SOIL SURVEY

Harrison County, Kentucky

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

Major fieldwork for this soil survey was done in the period 1961-64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in Harrison County in 1965. This survey was made cooperatively by the Soil Conservation Service and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Harrison County Soil Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Harrison County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Harrison County are shown on the detailed map at the back of this soil survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. 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 and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units.

Foresters and others can refer to the subsection "Woodland," where the soils of the county are discussed generally according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Managing the Soils for Wildlife."

Engineers and builders will find under "Engineering Applications" tables that give engineering properties of the soils in the county and that name soil features that affect engineering practices and structures.

Community planners and others concerned with community development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Use of Soils for Building Sites and Recreational Facilities."

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

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

Newcomers in Harrison County may 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."

Cover picture: **Tobacco on Loradale silt loam in Harrison County, Kentucky.**

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Contents

NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued April 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF HARRISON COUNTY, KENTUCKY

BY HUBERT B. ODOR, BILLY C. WEISENBERGER, ROBERT L. BLEVINS, AND JOHN L. TAYLOR,
SOIL CONSERVATION SERVICE

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

HARRISON COUNTY, in the northern part of Kentucky (fig. 1), has a land area of 308 square miles, or 197,120 acres. According to the 1960 census, the population of the county was 13,704 and that of Cynthiana, the county seat, was 5,641.

This county is undulating to hilly. Its soils generally are of limestone origin and are fertile. Elevations range from about 540 feet to about 1,000 feet above sea level.

Agriculture is diversified in Harrison County. The growing of tobacco and the raising of livestock are the principal enterprises. In 1959, the total value of farm products, including livestock, sold in the county was about $8 million. About half of that amount was from the sale of crops, mainly tobacco, and most of the rest was from the sale of livestock, chiefly beef cattle. Dairy cattle, hogs, and sheep also contribute to the economy of the county.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Harrison 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 material that has not been changed much by leaching or by roots of plants.

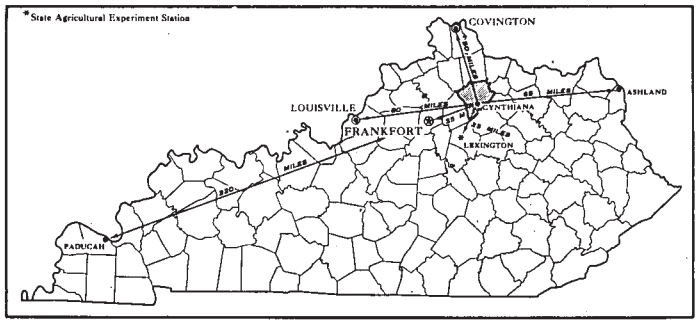

Figure 1.—Location of Harrison County in Kentucky.

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 survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important 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. Cynthiana and Faywood, 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 those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

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. Faywood silt loam and Faywood silty clay loam are two soil types in the Faywood series. The difference in texture of their surface layer is apparent from their names.

Some 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, Faywood silty clay loam, 2 to 6 percent slopes, eroded, is one of several phases of Faywood silty clay loam, a soil type that ranges from nearly level to strongly sloping.

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. These photographs show woodland, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey 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 some places two or more similar soils are mapped as a single unit, called an undifferentiated soil group, if the differences between the soils are too small to justify separate mapping. An example in this county is Fairmount and Cynthiana extremely rocky soils, 20 to 30 percent slopes. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Gullied land or Rock land, and are called land types rather than soils.

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 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 the soil survey. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and then test these by further study and by consultation with farmers, agronomists, engineers, and others. 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 the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Harrison County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The four soil associations in Harrison County shown on the general soil map are described in the following pages.

1. Faywood-Loradale Association

Deep and moderately deep, well-drained, gently sloping to moderately steep soils on uplands

This association, a geologic basin in the south-central part of the county, is in an area locally called the Inner Bluegrass Area. The association is in the southern half of the county and is divided into two parts by the Elk-Ashton-Huntington Association along the South Fork Licking River. It occupies about 45,400 acres, or about 23 percent of the county.

The Faywood soils make up about 45 percent of this association; the Loradale soils, about 30 percent; and minor soils, the remaining 25 percent (fig. 2).

The Faywood soils are generally moderately deep. They have a dark grayish-brown silt loam surface layer and a yellowish-brown clayey subsoil. The Loradale soils are deep. Their surface layer is dark-brown silt loam, and their subsoil is strong brown and clayey.

Among the minor soils in this association are the Maury, the McAfee, the Mercer, the Huntington, and the Lindside. The Maury soils are deep and have a dark-brown silt loam surface layer and a reddish-brown to red silty clay loam subsoil. The McAfee soils are moderately deep and have a dark-brown silt loam surface layer and a reddish-brown silty clay to clay subsoil. The Mercer soils have a fragipan and are moderately well drained. The Huntington and Lindside soils occur on flood plains and are well drained and moderately well drained, respectively.

The soils of this association are nearly all in pasture or meadow, but there are small acreages of tobacco and corn. Although tobacco is an important cash crop, most farms are beef-cattle enterprises on which some hogs are raised. Sheep are raised on a few farms. The average-sized farm is 135 acres.

2. Elk-Ashton-Huntington Association

Deep, mostly well-drained, nearly level to sloping soils on terraces and flood plains along major streams

Most of this association is in a long narrow strip, generally less than 1 mile wide, along the South Fork Licking River. Smaller areas are along the Licking River and Beaver and Mill Creeks. The landscape is generally nearly level, but some areas are strongly sloping. The association occupies about 20,000 acres, or about 10 percent of the county.

The Elk soils make up about 30 percent of this association; the Ashton soils, about 22 percent; the Huntington soils, about 20 percent; and minor soils, the remaining 28 percent (fig. 3).

The Huntington soils occur on the flood plains and consist of dark grayish-brown silt loam. These soils are below the Ashton soils, which are on the lower terraces. The Elk soils are above the Ashton soils. The Elk soils have a brown silt loam surface layer and a light silty clay loam subsoil. The Ashton soils have a dark-brown surface layer and are mostly silt loam throughout.

The Captina, Lindside, Lawrence, and Egam soils occur in small areas. Both the Captina and Lawrence soils have a fragipan. The Lindside soils occur on flood plains. The Captina soils are moderately well drained, and the Lawrence soils are somewhat poorly drained. The Egam soils

