (7.5YR 5/4) variegations; moderate, fine, angular blocky structure; very firm; very plastic and slightly sticky when wet; common concretions; abundant concretionary stains; pH 7.0; diffuse, smooth boundary.

B2b4—69 to 80 inches, dark yellowish-brown (10YR 3/4) clay; common, medium, distinct, brown (7.5YR 5/4) variegations; moderate, fine, angular blocky structure; very firm; very plastic and slightly sticky when wet; fewer concretions than in B2b3 horizon; pH 6.5; diffuse, smooth boundary.

B2b5—80 to 113 inches +, dark-red (2.5YR 3/6) clay; extremely firm; very plastic and sticky when wet; common light yellowish-brown pieces of weathered, calcareous siltstone; pH 5.9. (Sampled with orchard auger.)

The B3u horizon is a transitional zone between the upper part of the solum, which developed in loess, and the lower, unconforming B horizon, which developed in residuum derived from limestone.

Profile of **Crider silt loam** (S57Ky56–17), 3 percent slope, on a ridgetop covered with broomsedge, wild grasses, and lespedeza:

Ap—0 to 7 inches, dark-brown (10YR 3/3 to 7.5YR 3/2) silt loam; weak, fine, granular structure; very friable; abundant roots; pH 6.0; abrupt, smooth boundary.

B1—7 to 15 inches, reddish-brown or dark reddish-brown (5YR 4/4 or 3/4) silty clay loam; moderate, medium, subangular blocky structure; few clay skins; friable; common, medium and fine pores; some intrusion from the Ap horizon in root channels; pH 6.5; clear, smooth boundary.

B21—15 to 22 inches, reddish-brown (5YR 4/4) silty clay loam; strong brown (7.5YR 5/6) when crushed; strong or moderate, medium, subangular blocky structure; prominent clay skins; firm or friable; few small concretions; few large pores; pH 6.0; diffuse, smooth boundary.

B22—22 to 30 inches, dark reddish-brown (5YR 3/4) (ped exteriors) and brown (7.5YR 4/4) (ped interiors) silty clay loam; weak, coarse, prismatic structure breaks to strong, medium, subangular blocky structure; continuous clay skins; firm; few, small, black concretions; common medium pores; pH 5.5; gradual, smooth boundary.

B23—30 to 36 inches, reddish-brown (5YR 4/4) silty clay loam; moderate or strong, medium, subangular blocky structure; continuous clay skins; friable; common concretions and concretionary stains; pH 5.5; gradual, smooth boundary.

B3u—36 to 44 inches, red (2.5YR 4/6) silty clay loam; few, fine, distinct, brown (7.5YR 4/4) variegations; weak, medium, angular blocky structure; few clay skins; friable; common small concretions; few worm casts; pH 5.5 gradual, smooth boundary.

B2b1—44 to 57 inches, dark reddish-brown (2.5YR 3/4) silty clay; weak, medium, subangular blocky structure; pronounced clay skins; firm; plastic and slightly sticky when wet; few root channels (abount 15 millimeters in diameter) filled with brown (7.5YR 5/4) silt loam; abundant soft concretionary material and concretionary stains; few very small fragments of chert; pH 5.6+; diffuse, smooth boundary.

B2b2—57 to 72 inches +, dark reddish-brown (2.5YR 3/4) clay; weak, medium, subangular blocky structure; patchy clay skins; very firm; plastic and sticky when wet; abundant black concretionary material; root channels filled with brown (7.5YR 5/4) silt loam; pH 5.6+.

The B3u horizon is a transitional zone between the upper part of the solum, which developed in loess mostly, and the lower part of the B horizon, which developed in residuum derived from limestone.

Profile of **Fairmount flaggy silty clay loam** (S59Ky 56–1), 22 percent slope, in a south-facing, dissected area that is in second-growth cedar, hickory, locust, and walnut:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2), heavy flaggy silty clay loam; moderate or strong, fine, granular structure and, in places, weak, medium, angular blocky structure; firm; slightly sticky and plastic when wet; limestone fragments (½ inch to 1 inch in size, some coarser); few, fine, dark-brown concretionary specks; abundant fine roots; many fine root channels and worm channels; few worm casts; abrupt, smooth boundary.

A3—5 to 9 inches, very dark grayish-brown (10YR 3/2) or dark grayish-brown (10YR 4/2) heavy silty clay loam; some variegations of brown (10YR 4/3); moderate or strong, fine, angular blocky structure; very firm; slightly sticky and plastic when wet; abundant (50 to 60 percent) small fragments (¼ inch to 1 inch in size, some much coarser) of limestone; abundant fine roots and many worm casts; many fine root holes and worm holes; clear, smooth boundary.

B21—9 to 15 inches, brown (10YR 4/3) silty clay or clay; moderate, fine and medium, angular blocky structure; very firm; sticky and very plastic when wet; abundant fossils (¼ inch to 1 inch in size); some limestone fragments (½ inch to 3 inches in size); few faint clay films on some ped surfaces; many fine root holes and worm channels and some worm casts; many roots; clear, smooth boundary.

B22—15 to 23 inches, yellowish-brown (10YR 5/4) or dark yellowish-brown (10YR 4/4) clay; weak, medium, angular blocky structure or massive; very firm; sticky and very plastic when wet; few very fine concretionary specks; many roots; many (60 to 70 percent) stones (½ inch to 3 inches in diameter); tongues of strong-brown (7.5YR 5/6) clay from the B21 horizon extend into this horizon; irregular boundary.

C11—23 to 37 inches, variegated brown (10YR 5/3), dark yellowish-brown (10YR 4/4), and light olive-brown (2.5Y 5/4) clay; firm or very firm; sticky and plastic when wet; many, fine, black concretionary specks; many roots; scattered worm casts; abundant (70 to 80 percent) stones (3 to 5 inches in diameter); tongues from the B22 horizon extend into this horizon; clear, wavy boundary.

C12—37 to 43 inches, light olive-brown (2.5Y 5/4) to yellowish-brown (10YR 5/4) silty clay or clay; massive; firm; sticky and plastic when wet; few, very fine, dark-brown and black concretionary specks; few worm casts; scattered fine roots; much (40 to 50 percent) rock.

This profile appears to have creep influence. Rocks are small in the upper horizons (¼ inch to 1 inch in diameter in the A3 horizon), but they increase in size with depth

(6 to 12 inches in diameter in the C horizon). The soil material and the rocks are interbedded. The coarse fragments are oriented in the C horizon, but in the upper horizons they are not, thus indicating movement. The B22 horizon is a transitional zone between the upper part of the solum and the underlying C horizon.

Profile of **Fairmount flaggy silty clay loam** (S59Ky 56-2), 24 percent slope, in an east-facing, dissected area that is covered with bluegrass, weeds, and bushes of elm, white oak, sumac, cedar, and walnut:

A1—0 to 4 inches, very dark gray (10YR 3/1) or very dark grayish-brown (10YR 3/2) flaggy silty clay loam; moderate, medium and fine, granular structure; friable; abundant roots; common worm casts; abrupt, smooth boundary; weakly calcareous.

A3—4 to 8 inches, dark-gray (10YR 4/1) silty clay loam; few, fine, faint, dark grayish-brown (10YR 4/2) variegations; moderate, coarse, granular structure and fine, subangular blocky structure; friable; abundant roots; abundant, small (¼ inch to 1 inch across), irregularly shaped pieces of limestone; common worm casts; clear, smooth boundary; weakly calcareous.

B2—8 to 13 inches, grayish-brown (2.5Y 5/2) light silty clay; few, fine, faint, light olive-gray (5Y 6/2) variegations; dark-gray (10YR 4/1) intrusions from horizons above; weak to moderate, medium, subangular blocky structure; few clay films; firm; few pieces of limestone as in layer above; few roots; gradual, smooth boundary; calcareous.

Cca—13 to 20 inches, olive-gray (5Y 5/2) clay; fine, faint, distinct, light yellowish-brown (10YR 6/4) and greenish-gray (5GY 5/1) mottles; massive; few clay films; small pieces of partially weathered limestone and bits of carbonate precipitate into a discontinuous band, about 2 inches thick, of mottled very dark gray, olive-brown, and greenish-gray clay that occupies the lower part of this horizon; clear, wavy boundary; calcareous.