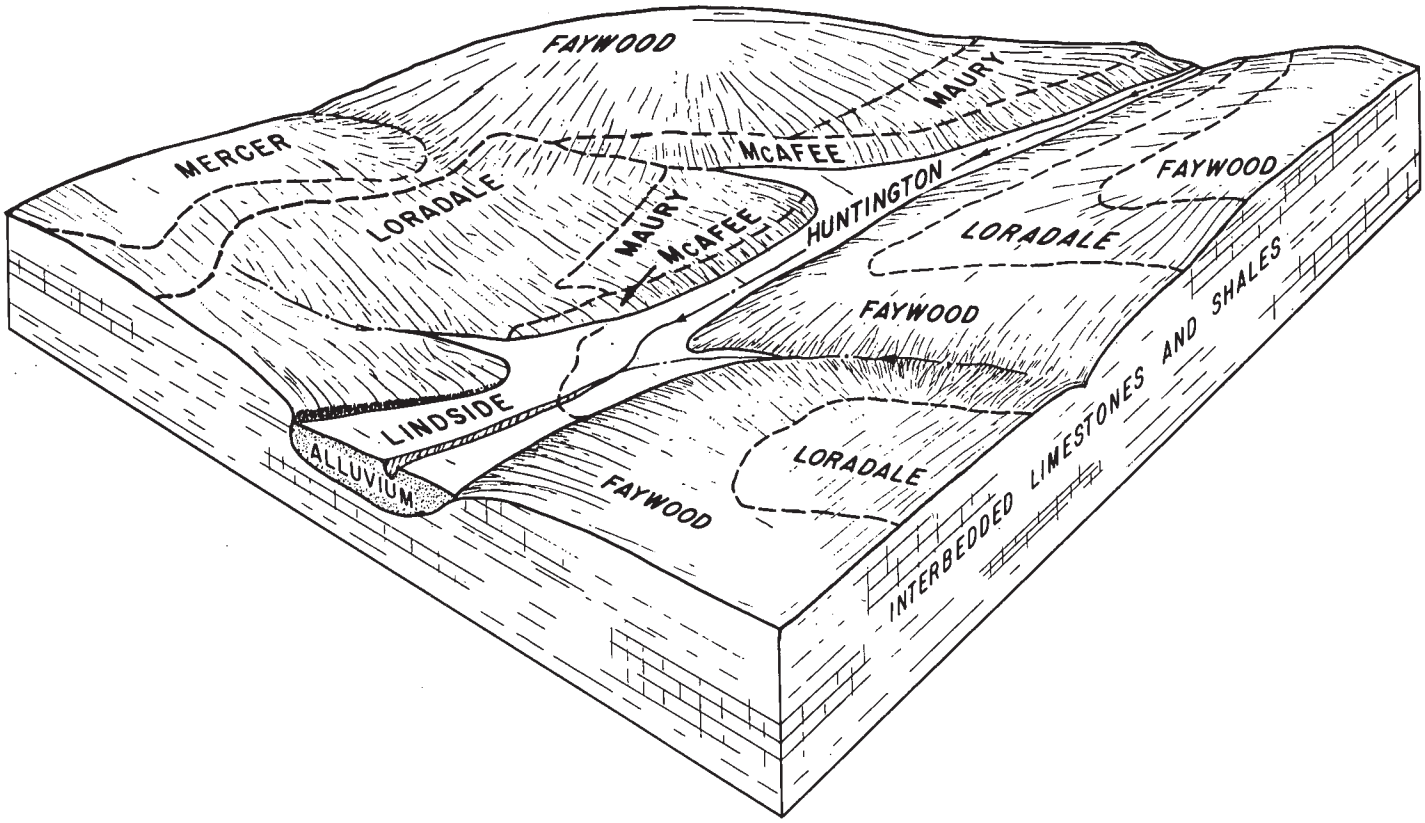

Figure 2.—Major and minor soils in association 1, their relationship to the landscape, and the parent material from which the soils formed

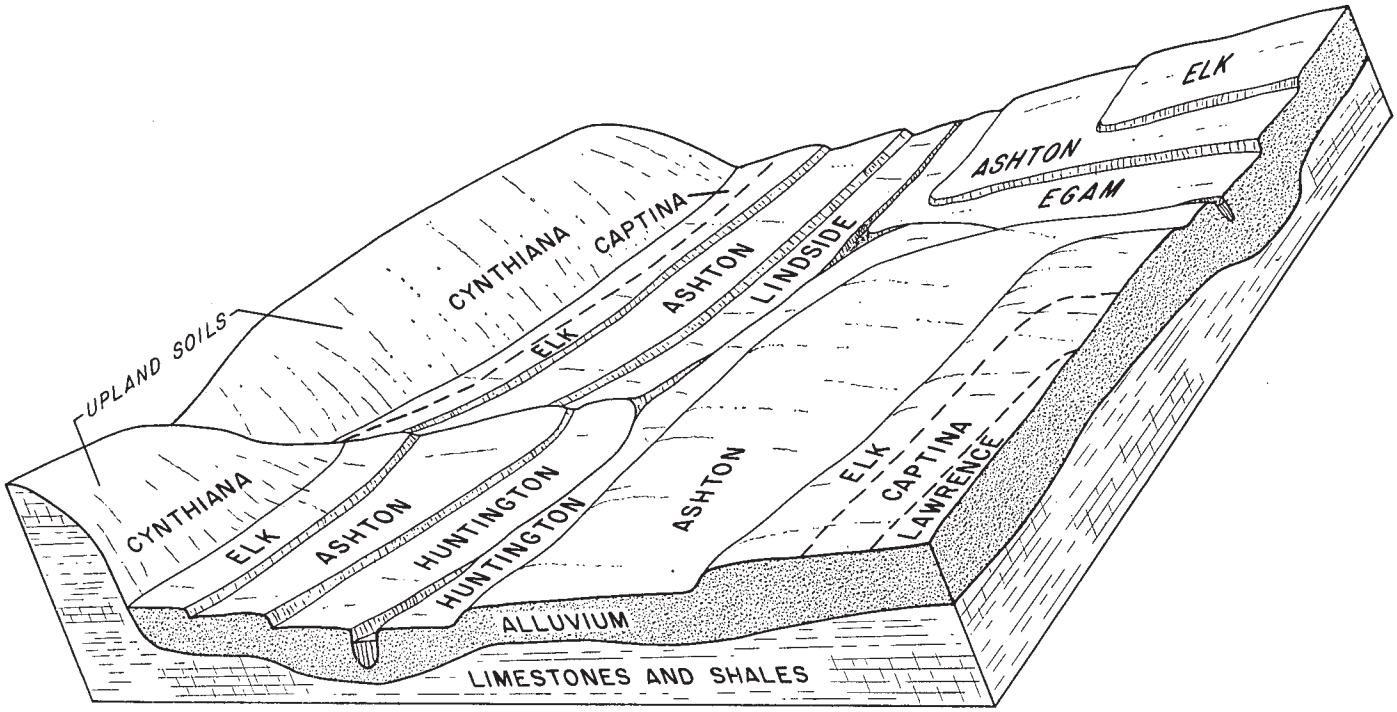

Figure 3.—Major soils in association 2, their relationship to the landscape, and the parent material from which the soils formed

have a slightly compact subsoil and are moderately well drained or well drained.

The soils of this association are farmed fairly intensively. Tobacco is grown on the well-drained soils where flooding is not likely. Most of the other areas in the association are used for corn, small grain, and hay. A farm typical of the association is about 180 acres in size and includes some land on hills and bluffs.

3. Cynthiana-Faywood Association

Shallow and moderately deep, sloping and moderately steep soils on uplands

Moderately high hills and moderately wide alluvial valleys dominate in this association. Most of the association is in broad areas in the western half of the county. Other areas are narrow, irregular broken strips along Beaver Creek and the Licking River. This association covers about 68,600 acres, or about 35 percent of the county.

The Cynthiana soils make up about 60 percent of this association; the Faywood soils, about 30 percent; and minor soils, the remaining 10 percent (fig. 4).

The Cynthiana soils are on the steeper hillsides and are shallow. They are well drained and have a brown or yellowish-brown silty clay loam to clay surface layer. Stones are common on the surface and throughout the profile. The Faywood soils are also well drained, but they are moderately deep and occupy ridgetops. They have a brown silt loam or silty clay loam surface layer.

Also in this association, on uplands, are the well-drained, deep Heitt soils, the moderately deep Eden soils, and the shallow Fairmount soils. In the narrow valleys are the well drained Huntington and Ashton soils and the moderately well drained Lindside soils.

Farms average about 116 acres in size. On a typical farm, a small acreage of tobacco is grown on the soils in the valleys and on ridgetops that have suitable slopes. Except for rougher parts in trees or bushes, the rest of a typical farm is in hay and pasture.

4. Eden-Heitt Association

Moderately deep and deep soils on sloping to moderately steep hillsides and narrow, winding ridges

This association consists of hilly areas, locally known as Eden Hills, that are characterized by narrow ridgetops and V-shaped drains and valleys. Most of the association is in two large general areas. One is an irregular area on the western and northwestern border of the county and the other is in the eastern and northeastern parts. The association occupies about 63,000 acres, or 32 percent of the county.

The Eden soils make up about 70 percent of this association; the Heitt soils, about 15 percent; and the Brashear and associated soils, about 15 percent (fig. 5). The Brashear soils are on foot slopes.

The Eden soils are on the steeper slopes and, in some areas, occupy all of a ridge from its top to the foot slopes. These soils have a brown to olive-brown surface layer and a yellowish-brown to olive-brown, clayey subsoil. Limestone flagstones are common on the surface and in the soil. The Heitt soils are mostly on the wider ridges and are deep and well drained. They have a brown silt loam or silty clay loam surface layer and a yellowish-brown silty clay or clay subsoil.

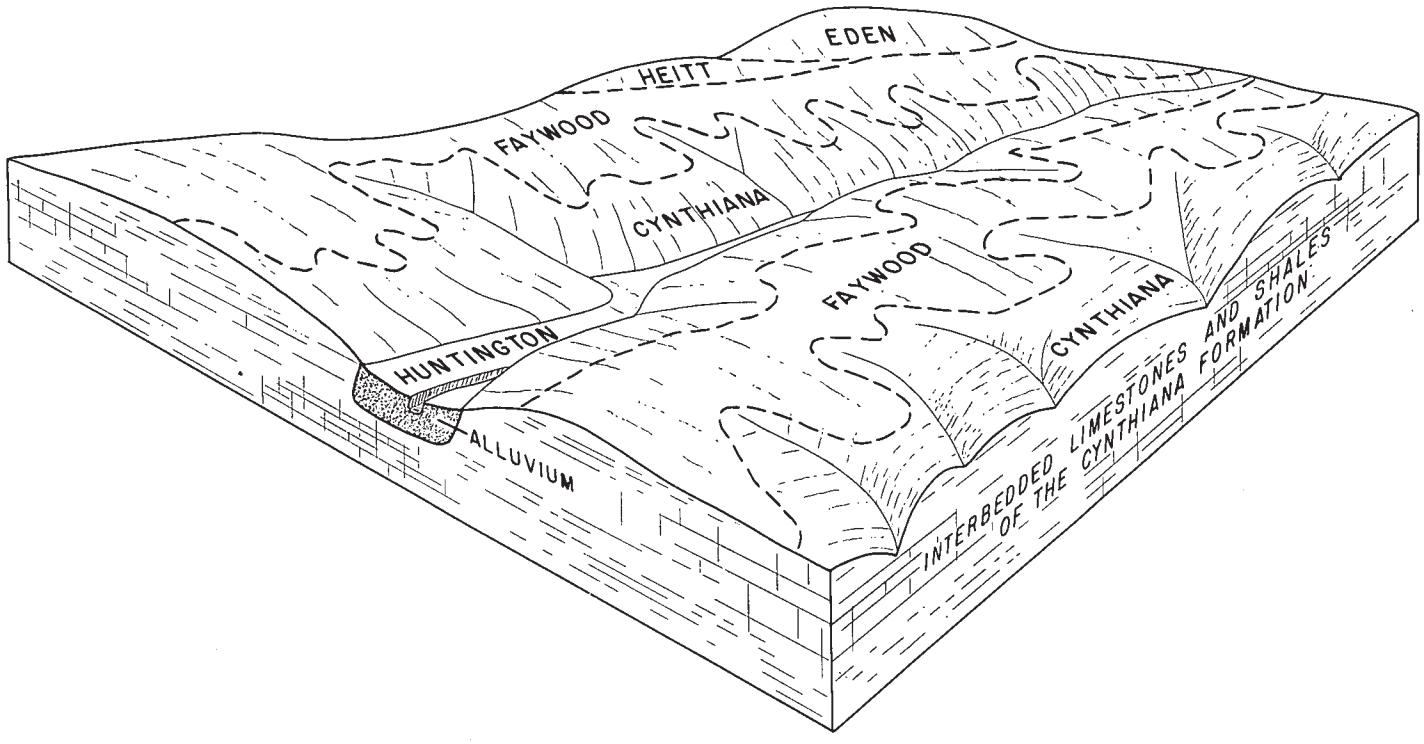

Figure 4.—Major soils in association 3, their relationship to the landscape and the parent material from which the soils formed.

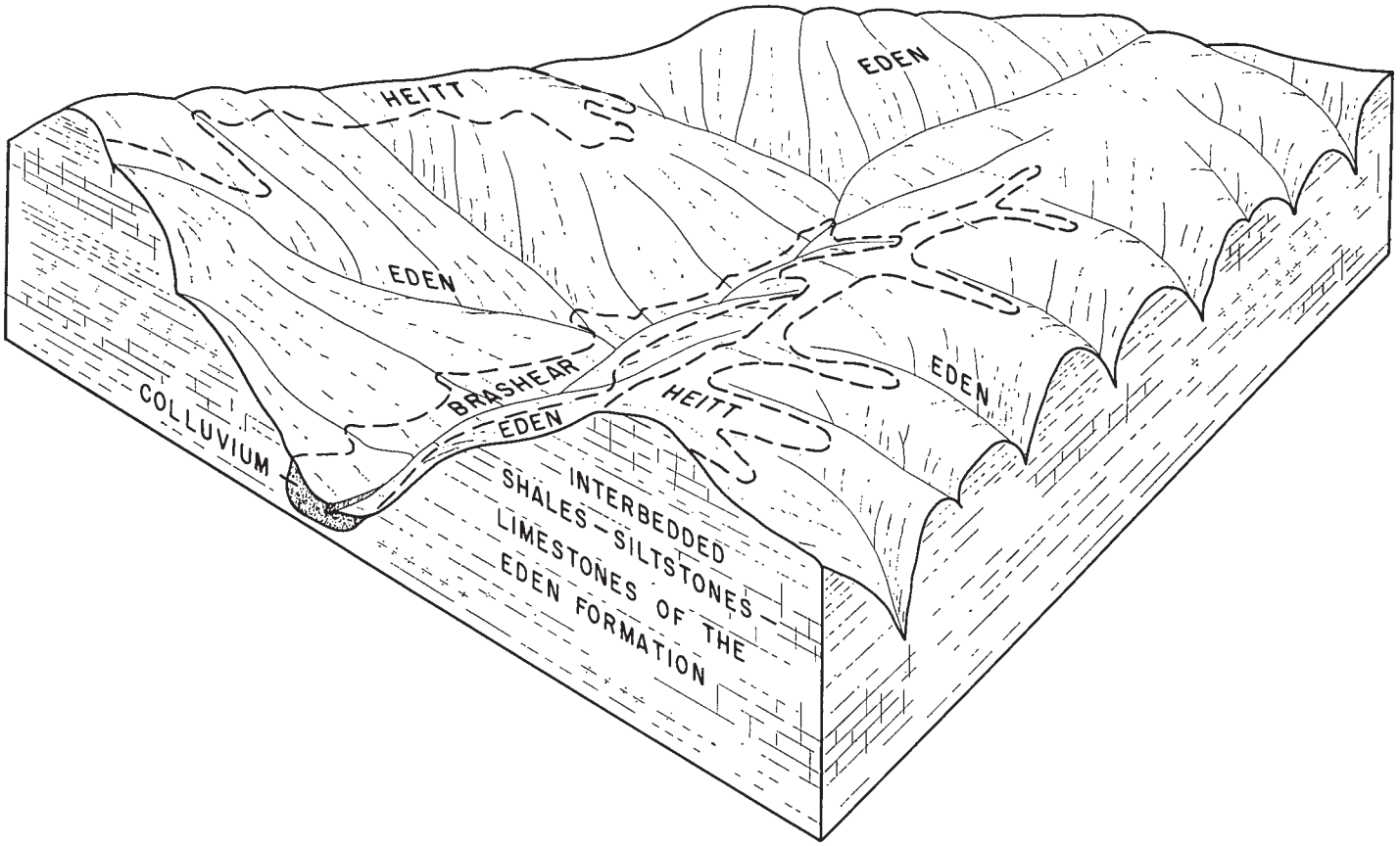

Figure 5.—**Major soils in association 4, their relationship to the landscape, and the parent material from which the soils formed.**

The soils in this association are used mostly for general farming. Typically, a small acreage of a farm is used for tobacco, and the rest is in pasture or hay or in trees of low quality. On many farms the cropland not used for tobacco is idle or grown up in bushes. The average-sized farm is 110 acres.

Descriptions of the Soils

This section describes the soil series, groups of similar soils, and the single soils, or mapping units, of Harrison County. The acreage and proportionate extent of each mapping unit are given in table 1.

The procedure in this section is first to describe the soil series and then the mapping units in the series. Thus to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How This Survey Was Made," not all mapping units are of a soil series. For example, Gullied land and Made land are miscellaneous land types and do not belong to a soil series; nevertheless, they, and the other land types in the county, are listed in alphabetic order along with the series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit to which the mapping unit has been placed. The pages on which each capability unit is described can be found by referring to the "Guide to Mapping Units" at the back of this publication.

Soil scientists, engineers, students, and others who want detailed descriptions of the soils series should turn to the section "Formation and Classification of Soils." Many terms used in the soil descriptions and other sections are defined in the Glossary and the "Soil Survey Manual" (*9*).[1]

Allegheny Series

The Allegheny series consists of deep, well-drained, moderately productive soils that are gently sloping to strongly sloping. These soils are inextensive in this county. They occur on old high terraces along the Licking River in the northeastern part of the county. Allegheny soils developed in old alluvium that washed from soils formed in material weathered mainly from acid sandstone and shale but partly from limestone. The main layers of a representative profile are—

0 to 8 inches, dark-brown loam that readily crumbles; almost neutral.
8 to 13 inches, brown loam that crumbles under slight pressure of hand; slightly acid.
13 to 30 inches, brown or yellowish-brown heavy loam that, when moist, crumbles under slight pressure of hand; medium acid.
30 to 48 inches, brown gravelly sandy clay; gravel increases with depth; medium acid.