C—20 to 38 inches, grayish-brown (10YR 5/2) or dark grayish-brown (10YR 4/2) clay; few, medium, distinct, brown (7.5YR 4/4) variegations; coarse, blocky structure or massive; firm; few roots; calcareous. A ledge of limestone, 1 foot to 3 feet across and 8 to 10 inches thick, was removed from this horizon.

There is indication of creep influence in the A1 and A3 horizons. Though present, secondary carbonates are not pronounced in the Cca horizon.

Profile of **Loring silt loam** (S59Ky56-3), 3 percent slope, on a narrow ridgetop that breaks to sloping and strongly sloping side slopes and that is covered with bluegrass, white clover, and weeds:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abundant fine grass roots; common worm holes; clear, abrupt boundary.

B1—6 to 13 inches, brown (7.5YR 4/4) silt loam; strong brown (7.5YR 5/6) when crushed; weak, moderate, subangular blocky structure; few clay films on ped surfaces and in pores; friable; common roots; few very dark brown iron stains; few old root holes; common worm casts; gradual, smooth boundary.

B21—13 to 24 inches, reddish-brown (5YR 4/4) heavy silt loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular blocky structure; pronounced clay films; firm or friable; common worm casts; few reddish-brown stains of iron oxide; fewer roots than in layers above; clear, smooth boundary.

B22—24 to 32 inches, brown (7.5YR 4/4) silt loam; strong brown (7.5YR 5/6) when crushed; few, fine, distinct, light yellowish-brown (2.5Y 6/4) variegations; moderate, medium and coarse, angular blocky structure; pronounced clay films; firm; very few roots; few black iron concretions; clear, smooth boundary.

B3m1—32 to 37 inches, mixture of equal amounts of brown (7.5YR 4/4) silt loam and light olive-gray (5Y 6/2) silt; weak, thick, platy structure; slightly compact in place, friable when crushed; few small manganese concretions; gray silt coats on polygon faces are pronounced; prisms are large and without definite bottoms; clear, wavy boundary.

B3m2—37 to 48 inches, brown (7.5YR 4/4) silt loam; common, medium, distinct, pale-brown (10YR 6/3) and gray (10YR 6/1) mottles; massive and breaks to coarse prisms and blocks; prisms are large and without definite bottoms; very compact in place, friable when crushed; thick, gray silt coats on polygon faces are pronounced; few small manganese concretions; gradual, smooth boundary.

B3m3—48 to 53 inches, similar to B3m2 horizon, but matrix color has slightly redder hue. Also, this horizon is slightly higher in clay and slightly less compact, and its gray silt coats are not so pronounced. The boundary is gradual and smooth.

B3m4—53 to 60 inches, reddish-brown (5YR 4/4) light silty clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive and breaks to coarse blocks; compact; firm; black manganese stains and concretions are more noticeable than in the B3m3 horizon; gray silt coats and black manganese stains on polygon faces; clear, smooth boundary.

C—60 to 80 inches, brown (7.5YR 5/4) silt loam; few, fine, distinct, pale-brown variegations; massive; friable or firm; common black manganese stains.

The B3m1 horizon has characteristics similar to those of an A2 horizon with some B3 matrix intermixed. The B3m2 horizon is the most compact in this profile.

Profile of **Loring silt loam** (S59Ky56-4), 3 percent slope, on a ridgetop that breaks to sloping and strongly sloping side slopes and that is covered with broomsedge, weeds, persimmon, sassafras, and sumac:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abundant roots; clear, smooth boundary.

B21—7 to 17 inches, reddish-brown (5YR 4/4) (ped surfaces) silty clay loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular blocky structure; noticeable clay films; firm or friable; common roots; common worm holes; clear, smooth boundary.

B22—17 to 23 inches, brown (7.5YR 4/4) (ped surfaces) silt loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular blocky structure breaks to fine, angular blocky structure; pronounced clay films; friable; few black specks or manganese stains; few roots; common worm holes; gradual, smooth boundary.

B3—23 to 30 inches, brown (7.5YR 4/4) silt loam; few, fine, distinct, gray (10YR 6/1) and light yellowish-brown (2.5Y 6/4) mottles; weak, medium, subangular blocky structure and fine, angular blocky structure; few clay films; friable; few black manganese stains; few roots; scattered worm holes; clear, wavy boundary.

B3m1—30 to 34 inches, light olive-brown (2.5Y 5/4) silt loam; common, medium, distinct, brown (7.5YR 4/4) and reddish-brown (5YR 4/4) mottles; weak, coarse, angular blocky structure; friable; vertical tongues of gray silt and brown silt loam; very few worm holes; few black manganese concretions; clear, irregular boundary.

B3m2—34 to 44 inches, mottled brown (7.5YR 4/4) and light brownish-gray (2.5Y 6/2) silt loam; weak, coarse, angular blocky structure or massive; slightly compact in place; friable when crushed; tongues as in layer above but less noticeable; common, small, black concretions of manganese; gradual, smooth boundary.

B3m3—44 to 55 inches, similar in color and texture to B3m2 horizon but more compact in place and more noticeable manganese concretions and stains; clear, smooth boundary.

B3m4—55 to 64 inches, brown (7.5YR 4/4) silt loam; pale-brown silt coatings on ped surfaces; pockets of gray silt; breaks to massive, coarse blocks; very compact in place but friable when crushed; common black manganese stains.

Pockets of silt loam with characteristics of an A2 horizon are irregularly spaced throughout the B3m1 horizon.

Profile of **Memphis silt loam** (S57Ky56-12), 3 percent slope, on a high ridgetop (covered with grease grass, broomsedge, and sassafras sprouts) on a bluff above the Ohio River lowlands:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium or fine, granular structure; very friable; common carbon specks; pH 6.5; abrupt, wavy boundary.

B1—8 to 14 inches, yellowish-red (5YR 4/6) fine silt loam or coarse silty clay loam; strong brown (7.5YR 5/6) when crushed; few, fine, faint, yellowish-brown (10YR 5/4) variegations; moderate, medium, subangular blocky structure; patchy clay skins; friable; few intrusions of grayish-brown silt loam from the Ap horizon; pH 6.0; clear, wavy boundary.

B21—14 to 23 inches, reddish-brown (5YR 4/4) silty clay loam; strong brown (7.5YR 5/6) when crushed; strong, medium, subangular blocky structure; prominent dark reddish-brown (5YR 3/4) clay skins; firm; few medium pores; few, small, black concretions; pH 5.0; gradual, smooth boundary.

B22—23 to 30 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular and angular blocky structure; very prominent dark reddish-brown clay skins; firm or friable; common, black iron and manganese concretionary stains; pH 5.0; gradual, smooth boundary.

B23—30 to 39 inches, similar to B22 horizon, but this horizon possibly has less clay and is a little more friable; it has weak, medium, prismatic macrostructure and a clear, smooth boundary.

B31—39 to 46 inches, brown (7.5YR 4/4) fine silt loam; few, fine, faint, yellowish-brown (10YR 5/6) variegations; coarse, prismatic macrostructure breaks to weak, medium, angular blocks; friable; few, small, black concretions; pH 5.0; clear, smooth boundary.

B32—46 to 52 inches, brown (7.5YR 4/4) silt loam (more silty than the B31 horizon); few, fine, faint, light yellowish-brown (10YR 6/4) variegations; weak, coarse, prismatic macrostructure breaks to moderate, coarse, subangular structure and weak, medium, angular blocky structure; reddish-brown clay skins; friable; more concretions than in the B31 horizon; pH 5.0; clear, smooth boundary.

C11—52 to 65 inches, brown (7.5YR 4/4) silt loam; common, fine, faint, yellowish-brown (10YR 5/4) variegations; weak, medium, subangular blocky structure or massive; weak reddish-brown clay skins; friable; few discontinuous voids (3 inches across and with long axis horizontal to surface); grayish-brown silt coats and yellowish-red iron oxide stains along walls of voids; few specks of carbon; few root channels filled with grayish-brown silt; pH 5.0; clear, smooth boundary.

C12—65 to 86 inches, brown (7.5YR 4/4) silt loam (high in silt); strong brown (7.5YR 5/6) when crushed; common, fine, distinct, light brownish-gray (10YR 6/2) variegations; massive; very friable; pale-brown silt coats along walls of root voids; few flecks of soft, black carbonlike material; pH 5.0; clear, smooth boundary.