[1] Italic numbers in parentheses refer to Literature Cited, p. 56.

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

Soil	Acres	Percent	Soil	Acres	Percent
Allegheny loam, 2 to 6 percent slopes	320	0.2	Fairmount and Cynthiana extremely rocky soils, 20 to 30 percent slopes	1,290	0.7
Allegheny loam, 6 to 12 percent slopes, eroded	680	.3	Fairmount and Cynthiana extremely rocky soils, 30 to 50 percent slopes	1,200	.6
Allegheny loam, 12 to 20 percent slopes, eroded	220	.1	Faywood silt loam, 2 to 6 percent slopes	4,370	2.2
Ashton silt loam, 0 to 2 percent slopes	2,290	1.2	Faywood silt loam, 6 to 12 percent slopes	2,230	1.1
Ashton silt loam, 2 to 6 percent slopes	1,920	1.0	Faywood silty clay loam, 2 to 6 percent slopes, eroded	960	.5
Ashton silt loam, 6 to 12 percent slopes	460	.2	Faywood silty clay loam, 6 to 12 percent slopes, eroded	16,710	8.5
Brashear silt loam, 2 to 6 percent slopes	2,430	1.2	Faywood silty clay loam, 12 to 20 percent slopes, eroded	10,500	5.3
Brashear silt loam, 6 to 12 percent slopes	1,770	.9	Gullied land	60	(1)
Brashear silty clay loam, 6 to 12 percent slopes, eroded	1,740	.9	Heitt silt loam, 2 to 6 percent slopes	790	.4
Brashear silty clay loam, 12 to 20 percent slopes, eroded	420	.3	Heitt silty clay loam, 6 to 12 percent slopes, eroded	6,810	3.5
Captina silt loam, 0 to 2 percent slopes	360	.2	Heitt silty clay loam, 2 to 6 percent slopes, eroded	660	.3
Captina silt loam, 2 to 6 percent slopes	750	.4	Huntington channery silt loam, shallow	450	.2
Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded	1,020	.6	Huntington silt loam, 0 to 4 percent slopes	6,940	3.5
Cynthiana very stony silty clay loam, 12 to 20 percent slopes, eroded	13,480	6.8	Huntington silt loam, 4 to 20 percent slopes	420	.2
Cynthiana very stony silty clay loam, 20 to 30 percent slopes, eroded	9,090	4.6	Lanton silt loam	160	(1)
Cynthiana very stony clay, 6 to 12 percent slopes, severely eroded	730	.4	Lawrence silt loam	430	.2
Cynthiana very stony clay, 12 to 20 percent slopes, severely eroded	10,380	5.0	Lindside silt loam	3,880	2.0
Cynthiana very rocky clay, 20 to 30 percent slopes, severely eroded	10,980	5.6	Loradale silt loam, 2 to 6 percent slopes	7,770	3.9
Eden flaggy silty clay, 6 to 12 percent slopes, severely eroded	2,120	1.1	Loradale silt loam, 6 to 12 percent slopes, eroded	5,650	2.9
Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded	17,060	8.7	Made land	110	(1)
Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded	29,540	15.0	Maury silt loam, 2 to 6 percent slopes	1,280	.6
Egam silt loam	220	.1	Maury silt loam, 6 to 12 percent slopes, eroded	760	.4
Elk silt loam, 0 to 2 percent slopes	930	.5	McAfee silt loam, 6 to 12 percent slopes, eroded	2,760	1.4
Elk silt loam, 2 to 6 percent slopes	3,530	1.8	McAfee silt loam, 12 to 20 percent slopes, eroded	1,700	.9
Elk silt loam, 6 to 12 percent slopes	1,450	.7	Mercer silt loam, 2 to 6 percent slopes	620	.3
Elk silt loam, 12 to 20 percent slopes, eroded	200	.1	Newark silt loam	470	.2
Etowah silt loam, 2 to 6 percent slopes	1,740	.9	Rock land	720	.4
Etowah silt loam, 6 to 12 percent slopes, eroded	1,590	.8	Total	197,120	100.0

[1] Less than 0.1 percent.

The amount of sand in the profile varies. Underlying sandy material is at a depth ranging from about 2 to 4 feet and is 4 to 12 feet thick.

Allegheny loam, 2 to 6 percent slopes (AlB).—The plow layer of this gently sloping soil is dark-brown, friable loam 6 to 10 inches thick. The subsoil is yellowish-brown loam that contains slightly more clay than the loam in the surface layer. The subsoil is underlain by 4 to 12 feet of stratified sand and gravel mixed with varying amounts of clay.

Included in mapping were some areas that have a silt loam surface layer and some areas that are moderately eroded. Also included were some nearly level areas that have a weak fragipan.

This Allegheny loam has good infiltration. Water and air move well through the subsoil. The root zone is deep, and the moisture-supplying capacity is high. The organic-matter content is medium, and natural fertility is moderate. Good tilth is easily maintained.

This soil is well suited to all locally grown crops and is especially well suited to watermelons and some truck crops. Erosion is a moderate hazard in cultivated areas. To prevent the loss of plant nutrients through leaching, only enough amendments should be added to meet the crop needs during one growing season. (Capability unit IIe–1)

Allegheny loam, 6 to 12 percent slopes, eroded (AlC2).—This sloping soil has a plow layer of brown or dark yellowish-brown loam 5 to 8 inches thick. The subsoil is yellowish-brown loam in which the content of clay increases slightly with depth. The subsoil ranges from 10 to 18 inches in thickness and overlies stratified sand and gravel mixed with varying amounts of clay.

Included in mapping were a few acres that have a silt loam surface layer, some uneroded areas, and a few small severely eroded areas.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move well in the subsoil. Fertility is moderate, though much of the organic matter has been lost through erosion. This soil can be tilled throughout a wide range of moisture content.

All locally grown crops are suited to this soil if lime and fertilizer are applied according to the needs of crops. Erosion is a severe hazard in cultivated areas. (Capability unit IIIe–1)

Allegheny loam, 12 to 20 percent slopes, eroded (AlD2).—This strongly sloping soil has a surface layer of brown loam about 5 inches thick. The yellowish-brown subsoil is exposed in a few small severely eroded areas. The subsoil is about 16 inches thick and is underlain by old mixed alluvium 4 to 10 feet thick.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the soil at a favorable rate. The organic-matter content is low, especially in the severely eroded areas. Tilth is easily maintained, except in the severely eroded spots, where the plow layer crusts and clods if it is worked when wet.

Locally grown crops are suited to this soil if adequate amounts of lime and fertilizer are added and practices are used to control erosion. The strong slopes, however, limit the use of some farm machines. (Capability unit IVe–1)

Ashton Series

The Ashton series consists of deep, well-drained, highly productive soils that are nearly level to sloping. These soils occur along most of the streams in this county. They developed in alluvium washed from soils of limestone origin. The main layers of a representative profile are—

0 to 9 inches, dark-brown silt loam; granular structure; friable; neutral.
9 to 38 inches, brown silt loam in upper part and brown light silty clay loam in lower part; blocky structure; friable; slightly acid.
38 to 48 inches +, dark yellowish-brown, stratified silt loam; friable; slightly acid.

The alluvium ranges from 3 to 10 feet or more in thickness.

These soils are among the most productive in this county and are suited to the crops commonly grown. The lower lying areas are subject to occasional flooding that damages crops, especially tobacco, during some years.

Ashton silt loam, 0 to 2 percent slopes (AsA).—This soil occupies nearly level second bottoms and foot slopes. The plow layer is very dark brown silt loam about 10 inches thick. This layer is underlain by brown silt loam 24 to 30 inches thick. The underlying material is stratified silt loam, silty clay loam, and sandy loam.

Included in mapping, mostly along the smaller streams, were a few acres that have a clayey subsoil. Also included were a few areas that have a fine sandy loam surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the soil at a favorable rate. Natural fertility is high, and organic-matter content is medium. This soil is neutral to slightly acid throughout the profile. It can be worked through a wide range of moisture content. Flooding is a hazard in some areas.

This soil is excellent for farming, and it can be cultivated intensively. In some places diversion channels are needed to intercept water that runs from higher areas. Management that maintains organic-matter content and fertility is beneficial. (Capability unit I–3)

Ashton silt loam, 2 to 6 percent slopes (AsB).—This gently sloping soil is on second bottoms and a few foot slopes. Its plow layer is dark-brown silt loam 8 to 10 inches thick. The subsoil, brown heavy silt loam 24 to 30 inches thick, is underlain by silt loam, loam, and sandy loam.