B2b—86 to 100 inches, brown (7.5YR 4/4) coarse silty clay loam or silt loam; common, fine, distinct, yellowish-brown (10YR 5/4) variegations; moderate, medium, angular blocky structure; friable; few charcoal specks (2 millimeters in size); pH 5.0; clear, smooth boundary.

Cb—100 to 104 inches, brown (7.5YR 5/4) silty clay; red (2.5YR 4/6) variegations; weak, medium, angular blocky structure; firm; plastic when wet; common dusky-red ironstones (1 centimeter across); numerous black concretions; pH 6.0; abrupt, smooth boundary.

The Ap horizon contains discontinuous remnants—grayish-brown (10YR 5/2) silt loam—of an A2 horizon. The C11 horizon appears vesicular and has some characteristics of a buried A horizon. The underlying rock is believed to be gray clay shale that contains numerous iron rocks. The B2b and Cb horizons were sampled with an orchard auger. Bulk density cores were taken from vertical faces of the pit.

Profile of **Russellville silt loam** (S57Ky56-18), 3 percent slope, on a broad ridgetop that is covered with orchardgrass and ladino clover:

Ap—0 to 8 inches, brown or dark brown (10YR 4/3 or 3/3) silt loam; weak, fine, granular structure; very friable; few medium pores; pH 6.0; abrupt, smooth boundary.

B21—8 to 15 inches, brown (7.5YR 4/4) coarse silty clay loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular blocky structure; patchy clay skins; friable; abundant medium and large pores; pH 5.5; gradual, smooth boundary.

B22—15 to 21 inches, brown (7.5YR 4/4) silty clay loam; few, fine, faint, brown (10YR 5/3) variegations; moderate, medium, subangular blocky structure; patchy clay skins; friable; abundant medium and large pores; pH 5.5; gradual, smooth boundary.

B3—21 to 31 inches, strong-brown (7.5YR 5/6) fine silt loam; common, medium, distinct, light yellowish-brown (2.5Y 6/4) variegations; moderate, medium, subangular blocky structure; patchy clay skins; friable or firm; brown silt coats on vertical ped faces are common; few concretionary stains; pH 6.0; clear, wavy boundary.

B3m1—31 to 37 inches, brown (7.5YR 4/4) fine silty loam; few, fine, faint, brown (7.5YR 5/2) mottles and streaks of light brownish-gray (10YR 6/2) silt in vertical cracks and on horizontal faces; strong, thick, platy macrostructure; very compact in place, friable when disturbed; abundant, small, black concretions; pH 5.0; clear, smooth boundary. (Clay-filled cracks first appear in this horizon.)

B3m2—37 to 44 inches, reddish-brown (5YR 4/4) coarse silty clay loam; common, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, thick, platy macrostructure; few, thin, patchy clay skins; firm and very compact; abundance of small, black concretions and concretionary material; pH 5.5; gradual, smooth boundary.

B3u—44 to 53 inches, yellowish-red (5YR 4/6) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4), grayish-brown (10YR 5/2), and strong-brown (7.5YR 5/6) variegations; weak, medium, angular blocky structure; patchy clay skins; firm; slightly plastic and slightly sticky when wet; abundance of soft, black concretionary material and stains; pH 5.5; diffuse, smooth boundary.

B3b1—53 to 97 inches, yellowish-red (5YR 4/6) silty clay; common, medium, distinct, brown (10YR 5/3) variegations; weak, medium, angular blocky structure; firm or very firm; plastic and slightly sticky when wet; abundance of soft, black concretions; black stains on ped faces; pH 5.5.

B3b2—97 to 115 inches +, yellowish-red (5YR 4/8) clay; very firm; very plastic and sticky when wet; numerous small fragments of chert; common concretionary material; few small pockets of gray silty clay; pH 6. (Sampled with can auger from bottom of pit.)

A ½-inch layer of dark grayish-brown (10YR 4/2) silt loam (remnants of an A2 horizon) at the boundary of the Ap horizon was not sampled. Tongues of gray silty clay (N 5/0) begin in the B3m1 horizon and extend along polygon faces to a depth of about 97 inches. The tongues are about 1½ inches in width at the top and taper to zero.

Profile of **Russellville silt loam** (S57Ky56-14), 3 percent slope, in a field of alfalfa on a broad ridgetop:

Ap—0 to 8 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, medium, granular structure; very friable; brown (10YR 4/3) silt loam (discontinuous remnants of an A2 horizon) detected in lowermost 2 inches; pH 7.0; abrupt, smooth boundary.

B21—8 to 15 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; noticeable clay skins; friable; common medium pores; pH 6.0; clear, smooth boundary.

B22—15 to 21 inches, strong-brown (7.5YR 5/6) coarse silty clay loam; moderate, medium, angular blocky structure; patchy, brown (7.5YR 4/4) clay skins; few medium pores; friable; pH 5.0; abrupt, smooth boundary.

B3—21 to 26 inches, yellowish-brown (10YR 5/6) coarse silty clay loam; few, fine, faint, grayish-brown (10YR 5/2) mottles; moderate, medium and fine, subangular blocky structure; weak clay skins; friable; few dark-brown concretionary stains; few medium pores; pH 5.0; abrupt, smooth boundary.

B3m1—26 to 32 inches, brown (10YR 4/3) silt loam; common, fine, distinct, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4) mottles; weak, coarse, angular blocky structure; slightly compact in place, friable when disturbed; common, small, black concretions; pH 5.5; gradual, wavy boundary.

B3m2—32 to 42 inches, brown (10YR 5/3) silt loam; common, fine, distinct, light brownish-gray (10YR 6/2) and gray (10YR 5/1) mottles; weak, medium, angular blocky structure; compact in place, friable when disturbed; few pockets of gray silty clay; pH 5.5; gradual, wavy boundary.

B3m3—42 to 49 inches, light yellowish-brown (10YR 6/4) silt loam; few, fine, faint, grayish-brown (2.5Y 5/2) mottles; thick, platy structure; compact in place, friable when disturbed; abundant black concretions (up to 10 millimeters in size); pH 5.5; gradual, smooth boundary.

C11—49 to 64 inches, variegated yellowish-brown (10YR 5/6), dark-red (2.5YR 3/6), and gray (10YR 6/1) silty clay; massive; firm; common black concretionary stains; pH 5.6; clear, smooth boundary. (Pickup in clay indicates strong limestone influence in this horizon.)

C12—64 to 76 inches, variegated yellowish-brown, light olive-brown, red and gray clay; massive; firm; plastic when wet; common black concretionary stains; pH 6.5.

D—76 to 110 inches, variegated light yellowish-brown (2.5Y 6/4), dark-red (2.5YR 3/6), and gray (N 6/0) clay; firm; plastic when wet; common black stains and small, black concretions; pH 6.5. (Sampled with can auger.)

In this profile, very coarse polygonal structure is noticeable. Tongues of grayish-brown (2.5Y 5/2) silty clay extend for several feet downward from a 26-inch depth as part of the polygonal system. The polygons have a 3-inch cap and 1½- to 4-inch vertical faces.

Profile of **Sequatchie fine sandy loam** (S57Ky56-11), 3 percent slope, on a well-drained, low ridgetop that is in weeds:

Ap—0 to 7 inches, dark-brown (10YR 3/3 or 3/4) fine sandy loam; weak, fine, granular structure; very friable; pH 6.5; abrupt, smooth boundary.

B1—7 to 11 inches, brown (7.5YR 4/4) fine sandy loam; weak, medium, angular blocky structure; pH 6.0; gradual, smooth boundary.

B21—11 to 18 inches, brown (7.5YR 4/4) fine sandy loam; strong brown (7.5YR 5/6) when crushed; few, medium, faint, yellowish-brown (10YR 5/4) variegations; moderate, medium, angular blocky structure; patchy dark yellowish-brown clay skins; friable; few medium pores; few mica flakes; pH 5.5; gradual, smooth boundary.

B22—18 to 26 inches, brown (7.5YR 4/4) fine sandy loam; moderate, medium, subangular blocky structure; patchy clay skins; friable; numerous pores and common worm casts; pH 5.5; gradual, smooth boundary.

B23—26 to 32 inches, brown (10YR 4/3) fine sandy loam; weak to moderate, subangular blocky structure; patchy clay skins; friable; common medium pores; pH 5.5; clear, wavy boundary.

B31—32 to 43 inches, brown (10YR 4/3) fine sandy loam; few, fine, distinct, olive-gray (5Y 5/2) and dark reddish-brown (5YR 3/4) variegations; moderate to weak, coarse, angular blocky structure; few patchy clay skins; compact in place, friable when disturbed; few black carbon specks; few medium pores; pH 5.5; gradual, smooth boundary.

B32—43 to 53 inches, brown (10YR 4/3) fine sandy clay loam; few, fine, faint, brown (10YR 5/3) variegations; pockets of reddish-brown (5YR 4/4) fine sandy loam flecked with black carbon specks; moderate, medium, subangular blocky structure and moderate, coarse, angular blocky structure; friable; common mica flakes; few medium pores; pH 5.5; clear, smooth boundary.

C—53 to 67 inches, brown (7.5YR 4/4) very fine sandy loam or fine sandy loam; few, fine, faint, pale-brown (10YR 6/3) variegations; massive; friable; numerous mica flakes; numerous reddish-brown iron streaks.

The uppermost 2 inches of the C horizon consists of yellowish-brown (10YR 5/4) loose sand. Very weakly discernible polygons are in the B32 horizon.

Profile of **Wheeling silt loam** (S57Ky56-10), 2 percent slope, in a meadow of grass and alfalfa on a low ridgetop:

Ap—0 to 8 inches, dark-brown (10YR 4/3 or 3/3) silt loam; moderate, fine, granular structure; very friable; pH 7.0; abrupt, smooth boundary.

B21—8 to 16 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; thin, discontinuous clay skins; firm; medium pores are common; pH 6.0; clear, smooth boundary.

B22—16 to 23 inches, brown (7.5YR 4/4) silty clay loam; weak, very coarse, prismatic structure breaks to strong, medium, subangular structure and angular blocky structure; firm or very firm; common medium pores; pH 4.5; gradual, smooth boundary.

B23—23 to 29 inches, brown (7.5YR 4/4) clay loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, subangular and angular blocky structure; patchy clay skins; firm or friable; few black concretionary specks and mica flakes; pH 4.5; gradual, smooth boundary.

B24—29 to 36 inches, brown (7.5YR 4/4) fine sandy clay loam; strong brown (7.5YR 5/6) when crushed; very coarse, prismatic structure breaks to moderate, medium, angular blocky structure; discontinuous clay skins; friable; organic clay films along macrostructure faces; common medium pores and mica flakes; pH 4.5; gradual, smooth boundary.

B31—36 to 45 inches, brown (7.5YR 4/4) fine sandy clay loam; strong brown (7.5YR 5/6) when crushed; weak, coarse, angular blocky structure; discontinuous organic and silicate clay skins; friable; few mica flakes; pH 4.5; gradual, smooth boundary.

B32—45 to 54 inches, brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) fine sandy loam; weak, coarse, angular blocky structure; thin, patchy, organic and silicate clay skins; friable or very friable; few mica flakes; pH 4.5; gradual, smooth boundary.

C—54 to 72 inches, discontinuous, irregular bands and pockets of brown (10YR 4/3) fine sand (single grained; loose; common mica flakes and carbon specks) and brown (7.5YR 4/4) to reddish-brown (5YR 4/4) fine sandy loam (massive; very friable; few mica flakes); pH 4.5; clear, smooth boundary.

The bands of fine sand and fine sandy loam that make up the C horizon were sampled separately.

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Profile of **Wheeling silt loam** (S57Ky56-13), 1 and 2 percent slope, in a wheatfield on a low ridgetop:

Ap—0 to 8 inches, brown or dark grayish-brown (10YR 4/3 or 4/2) silt loam; moderate, medium, granular structure; very friable; pH 7.5; abrupt, smooth boundary.

B1—8 to 12 inches, brown (7.5YR 4/4) silty clay loam; few, fine, distinct, yellowish-red (5YR 5-8) variegations; reddish-gray (5YR 5/2) silt coats; weak, medium, angular blocky structure; few clay skins; firm in place, friable when disturbed; reddish-gray (5YR 5/2) silt coats are common on ped surfaces; pH 7.5; clear, smooth boundary.

B21—12 to 21 inches, brown (7.5YR 4/4) silty clay loam; strong brown (7.5YR 5/6) when crushed; moderate, medium, angular blocky structure and subangular blocky structure; noticeable clay skins; firm; slightly plastic when wet; noticeable concretionary specks; few medium pores; pH 7.0.

B22—21 to 32 inches, brown (7.5YR 4/4) coarse silty clay loam; few, medium, distinct, yellowish-brown (10YR 5/8) and gray (5Y 5/1) variegations; coarse, moderate, medium, angular blocky structure; reddish-brown (5YR 4/3) clay skins; friable; few black concretions; few medium pores; pH 5.0.

B3—32 to 41 inches, brown (10YR 4/3) loam; few, fine, faint, yellowish-brown (10YR 5/4) variegations; weak, medium, subangular blocky structure; few thin clay skins; friable; few black concretions; common medium pores; pH 5.0.

C11—41 to 49 inches, brown (10YR 4/3) silt loam; few, fine, distinct, yellowish-red and light olive-brown (2.5Y 5/4) variegations; weak, medium, subangular blocky structure; friable; some evidence of clay flows along vertical surfaces; few black concretions; common medium pores; pH 5.0.

C12—49 to 51 inches, dark yellowish-brown (10YR 4/4) silt loam; massive; very friable; few, very small, black concretions; common medium pores; pH 5.0.

C13—51 to 55 inches, brown (7.5YR 4/4) mixed sandy clay loam and sandy loam; few, medium, faint, dark yellowish-brown (10YR 4/4) variegations; massive; friable; clay-filled interstices; few, very small, black concretions; common medium pores; pH 5.0.

C14—55 to 72 inches +, varigated brown (7.5YR 4/4 and yellowish-brown (10YR 5/4) silt loam; massive; friable; few large pores, common medium pores; pH 5.0.

Old voids of the C11, C12, and C13 horizons were filled with translocated material deposited in bands on the wall. The bulk of the translocated material is grayish-brown or light olive-brown silty clay loam; the outer coat consists of iron-oxidation products.

Laboratory methods

Clay content was determined by the pipette method (*8, 9, 11*). The pH values were determined by the glass electrode method, using a soil-water ratio of 1:1. Organic carbon was determined by wet combustion, using a modification of the Walkley-Black method. Nitrogen was determined by means of a modified procedure of the Association of Official Agricultural Chemists (*2*). Bulk density measurements were made on 1- by 2-inch core samples. Moisture retention measurements were made on 1- by 2-inch core samples (1/10 and 1/3 atmosphere) and on sieved samples (15 atmospheres) by pressure-plate and pressure-membrane apparatus (*13*).

The cation exchange capacity was calculated by summation of extractable cations. To determine the extractable calcium and magnesium, calcium was separated as calcium oxalate and magnesium as magnesium ammonium phosphate (*12*). Extractable sodium and potassium were determined by using the Beckman DU flame spectrophotometer on original extracts of ammonium acetate (*12*). The triethanolamine method was used to determine ertractable hydrogen (*12*).

The sum of the bases (Ca, Mg, Na, and K) except hydrogen divided by the sum of the cation exchange capacity and multiplied by 100 gives the sum of base saturation.

Clay mineralogy was determined by differential thermal analysis (*7*) and by X-ray diffraction, using a Norelco Diffractometer, FeK_a radiation, scanning speed of 1 degree per minute, on samples oriented on glass slides. The samples were saturated with magnesium, with a solvate of magnesium and ethylene-glycol, and with potassium, all at room temperature and after heating to 110° C., 250° C., and 500° C.

Relative amounts of montmorillonite (Mt), vermiculite (Vm), and mica (Mi) were estimated from areas enclosed by first-order X-ray diffraction peaks of basal spacings. Amounts of kaolinite (K) were estimated from the size of the respective endothermic peaks, as compared to known standards.

Laboratory interpretations

Except in the Fairmount soils, a moderate increase in the percentage of clay in the horizon immediately below the A horizon is indicative of an argillic horizon. In the Fairmount soils, the opposite is true, for these soils are alkaline throughout and are high in calcium, indicating that calcification has minimized eluviation of the A horizon. The nonuniform distribution of the clay fraction in the subhorizons of the two Loring profiles is indicative of a bisequum soil.