Included in mapping, mostly along the smaller streams, were a few acres that have a clayey subsoil. Also included were a few areas that have a fine sandy loam surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move well through the soil. This soil has medium organic-matter content, and it can be worked throughout a wide range of moisture content.

This soil is excellent for farming. Yields of all locally grown crops are favorable. The erosion hazard is moderate in cultivated areas. In some places diversion channels are needed to divert runoff from higher areas. (Capability unit IIe–1)

Ashton silt loam, 6 to 12 percent slopes (AsC).—The plow layer of this soil is dark-brown silt loam about 7 inches thick. The subsoil is dark-brown heavy silt loam or light silty clay loam. It is underlain by local alluvium 1 to 4 feet thick. Most areas are on foot slopes.

Included in mapping were a few acres that have a clayey subsoil. Also included were some moderately eroded areas and areas that have a fine sandy loam surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move well through the soil. The organic-matter content is medium, and tillage is easy throughout a wide range of moisture content.

This soil produces favorable yields of all locally grown crops. Erosion is a severe hazard where cultivated crops are grown. In some areas diversion channels are needed to intercept runoff from hillsides above this soil. (Capability unit IIIe–1)

Brashear Series

The Brashear series consists of deep, well drained and moderately well drained, moderately productive soils on foot slopes. These soils formed in local alluvium that washed from Eden and Cynthiana soils. The main layers of a representative profile are—

0 to 7 inches, brown silt loam; weak granular structure; friable.
7 to 18 inches, brown silty clay loam; blocky structure; friable.
18 to 40 inches, yellowish-brown silty clay mottled with pale brown and brownish gray; firm when moist, sticky and plastic when wet.
40 to 48 inches +, olive-brown clay mottled with brown, pale brown, and gray.

The surface layer is silt loam or, in eroded areas, silty clay loam. The alluvial material from which this soil formed extends to a depth of 20 to 40 inches.

These soils are in long narrow bands at the base of steep hills. They are important to farming because in their vicinity other tillable soils are scarce. Brashear soils are suited to all locally grown crops. Most of the acreage has been cleared and is used for tobacco or pasture.

Brashear silt loam, 2 to 6 percent slopes (BrB).—This gently sloping soil has a brown, friable silt loam surface layer. The top layer in the subsoil is brown silty clay loam about 10 inches thick. It is underlain by firm silty clay that is yellowish brown in the upper part and mottled olive brown in the lower part. This soil has been damaged little, if any, by erosion.

Included in mapping were a few acres that have a silty clay loam surface layer and a dark-brown silty clay subsoil.

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This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the lower part of the subsoil at a moderately slow rate. Natural fertility is moderately high, and organic-matter content is medium.

This soil is suited to all locally grown crops, and many areas are used continuously for tobacco. Erosion is a moderate hazard in cultivated areas. In some areas diversion channels and grassed waterways are needed to intercept the water that runs off slopes above this soil. (Capability unit IIe–2)

Brashear silt loam, 6 to 12 percent slopes (BrC).—The plow layer of this sloping soil is brown, friable silt loam. The top layer in the subsoil is brown silty clay loam about 10 inches thick. It is underlain by firm silty clay that is yellowish brown in the upper part and mottled light olive brown in the lower part.

Included in mapping were a few acres that have a silty clay loam surface layer and a brown silty clay subsoil.

This soil has a deep root zone and high moisture-supplying capacity. The surface layer takes in water easily, but the movement of water and air through the soil is moderately slow. Natural fertility is moderately high, and organic-matter content is medium.

This soil is suited to all locally grown crops. It is commonly planted to tobacco because in its vicinity other good tillable soils are scarce. The erosion hazard is severe in cultivated areas. Diversion terraces are needed in many places to intercept the water that runs off from slopes above this soil. (Capability unit IIIe–2)

Brashear silty clay loam, 6 to 12 percent slopes, eroded (BsC2).—The plow layer of this sloping, moderately eroded soil is brown silty clay loam about 5 inches thick. The subsoil is firm silty clay that is yellowish brown in the upper part and light olive brown mottled with gray in the lower part.

Included in mapping were a few severely eroded areas in which the surface layer is lighter colored and more clayey than that described and contains less organic matter. Also included were areas that have a silt loam surface layer and areas where small gullies have formed.

This soil has a deep root zone. Water and air move through the soil more slowly than is desirable. Natural fertility is moderately high, but organic-matter content is low. Because of its content of clay, the plow layer is difficult to till and tends to clod if it is worked when wet.

This soil is suited to the locally grown crops, but a severe hazard of erosion limits the frequency that cultivated crops can be grown. Unless runoff from this soil is intercepted by diversion channels and sodded waterways, it damages cultivated crops. (Capability unit IIIe–2)

Brashear silty clay loam, 12 to 20 percent slopes, eroded (BsD2).—This moderately eroded, strongly sloping soil has a brown silty clay loam plow layer about 4 to 6 inches thick. The subsoil is firm or sticky and plastic, yellowish-brown silty clay that is mottled in the lower part.

Included in mapping were areas that have a silt loam surface layer and areas that have a silty clay surface layer. Also included were severely eroded spots.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the lower subsoil at a moderately slow rate, but this soil is moderately well drained or well drained. Natural fertility is moderately high, and organic-matter content is low. Tillage is difficult, especially in the more severely eroded spots.

This soil can be cultivated only occasionally because the erosion hazard is very severe in cultivated areas. Yields of locally grown crops are favorable. Because slopes are strong, some farm machines are difficult to operate. (Capability unit IVe–1)

Captina Series

The Captina series consists of moderately well drained, strongly acid, moderately productive silt loam soils that have a fragipan. These soils generally are on second bottoms of main streams in the county. They range from nearly level to gently sloping. The main layers of a representative profile are—

0 to 8 inches, brown silt loam that readily crumbles.
8 to 20 inches, yellowish-brown heavy silt loam that sticks together when wet; few pale-brown mottles in the lower part.
20 to 37 inches, mottled yellowish-brown and gray, compact and brittle silt loam to silty clay loam (fragipan); some brown and black concretionary material.
37 to 50 inches +, mottled yellowish-brown and light-gray silty clay loam deposited by streams.

The depth to the fragipan ranges from 14 to 24 inches.

Captina soils are suited to most locally grown crops except alfalfa and other crops requiring a deep root zone.

Captina silt loam, 0 to 2 percent slopes (CaA).—This nearly level soil has a brown silt loam surface layer 6 to 12 inches thick. The subsoil, to a depth of about 20 inches, is yellowish-brown silt loam. Below that depth is a mottled brown and gray fragipan consisting of compact, brittle silty clay loam. The subsoil, including the fragipan, generally ranges from 30 to 40 inches in thickness. It is underlain by mixed alluvium.

Included in mapping were a few somewhat poorly drained areas.

This soil is easily worked. It has moderate natural fertility and medium organic-matter content. Moisture-supplying capacity is moderately high. The movement of water and air is favorable in the surface layer and upper part of the subsoil, but it is slow in the fragipan. In some areas excess water from higher slopes may damage cultivated crops if the water is not intercepted by diversion channels.

Locally grown crops are suited to this soil, but in wet periods some crops, especially tobacco, may be damaged by scalding in the small, somewhat poorly drained included areas. Drainage may be needed in the wetter areas so that an entire field can be worked early in the growing season. (Capability unit IIe–6)

Captina silt loam, 2 to 6 percent slopes (CaB).—This moderately well drained, gently sloping soil has a brown silt loam surface layer 6 to 12 inches thick. The subsoil is yellowish-brown silt loam to a depth of about 20 inches. Below that depth is a fragipan consisting of mottled brown and gray, compact, brittle silty clay loam. The subsoil is 30 to 40 inches thick over mixed alluvium. This soil has been damaged little, if any, by erosion.

Included in mapping were a very few acres that have slopes of 6 to 12 percent.

Water and air move well through the surface layer and the upper subsoil, but they move slowly through the fragipan. Moisture-supplying capacity is moderately high. Natural fertility is moderate, and organic-matter conten

is medium. This soil is easily worked and easily kept in good tilth.