The presence of a fragipan in each of the Loring and Russellville profiles is supported by an increase in bulk density in the zone of greatest compactness and brittleness.

The mineralogical composition of silt and of sand in the upper part of the B horizon and in the C horizon of one of the Beasley profiles (S57Ky56-15) is indicative of a polygenetic soil, and this supports a prior postulation that the parent material of the upper part of the solum was limestone and an admixture of loess, and that the lower part of the solum was greatly influenced by marly shale.

The two Crider profiles are similar, as shown by the noticeable increase of clay in the lower horizons over that in the upper one-third to one-half of the B horizon.

The reaction and the base saturation for one Wheeling profile (S57Ky56-10) and for the Sequatchie profile, are at the lower extreme for Gray-Brown Podzolic soils. In contrast, the reaction and base saturation for one Crider profile (S57Ky56-16) indicate only moderate leaching, yet Red-Yellow Podzolic soils normally are strongly leached.

General Nature of the County

This section gives information about the history, development, population, physiography, relief, and drainage of Jefferson County. Also, it discusses agriculture in the county, and it gives climate data.

History and Development

The first settlement in the area that is now Jefferson County was established in 1779 at Crow Island by a party that included Gen. George Clark. These first settlers had been traveling down the Ohio River by boat but had to abandon their boat when they reached the Falls of the Ohio. The camp they set up on Crow Island was to be a temporary one, but it grew and soon became known as Louisville. In 1780 the legislature of Virginia established Jefferson County as one of the three original counties in what was later to be the State of Kentucky.

River transportation was largely responsible for the early growth of Louisville, and of the county, for it was at this point along the Ohio River that cargo had to be unloaded from one river craft and reloaded on another beyond the Falls of the Ohio.

In the next period of growth, agriculture became important in the county mainly because markets were within easy reach of Louisville via the Ohio River. Next, the tobacco industry added to the growth of the county, and then the distilling industry. Other industries were slow to move in until the 1940's. The industrial expansion that began then is still continuing and at a rapid rate. Nonfarm employment today exceeds 250,000. Among the most important industries in the county are the food processing, tobacco, chemical, and fabricated metals and machinery industries.

Louisville also is a large market for agricultural products. One of the stockyards in the city handles nearly a million dollars worth of livestock each year. Many packers and meat processors surround the stockyards. A produce market in the city deals with both retailers and wholesalers.

Eight railroads, three river barge lines, four major air lines, and over a hundred truck lines serve the county.

Population

The population of Jefferson County was 4,700 in 1790. It had increased to 60,000 by 1850 and to about 119,000 by 1870. The population rose rapidly after 1920; it reached 355,000 in 1930 and continued to rise. It has increased significantly in the past decade, especially in the last few years. The population was 484,615 in 1950. Of this, according to the Federal census, 419,183 was urban. The population was 610,947 in 1960, and of this, 540,458 was urban.

This most recent rapid rise in population is attributed principally to the several large and many small industries that have moved into the Louisville area. Slightly lower wages, good power facilities, and an excellent transportation system have drawn these industrial concerns into the area.

Agriculture

Before the coming of the first white settlers in 1779, most of the area that is now Jefferson County was a vast forest. Cultivation, if any, by the Indians was insignificant. The first settlers cleared and farmed small plots of land, mostly to provide food for themselves. Later, as river transportation improved and the population increased, larger areas were cleared and planted to cash crops, such as corn and tobacco. As the city of Louisville grew in size, more and more acreage was used for agriculture. In recent years, however, the growth and expansion of the city have had a reverse effect on agriculture.

Industries and subdivisions have spread outside of the city limits and forced some farmers out of business because of inflated land values. Houses are strung along both sides of many of the main highways on acreage that was once farmland, and subdivisions have been built out as far as the county line. The number and size of farms, consequently, have steadily decreased. According to the latest agriculture census (*19*), 1,192 farms are operating in the county, and the average size of a farm is 83 acres. Only about 200 farms are more than 140 acres in size. Farms of 3 to 30 acres have greatly increased in number, mostly because nearly a third of all farmers in the county either work part time in the city to supplement their farm income or work their farms part time and work full time in the city.

Farmland has sold for as much as $2,500 an acre. Because general farming cannot be profitable on land of such value, many farmers have turned to specialized farming, such as dairying, truck gardening, nurseries, and orchards. Only in the extreme eastern part of the county—the part least affected by urban development—is general farming still practiced. Farms in this area produce corn, grain, hay, beef cattle, and hogs.

In 1959 the total value of farm products sold in the county was more than $5 million, of which more than half was for livestock and livestock products.

Almost all of the farmers use modern equipment; those on the smaller farms generally contract with commercial operators rather than buy expensive machinery. Almost all of the farms have electricity, and many have city gas and water—the result of urban growth and expansion. Louisville provides the farmers with a close market for anything they produce. Furthermore, it is a nearby source of all farm supplies.

Physiography, Relief, and Drainage

Jefferson County, except for the Knob Hills to the southwest, is almost entirely in the Outer Bluegrass region of Kentucky. Most of the soils developed in material from more than one source, for example, loess (windblown material) over high-grade limestone. Much of the acreage is taken up by alluvial soils, especially in the extreme western part of the county.

In the Ohio Valley (see figure 17, p. 130), the soils consist of deep alluvium that washed from the upper drainage basin of the Ohio River. These soils are primarily of the Wheeling catena and are on terraces. Some are of the Huntington catena and are on bottoms. Most of these soils are nearly level. Some are on sloping banks adjacent to the bottoms along the small streams that dissect the valley. The streams form a north-south drainage pattern. These soils, for the most part, are not well drained. Their degree of wetness varies, however, either because of compact subhorizons or a temporary high water table.

Next to the Ohio Valley is a rough, highly dissected area of shale and sandstone knobs. These knobs are unique in that a thick mantle of loesslike material has been deposited on the level to sloping, broad ridges and on the steep side slopes, especially those adjoining the Ohio Valley. This loesslike mantle thins to only a few inches on the steep side

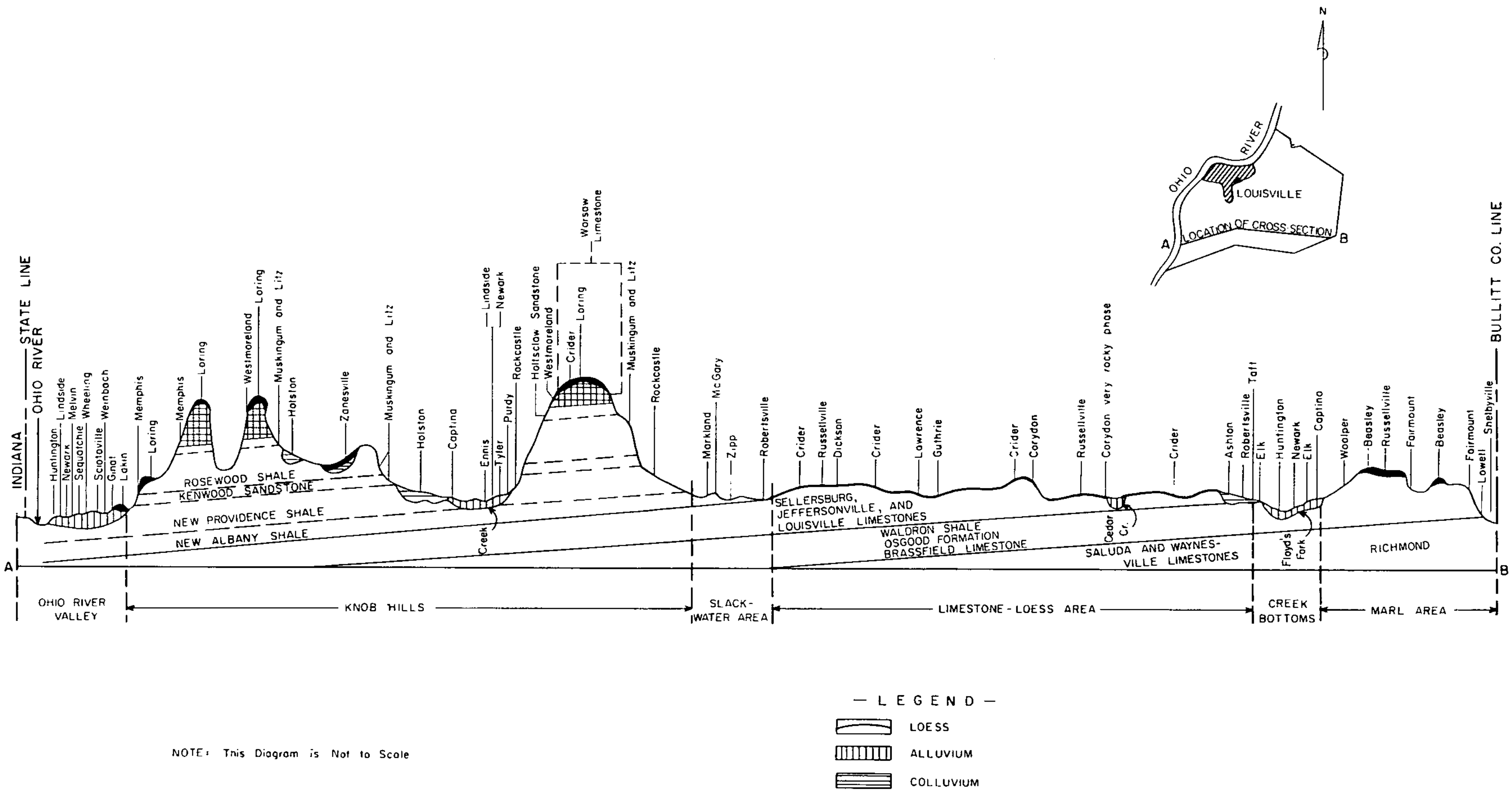

Figure 17.—**Diagrammatic east-west cross section of Jefferson County showing geologic formations and related soils.**

slopes that face eastward. A considerable amount of colluvial-alluvial material has gravitated or washed from higher elevations and accumulated on foot slopes and toe slopes or as fans. Some of these local alluvial soils extend a considerable distance from the base of the slopes. The soils on foot slopes are generally sloping or gently sloping, and many are wet because of a compacted layer, seepage, or both.

Eastward, the shale and sandstone ridges of the knobs are narrow and are capped with cherty Warsaw limestone of low grade. The soils here have a thin mantle of loess-like material. They generally are well drained.

Further east, and somewhat between the knobs, is an old slack-water area. Most of the soils here are level or nearly level, and they are fine textured and calcareous. Most are underlain by New Albany shale, but the shale probably has had little or no influence on the soils. These soils, in general, are poorly drained because of their level relief and the nature of their subsoil. Several drainage ditches have been opened throughout the area and have somewhat improved surface runoff.

The wide belt of soils to the east of the slack-water area developed from residuum of Sellersburg, Louisville, and Jeffersonville limestones. These soils are typically gently sloping to moderately steep, but some are level to gently sloping. Most of the level to gently sloping soils have a mantle of loess about 3 feet thick. The steeper soils, in the area dissected by streams, are little if at all influenced by loess. Generally they are shallow, and limestone outcrops at their surface. Some of the nearly level soils have a fragipan that impedes drainage, but most of the soils in the area are well drained. Most of the creeks in the area are small and are bordered by narrow well-drained bottoms.

The extreme eastern part of the county is underlain by limestone and calcareous shale of the lower Silurian and upper Ordovician periods. Most of the soils here developed in residuum variably influenced by flaggy limestone. The soils on ridges, especially those on the broader ridges, have a mantle of loess that is as much as 3 feet thick, and generally they have a fragipan at a depth of about 30 to 36 inches. The relief, in general, is sloping to steep. Surface runoff is excessive in most places, and internal drainage is impeded by the fine-textured subsoil. All of this area drains into Floyds Fork, which flows south to the Salt River. The alluvial soils on bottoms and terraces along Floyds Fork take up an area a quarter mile to a half mile wide. Most of these alluvial soils are well drained, though subject to frequent flooding.

Jefferson County varies in elevation from 382 feet, the pool stage of the Ohio River, to more than 900 feet at the southern boundary. The geologic formations tilt slightly upward from the southwest to the northeast corner of the county.

Climate [9]

Jefferson County has a wide range in temperature, rainfall, wind, and humidity, but the range is within limits suitable for varied plant and animal life. Occasional hot spells in summer and cold spells in winter cause the greatest extremes in temperature, but there is considerable variability in all seasons.

The temperature rises to 90° F. or higher on about 49 days in an average year. A temperature of 100° is reached about once each year in June, July, August, or September.

Freezing temperatures occur on about 92 nights in an average winter, but except on about 15 days a year, the temperature rises above 32° during daytime. Thus, a daily freeze-thaw cycle is normal for cold weather. The temperature drops below 0° on an average of less than once each winter.

The average length of the growing season in Jefferson County—from the last light freeze in spring to the first light freeze in fall—ranges from 200 days in the western part of the county to 175 days in the eastern part. In 5 years out of 10, the growing season will range from 189 to 211 days in the western part and from 164 to 186 days in the eastern part. In 8 years out of 10, the growing season will range from 179 to 221 days in the western part and from 154 to 196 days in the eastern part.

Jefferson County has an average annual rainfall of 41.32 inches, which is sufficient for agricultural production. During an ordinary year, the heaviest 1-hour rainfall is about 1.17 inches. There is a 30-percent chance that such a 1-hour rain will occur in July, but less than a 1-percent chance of its coming in December through February. Once in 10 years, a total of 4.4 inches in 24 hours may be expected. There is about a 2-percent chance that this much rain will fall in any July, but a chance of 1-percent or less that this will happen in any other month.

Thunderstorms occur on an average of 46 days a year. They are most frequent from March through November but may occur in any month. Thunderstorms bring most of the short, intense rainfall during summer. Less intense rainfall that lasts for several days sometimes occurs late in spring and delays early tillage. These long, slow spring rains are those most apt to cause local floods because they come when soils are frozen, snow covered, or saturated. Measurable amounts of precipitation occur on an average of 123 days each year. In fall, however, when harvesting needs to be done, long periods of mild sunny weather are typical.

Although the average yearly snowfall is 15.7 inches, the ground is seldom covered with snow for more than a few days. During a normal year, no more than five snowfalls will amount to more than 1 inch.

Relative humidity depends on the temperature, as well as on the moisture content of the air, and therefore is extremely variable. An average for the early morning hours is 87 percent; and for early afternoon, 64 percent. Early morning readings can range from 55 percent to 100 percent. Afternoon readings are seldom more than 75 percent but can fall to 30 percent or, infrequently, to less.

Winds, prevailing from the south, average 8.5 miles per hour. Calm periods seldom persist for as long as 24 hours. Peak gusts, ranging from 50 to 65 miles per hour, generally occur at the beginning of heavy thunderstorms.

During an average year, there are 100 clear days, 101 cloudy days, and 164 days with partly cloudy skies.

Table 13 shows, by month, the average daily maximum and the average daily minimum temperatures at Louisville. The table also gives precipitation data that includes monthly averages.

[9] By DOYLE COOK, meteorologist, and staff, U.S. Weather Bureau, Louisville, Ky.

The probable risk of frost damage to crops can be determined with the help of tables 14 and 15. Critical temperatures of individual crops must, of course, be known. Probabilities of light (32°F.), moderate (28°F.), and severe (24°F.) freezes after various dates in spring and before specified dates in fall are given in these tables. Two tables are necessary because of the climatic differences between the warmer lowlands and urban areas in the western part of the county (table 14) and the relatively higher and colder rural areas in the eastern part (table 15).

TABLE 13.—*Temperature and precipitation at Louisville, Ky.*

Month	Temperature		Precipitation			
	Average daily maximum	Average daily minimum	Average total	1 year in 10 will have— Less than—	1 year in 10 will have— More than—	Average days with 1.0 inch or more of snow
			Inches	*Inches*	*Inches*	*Number*
January	43.5	25.5	4.10	1.16	7.90	1
February	45.6	26.0	3.29	.83	6.48	1
March	53.8	32.8	4.59	1.79	8.41	1
April	66.4	43.1	3.82	1.97	6.15	(1)
May	76.2	52.6	3.90	2.12	7.84	0
June	85.0	61.8	3.99	1.05	7.85	0
July	88.5	65.5	3.36	.69	4.93	0
August	87.3	64.1	2.97	.86	5.52	0
September	81.3	56.7	2.63	.85	4.71	0
October	69.6	45.2	2.25	.75	4.08	0
November	54.4	33.9	3.20	1.15	5.80	(1)
December	44.7	26.8	3.22	1.68	4.99	1

[1] Less than 1 day per year.