This soil is suited to the locally grown crops except alfalfa. Erosion is a moderate hazard in cultivated areas. In some areas the greatest hazard is the water that runs off upland slopes, but this water can be intercepted by constructing diversion channels. (Capability unit IIe–6)

Cynthiana Series

The Cynthiana series consists of shallow, well-drained and somewhat excessively drained soils that are very stony and have a silty clay loam or clay surface layer. These soils are sloping to moderately steep. They formed in residuum from limestone and thin calcareous shale of the Cynthiana geologic formation. The main layers of a representative profile are—

0 to 5 inches, brown silty clay loam; granular structure; friable; slightly sticky when wet; few flagstones; neutral.
5 to 15 inches, yellowish-brown silty clay; angular blocky structure; firm when moist, plastic when wet; common flagstones; slightly acid.
15 to 18 inches, mottled light olive-brown and yellowish-brown clay; very firm when moist; very plastic and sticky when wet; intermittent flagstones or stones; neutral.
18 inches +, limestone bedrock.

Depth to rock ranges from 12 to 20 inches. Stones on the surface range from none in some areas to many in other areas.

These soils are not suitable for cultivation, mainly because they are shallow to bedrock and stony. Also they are droughty. Many acres that have been cultivated are permanently damaged by severe erosion. Much of the acreage is now in pasture (fig. 6), and some areas have grown up in brush or second-growth hickory, oak, ash, honeylocust, elm, and other trees. Unless a protective cover is maintained, these soils will be damaged further by erosion.

Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded (ChC2).—This sloping, moderately eroded soil has a brown silty clay loam surface layer 3 to 5 inches thick. The subsoil consists of yellowish-brown silty clay or clay that is 10 to 15 inches thick and is underlain by thin-bedded calcareous shale and limestone. Many flagstones of limestone are in the profile. In a few places rock crops out at the surface or is near the surface.

This soil has a shallow root zone and low moisture-supplying capacity. Water and air move slowly through the subsoil. Working this soil is difficult because it is

Figure 6.—**Pasture and hayfield on Cynthiana soils.**

stony and its surface layer contains a large amount of clay.

Forage plants can be grown on this soil. Additions of nitrogen are beneficial in establishing new stands of grass, but nitrogen and any other fertilizer should be applied according to the amount of moisture available. The main limitation to use of this soil is insufficient moisture. (Capability unit VIs–1)

Cynthiana very stony silty clay loam, 12 to 20 percent slopes, eroded (ChD2).—This strongly sloping soil has a brown silty clay loam surface layer 3 to 5 inches thick. The subsoil is yellowish-brown silty clay or clay 10 to 15 inches thick. It is underlain by thin-bedded calcareous shale and limestone. Flagstones of limestone are common on the surface and throughout the profile, and in a few places limestone crops out as ledges 6 to 10 inches thick.

The root zone is shallow to underlying bedrock. Moisture-supplying capacity is low, and the movement of water and air through the subsoil is slow. Organic-matter content is low. This soil is difficult to work because it is moderately fine textured, stony, and strongly sloping.

This soil can be used for hay or pasture. Yields of forage plants can be increased by adding fertilizer, but the amount of this increase largely depends on the amount of moisture available. In some places this soil can be improved by removing stones from the surface. (Capability unit VIs–1)

Cynthiana very stony silty clay loam, 20 to 30 percent slopes, eroded (ChE2).—This moderately steep, moderately eroded soil has a brown silty clay loam surface layer 3 to 5 inches thick. The subsoil is yellowish-brown silty clay in the upper part and clay in the lower part. The silty clay grades to clay at a depth of about 15 inches, and the clay is underlain by thin-bedded calcareous shale and limestone at about 20 inches. Flagstones of limestone or other rocks are common on the surface and throughout the profile. Limestone ledges crop out in a steplike pattern in some areas.

This soil is shallow to bedrock and has low moisture-supplying capacity. Also low is the content of organic matter. Water and air move through the subsoil slowly.

Additions of a complete fertilizer help to obtain good yields of forage if the moisture content of this soil is favorable. This soil can be improved in some areas by removing the stones on and in the surface layer. (Capability unit VIs–1)

Cynthiana very stony clay, 6 to 12 percent slopes, severely eroded (CnC3).—This sloping, severely eroded soil has a clay surface layer consisting chiefly of upper subsoil material. The subsoil is yellowish-brown, sticky and plastic clay about 10 inches thick. It is underlain by thin-bedded calcareous shale and limestone. Many stones are on the surface, and rock crops out in a few places.

This soil is shallow to bedrock and has low moisture-supplying capacity. It is very low in organic-matter content. Phosphorus and potassium are in good supply, but there is very little nitrogen. Working this soil is difficult because it is stony and severe crusting and clodding are likely.

In newly seeded areas mulching with straw or other organic material is desirable and is sometimes necessary in establishing a good stand of forage plants. Additions of nitrogen are beneficial in establishing new stands of grass. The moisture content of this soil should be considered if fertilizer is added to increase the yields of hay and pasture. In some places the management of hayfields and pasture is also affected by stoniness. (Capability unit VIs–2)

Cynthiana very stony clay, 12 to 20 percent slopes, severely eroded (CnD3).—This strongly sloping, severely eroded soil is clay textured throughout. Depth to bedrock ranges from 12 to 18 inches. Flagstones of limestone are common on the surface and throughout the profile, and a few outcrops of bedrock occur in most areas.

This soil has a shallow root zone and very low moisture-supplying capacity. It contains good supplies of potassium and phosphorus, but little nitrogen.

Working this soil and reestablishing pasture and hay are difficult, though forage yields are fair after a good stand is established. In establishing pasture, good use should be made of available moisture. By seeding early, crusting can be avoided and plants generally grow enough to withstand the usual summer drought. A mulch of straw is desirable. Drought-resistant plants are the most suitable. Nitrogen fertilizer is useful in establishing new stands. The effectiveness of adding fertilizer for higher yields depends on the supply of moisture. The degree of stoniness affects the use and management of this soil, but in some areas the stones can be removed. (Capability unit VIs–2)

Cynthiana very rocky clay, 20 to 30 percent slopes, severely eroded (CrE3).—This moderately steep soil is clay textured throughout. Most of its original surface layer has been lost through erosion. Limestone the size of flagstones or stones is common on the surface and throughout the profile. In a few places limestone crops out as ledges 6 to 10 inches thick. Depth to bedrock ranges from 10 to 15 inches. Shallow gullies have formed in some areas.

Included in mapping were small areas of Rock land. In most of these areas the soil material has been lost through very severe erosion and the bedrock is exposed.

This soil has a shallow root zone and very low moisture-supplying capacity. Infiltration and permeability are slow. Organic-matter content is low.

Much of this soil is covered by brushy trees. Some areas are in low-grade black locust, and other areas are in redcedar. This soil is not suited to row crops or hay crops, and use for pasture is severely limited. Moderately steep slopes, severe erosion, and rocks make it difficult to establish suitable plants and to carry out maintenance operations such as mowing. The response of plants to additions of fertilizer is limited by the moisture supply. Mulching with straw or other organic material helps to conserve moisture and to prevent crusting in newly seeded areas. Yields of forage are increased if stones are removed and if maintenance operations are by hand instead of by machines. (Capability unit VIIs–2)

Eden Series

The Eden series consists of almost neutral, well-drained and somewhat excessively drained soils that developed in residuum from calcareous shale and limestone. These soils occupy hilly uplands in the northwestern and northeastern parts of the county. They are on narrow, sloping to strongly sloping ridgetops and moderately steep hillsides. The Eden soils contain a moderate amount of

phosphorus and medium to large amounts of potassium. The main layers of a representative profile are—

0 to 4 inches, olive-brown to brown silty clay; slightly sticky and plastic when wet; neutral.
4 to 13 inches, yellowish-brown silty clay variegated with light olive brown; angular blocky structure; sticky and plastic when wet; neutral.
13 to 30 inches, light olive-brown clay variegated with light yellowish brown, yellowish brown, and pale olive; limestone slabs common; mildly alkaline to calcareous.
30 inches +, interbedded shale, siltstone, and limestone.

Depth to bedrock ranges from 20 to 40 inches, depending on past erosion. A variable amount of limestone flagstones is at or on the surface. Limestone that varies in amount and thickness occurs at different elevations within the Eden geologic formation that underlies these soils.

These soils were highly productive when they were first cleared, but production is now only moderate because most of the original surface soil has been lost through erosion. Although these soils are droughty, they can produce good pasture of long-lived grasses and legumes. Much of the acreage is used for that purpose, but large areas have been abandoned because maintenance is difficult.