TABLE 14.—*Probabilities of last freezing temperatures in spring and first in fall at Louisville, Ky.*

Probability	Dates for given probability and temperature		
	24° F. or lower	28° F. or lower	32° F. or lower
Spring:			
1 year in 10 later than	Mar. 28	Apr. 9	Apr. 16
2 years in 10 later than	Mar. 22	Apr. 3	Apr. 10
5 years in 10 later than	Mar. 10	Mar. 23	Apr. 1
Fall:			
1 year in 10 earlier than	Nov. 10	Nov. 2	Oct. 23
2 years in 10 earlier than	Nov. 16	Nov. 7	Oct. 28
5 years in 10 earlier than	Nov. 27	Nov. 16	Nov. 7

TABLE 15.—*Probabilities of last freezing temperatures in spring and first in fall at Anchorage, Ky.*

Probability	Dates for given probability and temperature		
	24° F. or lower	28° F. or lower	32° F. or lower
Spring:			
1 year in 10 later than	Apr. 15	Apr. 30	May 10
2 years in 10 later than	Apr. 9	Apr. 24	May 4
5 years in 10 later than	Mar. 28	Apr. 13	Apr. 25
Fall:			
1 year in 10 earlier than	Oct. 22	Oct. 13	Sept. 30
2 years in 10 earlier than	Oct. 28	Oct. 18	Oct. 5
5 years in 10 earlier than	Nov. 8	Oct. 27	Oct. 15

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Glossary

Acidity. See Reaction.

Alluvium. Sand, mud, or other fine material that has been deposited on land by streams.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a 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 clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

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; will 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 and brittle; little affected by moistening.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Erosion hazard. An evaluation of the susceptibility of a soil to loss of surface soil by erosion, and the probable damage to the soil by more erosion. In Jefferson County the classes of erosion hazard are—none, moderately low, moderate, moderately high, high and very high.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Fragipan. A loamy, brittle subsurface horizon, very low in organic matter and clay but rich in silt or very fine sand. A fragipan is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching, soil. The removal of soluble materials from soils or other material by percolating water.

Loess. Geologic deposit of relatively uniform, fine material, mostly silt, presumably transported by wind.

Moisture-supplying capacity. The capacity of a soil to take in and hold moisture in a form available to most plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Morphology, soil. The physical constitution of the soil expressed in the kinds of horizons, their thickness and arrangement in the profile, and their color, texture, structure, consistence, and chemical and biological properties.

Mottling, soil. Irregular spots or patches of different colors, usually indicating poor aeration and lack of drainage. The pattern of mottles is described as to abundance, size, and contrast. Descriptive terms are as follows: Abundance—*few*, *common*, and *many;* size—*fine*, *medium* and *coarse;* contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural drainage. Refers to the conditions that existed during the development of the soil, 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 different classes of natural drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Imperfectly or somewhat poorly drained soils are wet for significant periods but not all the time; podzolic soils that are somewhat poorly drained commonly have mottlings in the lower part of the A horizon and in the B and C horizons (at a depth below 6 to 16 inches).

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly absent in some.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; C horizon in the soil profile.

Permeability. The quality of a soil that enables water and air to move through it; can be measured in terms of rate of flow of water through a unit cross section of saturated soil in unit time. Rates are expressed in inches per hour, as follows:

	Inches per hour
Slow	Less than 0.2
Moderately slow	0.2 to 0.8
Moderate	0.8 to 2.5
Moderately rapid	2.5 to 5.0
Rapid	More than 5.0

Profile, soil. A vertical section of a soil through all of its horizons and extending into the parent material.

Reaction. The degree of acidity or alkalinity of a soil, expressed in pH values or in words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of the land surface, considered collectively.

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

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, but sand may be of any mineral composition. As a textural class, soil material that is 85 percent or more sand and not more than 10 percent clay.

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 textural class, soil material that is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon 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 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). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes 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 characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; commonly, that part of the profile below plow depth.

Substratum. Any layer beneath the solum, or true soil; applies to both parent material and other layers unlike the parent material below the B horizon.

Surface runoff. The water that flows off the land surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness.

Terrace. An embankment or ridge constructed across sloping soils on the contour or at a slight angle to the contour. A terrace intercepts surface runoff so that it will soak into the soil or flow slowly to a prepared outlet without harm.

Terrace (geological). An old alluvial plain, usually flat or undulating, bordering a stream; frequently called a second bottom, as contrasted to a first bottom or flood plain; seldom subject to overflow.

Topsoil. A presumed fertile soil or soil material, generally rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and ordinarily lying at a higher elevation than the alluvial plain or stream terrace.

GUIDE TO MAPPING UNITS

[See table 1, p. 9, for approximate acreage and proportionate extent of soils; table 2, p. 56, for estimated average acre yields of crops; table 4, p. 72, table 5, p. 82, and table 6, p. 84, for information significant to soil engineering; and table 7, p. 92, for information pertaining to nonagricultural uses of soils]

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Number	Woodland group Page	Wildlife group Number	Wildlife group Page
AsA	Ashton silt loam, 0 to 2 percent slopes	8	I-3	42	1	63	1	69
AsB	Ashton silt loam, 2 to 6 percent slopes	8	IIe-1	43	2	63	1	69
BaB	Beasley silt loam, 2 to 6 percent slopes	10	IIe-2	43	7	64	1	69
BaB2	Beasley silt loam, 2 to 6 percent slopes, eroded	10	IIe-2	43	7	64	1	69
BaC2	Beasley silt loam, 6 to 12 percent slopes, eroded	10	IIIe-4	46	7	64	1	69
BaD2	Beasley silt loam, 12 to 20 percent slopes, eroded	11	IVe-3	50	7	64	2	69
BeB3	Beasley silty clay loam, 2 to 6 percent slopes, severely eroded	11	IIIe-14	48	11	65	3	70
BeC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	11	IVe-11	51	11	65	3	70
BeD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	11	VIe-2	52	11	65	3	70
Br	Breaks and Alluvial land	12	VIIe-4	55	16	66	3	70
CaA	Captina silt loam, 0 to 2 percent slopes	12	IIw-1	44	5	64	2	69
CaB	Captina silt loam, 2 to 6 percent slopes	12	IIe-6	44	5	64	2	69
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded	12	IIIe-8	47	5	64	2	69
CdB2	Corydon silt loam, 2 to 6 percent slopes, eroded	13	IIIe-10	47	12	66	2	69
CmC3	Corydon silty clay loam, 6 to 12 percent slopes, severely eroded	13	VIe-4	53	11	65	3	70
CnC	Corydon very rocky silt loam, 6 to 12 percent slopes	13	VIs-1	53	12	66	2	69
CnD	Corydon very rocky silt loam, 12 to 20 percent slopes	13	VIs-1	53	12	66	2	69
CnE	Corydon very rocky silt loam, 20 to 30 percent slopes	14	VIIs-2	55	12	66	2	69
CrC3	Corydon very rocky silty clay loam, 6 to 12 percent slopes, severely eroded	14	VIs-2	54	11	65	3	70
CrD3	Corydon very rocky silty clay loam, 12 to 20 percent slopes, severely eroded	14	VIIs-2	55	11	65	3	70
CrE3	Corydon very rocky silty clay loam, 20 to 30 percent slopes, severely eroded	14	VIIs-2	55	11	65	3	70
CsA	Crider silt loam, 0 to 2 percent slopes	15	I-3	42	4	63	1	69
CsB	Crider silt loam, 2 to 6 percent slopes	15	IIe-1	43	4	63	1	69
CsB2	Crider silt loam, 2 to 6 percent slopes, eroded	15	IIe-1	43	4	63	1	69
CsC	Crider silt loam, 6 to 12 percent slopes	15	IIIe-1	45	4	63	1	69
CsC2	Crider silt loam, 6 to 12 percent slopes, eroded	16	IIIe-1	45	4	63	1	69
CsC3	Crider silt loam, 6 to 12 percent slopes, severely eroded	16	IVe-9	51	11	65	2	69
CsD2	Crider silt loam, 12 to 20 percent slopes, eroded	16	IVe-1	50	4	63	1	69
DcA	Dickson silt loam, 0 to 2 percent slopes	16	IIw-1	44	5	64	2	69
DcB	Dickson silt loam, 2 to 6 percent slopes	17	IIe-6	44	5	64	2	69
Dn	Dunning silty clay loam	17	IIIw-7	49	3	63	3	70
EkA	Elk silt loam, 0 to 2 percent slopes	17	I-3	42	2	63	1	69
EkB	Elk silt loam, 2 to 6 percent slopes	18	IIe-1	43	2	63	1	69
En	Ennis cherty silt loam	18	IIs-1	45	1	63	2	69
FaD	Fairmount flaggy silty clay, 12 to 20 percent slopes	18	VIe-1	52	11	65	2	69