Eden flaggy silty clay, 6 to 12 percent slopes, severely eroded (EdC3).—This soil has a dark yellowish-brown or olive-brown silty clay plow layer. The subsoil is yellowish-brown silty clay 4 to 8 inches thick. The underlying material is variegated light olive-brown and light yellowish-brown clay that contains numerous limestone fragments. Flagstones are on the surface and throughout the profile. The underlying material is exposed in some places through erosion, or it has been brought to the surface through cultivation.

Included in mapping were a few less severely eroded areas that have a surface layer of brown or dark grayish-brown silt loam or silty clay loam.

This soil has a deep or moderately deep root zone, depending on the depth of weathering into the calcareous shale and on how much limestone underlies the subsoil. The moisture-supplying capacity is moderately low. Infiltration into this soil and the movement of water and air through it are slow. This soil contains very small amounts of roganic matter and nitrogen. Working this soil is difficult, and clodding and crusting are likely.

Past erosion and the hazard of additional erosion make this soil poorly suited to row crops. All general crops can be grown, but yields are generally low. Stones are troublesome and are removed by hand from many fields. (Capability unit IVe–6)

Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded (EdD3).—This strongly sloping soil has a surface layer of olive-brown silty clay that is underlain by about 18 to 24 inches of neutral or alkaline clay. The layer of clay is generally calcareous in the lower part. It is underlain by weathered calcareous shale and numerous slabs of limestone. Thin-bedded limestone occurs throughout the profile, and flagstones of limestone are on the surface.

Included in mapping were a few less eroded areas and here the surface layer is brown silty clay loam. These included areas have fewer flagstones on the surface.

This soil has a moderately deep root zone and moderately low moisture-supplying capacity. Runoff is rapid, partly because infiltration and permeability are slow. This soil is neutral. It contains a medium amount of phosphorus and, in places, a large amount of potassium. The nitrogen content is low, and organic-matter content is very low. This soil can be worked within only a very narrow range of moisture content.

This soil is not suited to cultivated crops, because of strong slopes, past erosion, and the hazard of more erosion. It can be used for hay crops and pasture. All of the locally grown grasses and legumes are suitable for planting. Preparing the seedbed when moisture is favorable, mulching, and applying nitrogen are management practices needed to insure a good stand of grasses and legumes. It is necessary to remove the flagstones from some areas because they interfere with cutting and baling of hay. Strong slopes limit the use of other machines in many places. (Capability unit VIe–3)

Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded (EdE3).—This moderately steep soil has lost most of its original surface layer and thin subsoil through erosion. Olive-brown clay underlying material is near the surface. Brown silty clay loam, 1 or 2 inches thick, is now at the surface. Thin fragments of limestone are scattered on the surface and throughout the profile.

Included in mapping were a few less severely eroded areas that have a silty clay loam surface layer 2 to 4 inches thick and fewer limestone fragments on the surface.

This soil has a root zone that varies in depth. Moisture-supplying capacity is moderately low. Runoff is increased because water enters and moves through this soil slowly. Also, permeability to air is slow. Organic-matter content is very low, and the nitrogen supply is low. This soil can be worked only within a very narrow range of moisture content, and tilth is very poor.

This soil is not suited to cultivated crops, because slopes are moderately steep, are severely eroded, and are susceptible to additional erosion. It is suited to pasture, but use for hay is limited. Steep slopes and flagstones interfere with equipment used to cut and bale hay. Because this soil tends to crust, the seeding of grass should be at the most favorable season and when the moisture content is good. Also, the use of mulch may be necessary. Additions of nitrogen aid in establishing new stands of grass. If moisture is sufficient, adding a complete fertilizer helps to produce a protective sod and to obtain good yields of forage. (Capability unit VIe–3)

Egam Series

The Egam series consists of moderately well drained and well drained, highly productive, almost neutral soils. These soils formed from recent alluvium washed from soils that developed in residuum from limestone. The main layers of a representative profile are—

0 to 16 inches, dark-brown silt loam; granular structure; friable; neutral.
16 to 24 inches, very dark gray silty clay loam; slightly compact; sticky and slightly plastic when wet.
24 to 41 inches, dark-brown heavy silt loam to silty clay loam that grades to dark-gray silty clay loam in the lower part; few mottles; few fine concretions.

The surface layer ranges from 6 to 18 inches in thickness.

These soils occur generally as narrow bands adjacent to the uplands. They are slow to dry out in spring, but they can be worked early if they are artificially drained.

Egam silt loam (0 to 2 percent slopes) (Eg).—This deep, nearly level soil is on first bottoms and is subject to flooding. The surface layer is dark-brown silt loam. It is

underlain by a compact layer of very dark gray silty clay loam. This layer is underlain by dark-brown silt loam that was the surface layer of an older buried soil.

Included in mapping were a few areas that have a silty clay loam surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Permeability is moderate in the surface layer, but water moves moderately slowly through the compact layer of the buried soil. The organic-matter content is medium in the surface layer and high in the compact layer. Egam silt loam can be worked within a fairly wide range of moisture content.

All locally grown crops are suited to this soil, but the slow permeability of the compact layer and flooding can reduce the yields of tobacco. Corn and soybeans are more commonly grown than tobacco. Practices are needed that maintain structure and organic-matter content. In some places it is desirable to intercept or divert the water that runs onto this soil from slopes above. (Capability unit I–1)

Elk Series

The Elk series consists of deep, well-drained, nearly level to strongly sloping soils that formed in old alluvium of limestone origin. These soils occur mostly in the center of the county along the South Fork Licking River, but some areas are along the Licking River in the northeastern part. The main layers of a representative profile are—

0 to 10 inches, brown silt loam; granular structure; very friable; neutral.
10 to 40 inches, brown silt loam to silty clay loam; friable; slightly sticky and slightly plastic when wet; generally slightly acid in upper part, but acidity increases with depth.
40 to 48 inches +, yellowish-brown silty clay loam alluvium; strongly acid.

The thickness of the alluvium ranges from 3 to 15 feet.

These soils are fairly extensive along the main streams in this county. They are very productive and are used primarily for row crops. Some lower lying areas are subject to flooding.

Elk silt loam, 0 to 2 percent slopes (EkA).—This nearly level soil has a surface layer of brown, very friable silt loam about 10 inches thick. The subsoil is brown silty clay loam about 30 inches thick. It is underlain by yellowish-brown silty clay loam.

Included in mapping were a few acres of a soil that has a subsoil that is a little more compact than the soil described and is mottled in the lower part.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move well in the subsoil. This soil is naturally fertile and has medium organic-matter content. It can be worked throughout a wide range of moisture content without crusting or clodding.

All locally grown crops are suited to this soil. Crop yields are favorable. This soil is easily worked and has been no more than slightly eroded. In some places diversion channels are needed to intercept water that runs off from slopes above this soil. (Capability unit I–3)

Elk silt loam, 2 to 6 percent slopes (EkB).—The surface layer of this gently sloping soil is brown, very friable silt loam about 10 inches thick. The subsoil is brown silty clay loam about 30 inches thick. It is underlain by loamy alluvium.

Included in mapping were a few moderately eroded areas and here the surface layer is light silty clay loam.

This soil has a deep root zone and no restricting layers. The moisture-supplying capacity is high, and water and air move well through the soil. The organic-matter content is medium, and good tilth is easily maintained within a wide range of moisture content.

All locally grown crops are suited to this soil, but the erosion hazard is moderate in cultivated areas. (Capability unit IIe–1)

Elk silt loam, 6 to 12 percent slopes (EkC).—This sloping soil has a brown, friable silt loam surface layer 6 to 10 inches thick. The subsoil is brown silty clay loam 18 to 30 inches thick. It is underlain by yellowish-brown loamy alluvium.

Included in mapping were a few moderately eroded areas that have a thinner surface layer than that described. Material from the subsoil has been mixed into this surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move well through the soil. Natural fertility is high, and organic-matter content is medium. Good tilth is easily maintained.

All locally grown crops are suited to this soil. Erosion is a severe hazard in cultivated areas, and in some areas diversion channels are needed to intercept water from higher areas. (Capability unit IIIe–1)

Elk silt loam, 12 to 20 percent slopes, eroded (EkD2).—This strongly sloping soil is mostly on narrow escarpments along edges of flood plains and lower lying stream terraces. The plow layer is mostly silt loam, but in places material from the subsoil is mixed into it. The subsoil is brown silty clay loam about 2 feet thick. It is underlain by yellowish-brown silty clay loam alluvium several feet thick.