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Number	Woodland group Page	Wildlife group Number	Wildlife group Page
FaD3	Fairmount flaggy silty clay, 12 to 20 percent slopes, severely eroded	19	VIe-4	53	11	65	3	70
FaE	Fairmount flaggy silty clay, 20 to 30 percent slopes	19	VIe-1	52	11	65	2	69
FaE3	Fairmount flaggy silty clay, 20 to 30 percent slopes, severely eroded	19	VIIe-2	55	11	65	3	70
FaF	Fairmount flaggy silty clay, 30 to 50 percent slopes	19	VIIe-1	54	11	65	3	70
Gm	Ginat silt loam	20	IVw-1	51	3	63	3	70
Gn	Gullied land	20	VIIe-4	55	16	66	3	70
Gu	Guthrie silt loam	20	IVw-1	51	3	63	3	70
HgD	Holston gravelly silt loam, 12 to 20 percent slopes	21	IVe-2	50	13	66	2	69
HgE	Holston gravelly silt loam, 20 to 30 percent slopes	21	VIe-7	53	13	66	2	69
Hn	Huntington fine sandy loam	21	I-1	42	1	63	1	69
Hs	Huntington silt loam	22	I-1	42	1	63	1	69
LaB	Lakin loamy fine sand, 2 to 6 percent slopes	22	IIIs-1	49	14	66	3	70
LaC	Lakin loamy fine sand, 6 to 12 percent slopes	22	IVs-2	52	14	66	3	70
LaD	Lakin loamy fine sand, 12 to 25 percent slopes	22	VIs-3	54	14	66	3	70
Lb	Lawrence silt loam	23	IIIw-1	48	6	64	2	69
Ld	Lindside silt loam	23	I-2	42	1	63	1	69
LeD	Litz silt loam, 12 to 20 percent slopes	24	VIe-7	53	9	65	2	69
LmE	Litz-Muskingum silt loams, 20 to 30 percent slopes	24	VIe-7	53	8,9	64,65	3	70
LmF	Litz-Muskingum silt loams, 30 to 50 percent slopes	24	VIIe-1	54	8,9	64,65	3	70
LnB	Loring silt loam, 2 to 6 percent slopes	24	IIe-10	44	10	65	1	69
LnC2	Loring silt loam, 6 to 12 percent slopes, eroded	25	IIIe-2	46	10	65	1	69
LoC2	Loring-Crider silt loams, 6 to 12 percent slopes, eroded	25	IIIe-2	46	4,10	63,65	1	69
LsC2	Lowell silt loam, 6 to 12 percent slopes, eroded	25	IIIe-2	46	7	64	1	69
Ma	Made land	26	VIIe-4	55	16	66	3	70
MdB2	Markland silt loam, 2 to 6 percent slopes, eroded	26	IIIe-14	48	7	64	2	69
MdC2	Markland silt loam, 6 to 12 percent slopes, eroded	26	IVe-8	50	7	64	2	69
MdE	Markland silt loam, 12 to 30 percent slopes	26	VIe-1	52	7	64	2	69
Mg	McGary silt loam	27	IIIw-1	48	15	66	2	69
Mm	Melvin silt loam	27	IIIw-5	49	3	63	3	70
Mn	Melvin silty clay loam	27	IIIw-5	49	3	63	3	70
Mo	Melvin silt loam, overwash	27	IIw-4	45	3	63	2	69
MpB	Memphis silt loam, 2 to 6 percent slopes	28	IIe-1	43	10	65	1	69
MpC2	Memphis silt loam, 6 to 12 percent slopes, eroded	28	IIIe-2	46	10	65	1	69
MpD2	Memphis silt loam, 12 to 20 percent slopes, eroded	28	VIe-7	53	10	65	2	69
MpE2	Memphis silt loam, 20 to 30 percent slopes, eroded	28	VIe-7	53	10	65	2	69
MuF	Muskingum stony soils, 30 to 50 percent slopes	29	VIIs-2	55	8,9	64,65	3	70
Ne	Newark silt loam	29	IIw-4	45	3	63	2	69
OcD	Otway silty clay, 12 to 20 percent slopes	30	VIe-1	52	11	65	3	70

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Number	Woodland group Page	Wildlife group Number	Wildlife group Page
OcD3	Otway silty clay, 12 to 20 percent slopes, severely eroded	30	VIIs-3	55	11	65	3	70
Pd	Purdy silt loam	30	IVw-1	51	3	63	3	70
Rb	Robertsville silt loam	30	IVw-1	51	3	63	2	69
RcE	Rockcastle silt loam, 15 to 30 percent slopes	31	VIIs-3	55	9	65	3	70
Rd	Rock land	31	VIIs-5	55	16	66	3	70
RuA	Russellville silt loam, 0 to 2 percent slopes	31	I-3	42	4	63	1	69
RuB	Russellville silt loam, 2 to 6 percent slopes	32	IIe-10	44	4	63	1	69
RuB2	Russellville silt loam, 2 to 6 percent slopes, eroded	32	IIe-10	44	4	63	1	69
RuC2	Russellville silt loam, 6 to 12 percent slopes, eroded	32	IIIe-2	46	4	63	1	69
ScA	Sciotoville silt loam, 0 to 2 percent slopes	33	IIw-1	44	5	64	2	69
ScB	Sciotoville silt loam, 2 to 6 percent slopes	33	IIe-6	44	5	64	2	69
ScC2	Sciotoville silt loam, 6 to 12 percent slopes, eroded	33	IIIe-8	47	5	64	2	69
SfA	Sequatchie fine sandy loam, 0 to 2 percent slopes	33	I-3	42	2	63	1	69
SfB	Sequatchie fine sandy loam, 2 to 6 percent slopes	34	IIe-1	43	2	63	1	69
SfC2	Sequatchie fine sandy loam, 6 to 12 percent slopes, eroded	34	IIIe-2	46	2	63	1	69
ShB	Shelbyville silt loam, 2 to 6 percent slopes	34	IIe-1	43	4	63	1	69
Ta	Taft silt loam	34	IIIw-1	48	6	64	2	69
Ty	Tyler silt loam	35	IIIw-1	48	6	64	2	69
Wb	Weinbach silt loam	35	IIIw-1	48	3	63	2	69
WcF	Westmoreland-Litz-Muskingum complex, 30 to 50 percent slopes	36	VIIe-1	54	8,9	64,65	3	70
WeA	Wheeling silt loam, 0 to 2 percent slopes	36	I-3	42	2	63	1	69
WeB	Wheeling silt loam, 2 to 6 percent slopes	36	IIe-1	43	2	63	1	69
WeC2	Wheeling silt loam, 6 to 12 percent slopes, eroded	36	IIIe-1	45	2	63	1	69
WeD2	Wheeling silt loam, 12 to 20 percent slopes, eroded	37	IVe-1	50	2	63	1	69
WeE2	Wheeling silt loam, 20 to 30 percent slopes, eroded	37	VIe-7	53	2	63	2	69
WmB	Woolper silty clay loam, 2 to 6 percent slopes	37	IIe-2	43	7	64	1	69
WmC2	Woolper silty clay loam, 6 to 12 percent slopes, eroded	38	IIIe-4	46	7	64	1	69
ZaB	Zanesville silt loam, 2 to 6 percent slopes	38	IIe-10	44	4	63	2	69
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	38	IIIe-2	46	4	63	2	69
ZaD2	Zanesville silt loam, 12 to 20 percent slopes, eroded	38	IVe-3	50	4	63	2	69
Zp	Zipp silty clay	39	IIIw-4	48	3	63	3	70

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