This soil has a deep root zone, high moisture-supplying capacity, and favorable permeability. It can be worked easily through a wide range of moisture content.

The hazard of erosion is very severe if row crops are grown. A cultivated crop can be grown occasionally, but pasture and hay crops are better suited. The strong slopes limit the use of some farm machines. (Capability unit IVe–1)

Etowah Series

The Etowah series consists of deep, well-drained, highly productive soils. These soils are on old terraces above the present flood plain along South Fork Licking River. In some areas they seem to follow a previous course of this river. The main layers of a representative profile are—

0 to 7 inches, dark-brown silt loam; granular structure; friable; a few small chert fragments and some quartz gravel are on the surface.
7 to 22 inches, brown silty clay loam; blocky structure; firm; slightly acid or medium acid; common chert fragments.
22 to 37 inches, yellowish-red silty clay loam or silty clay; firm when moist, sticky when wet; few to many black concretions; strongly acid; common chert fragments.
37 to 50 inches, reddish-yellow to yellowish-brown silty clay loam old mixed alluvium; few to many dark concretions ¼ to 1 inch across; strongly acid; common chert fragments.

The alluvium ranges from 2 to 15 feet in thickness. In some areas the subsoil is less red than that of the profile described.

These soils are not extensive in this county, but they are in fairly large areas on some farms. They are good soils for farming. Yields of all locally grown crops are favorable.

Etowah silt loam, 2 to 6 percent slopes (EtB).—This gently sloping soil has a dark-brown, very friable silt loam surface layer about 10 inches thick. The upper subsoil is brown silty clay loam, and the lower subsoil is yellowish-red silty clay loam or silty clay.

Included in mapping were a few moderately eroded areas where the surface layer is thinner than that described. In places subsoil material has been mixed into the plow layer.

This soil has a deep root zone and high moisture-supplying capacity. Air moves through the soil at a moderate rate. Natural fertility is high, and organic-matter content is medium. This soil is easily worked throughout a wide range of moisture content. Tilth is easily maintained.

This soil is particularly suitable for tobacco, and on some farms it is a permanent site for tobacco. Erosion is a moderate hazard in cultivated areas, and crop yields are lower in the moderately eroded included areas. (Capability unit IIe–1)

Etowah silt loam, 6 to 12 percent slopes, eroded (EtC2).—The surface layer of this sloping soil is dark-brown silt loam about 7 inches thick. It generally consists of a mixture of material from the original surface layer and the subsoil. The subsoil is brown silty clay loam in the upper part and yellowish-red silty clay loam to silty clay in the lower part. It is underlain by old mixed alluvium 2 to 15 feet thick. Pebbles of chert and quartz are scattered on the surface and throughout the profile.

Included in mapping were a few areas that are only slightly eroded, if at all. In these areas the surface layer averages about 9 inches in thickness. Also included were a few strongly sloping areas.

This soil has a deep, unrestricted root zone and high moisture-supplying capacity. Water and air move through the soil at a moderate rate. Organic-matter content is medium in most places and low in the more eroded spots. Natural fertility is high, and good tilth is easily maintained.

This soil is suited to all crops commonly grown in the county. Erosion is a severe hazard in cultivated areas. (Capability unit IIIe–1)

Fairmount Series

The Fairmount series consists of dark-colored somewhat excessively drained soils that are shallow and extremely rocky. These soils are on some of the moderately steep to steep slopes that border the major streams in the county. The main layers of a representative profile are—

0 to 6 inches, very dark grayish-brown, extremely rocky silty clay loam; granular structure; friable when moist, slightly sticky when wet; limestone fragments and flagstones make up 20 percent of horizon, by volume; mildly alkaline.
6 to 12 inches, brown to dark-brown, calcareous clay; blocky structure; numerous limestone fragments; alkaline.
12 inches +, limestone interbedded with thin layers of calcareous shale.

Depth to bedrock ranges from about 6 to 20 inches. The number of stones and the amount of rock outcrop on the surface vary a great deal.

These steep, shallow rocky soils are susceptible to erosion and are not suitable for cultivation. Part of the acreage is pasture, and the rest is brushy forest consisting of oak, elm, hickory, hackberry, redbud, and redcedar.

Fairmount and Cynthiana extremely rocky soils, 20 to 30 percent slopes (FcE).—This mapping unit is in moderately steep areas that are hilly or blufflike. Some areas are made up of intermingled dark grayish-brown Fairmount soils, lighter colored Cynthiana soils, and Rock land. Other areas consist entirely of Fairmount soils or of Cynthiana soils. Mapping these areas separately would serve no useful purpose, because all areas have similar limitations to use.

The Fairmount soils and the Cynthiana soils have about the same depth to rock and about the same amount of rock fragments in the profile and on the surface. The depth of both soils to rock is 20 inches or less. The surface layer of the Fairmount soils is dark grayish brown. In severely eroded areas, the surface layer of the Cynthiana soils is brown or yellowish brown. Rock land consists of limestone outcrops and soil material between the outcrops.

These soils are shallow and have moderately low to low moisture-supplying capacity. Permeability is moderately slow to slow in the subsoil. Organic-matter content is high to medium.

Most of this mapping unit is wooded, and the trees are mainly second-growth oak, elm, hickory, and redbud. Part of the acreage is in pasture, but these soils are poorly suited to pasture. (Capability unit VIIs–2)

Fairmount and Cynthiana extremely rocky soils, 30 to 50 percent slopes (FcF).—This mapping unit is in steep areas that are hilly or blufflike. In some areas dark grayish-brown Fairmount soils, lighter colored Cynthiana soils, and Rock land are intermingled. Other areas consist entirely of Fairmount soils or of Cynthiana soils.

The Fairmount soils and the Cynthiana soils have about the same depth to rock and about the same amount of rock or flagstones in the profile and on the surface. Both are 20 inches or less deep to rock. In some areas the surface layer of Fairmount soils is very dark grayish brown, and in severely eroded areas, the surface layer of the Cynthiana soils is brown or yellowish brown. Rock land consists of outcrops of limestone and soil material between the outcrops.

The soils in this mapping unit have moderately low to low moisture-supplying capacity. Permeability is moderately slow to slow in the subsoil. Organic-matter content is high to medium.

These soils are poorly suited to uses other than for trees or wildlife. Most areas are wooded, and the trees are mainly second-growth oak, elm, hickory, and redbud. (Capability unit VIIs–2)

Faywood Series

The Faywood series consists of moderately deep or deep, well-drained soils. These soils developed on uplands in residuum from calcareous shale and moderately to highly

hosphatic limestone. The main layers of a representative profile are—

0 to 10 inches, brown silt loam; friable; neutral.
10 to 15 inches, brown silty clay loam; sticky and plastic when wet; slightly acid.
15 to 36 inches, yellowish-brown silty clay or clay variegated with light olive brown and brown; very sticky and plastic when wet; medium acid.
36 inches +, thin-bedded limestone and calcareous shale

The surface layer is silt loam or, in eroded areas, silty clay loam. Depth to rock ranges from 20 to 40 inches.

These soils are widespread in this county. Most of their acreage has been cleared and is used for pasture, hay, and row crops.

Faywood silt loam, 2 to 6 percent slopes (FwB).—This gently sloping soil is only slightly eroded. The surface layer is brown silt loam. The subsoil is yellowish-brown silty clay loam in the upper part and silty clay or clay in the lower part. Depth to bedrock is 2 feet or more.

This soil has high moisture-supplying capacity. It can be easily worked through a wide range of moisture content. Water and air move well throughout the surface layer and the upper subsoil, but they move somewhat more slowly through the lower subsoil and the underlying material. Natural fertility is relatively high, and organic-matter content is medium.

This soil is suited to all locally grown crops, but erosion is a moderate hazard in cultivated areas. In many places additions of potash are needed. (Capability unit IIe–2)

Faywood silt loam, 6 to 12 percent slopes (FwC).—This sloping soil is no more than slightly eroded. Depth to bedrock is 2 or 3 feet.

Included in mapping were a few areas of a deeper soil.

This Faywood soil has high moisture-supplying capacity. It can be easily worked through a wide range of moisture content. The movement of water and air is favorable in the surface layer and the upper part of the subsoil, but it is somewhat slower in the lower subsoil and the underlying material. Fertility is fairly high, and organic-matter content is medium.

This soil is suited to the crops commonly grown in the county, but the slope is strong enough to create a severe hazard of erosion if row crops are grown. (Capability unit IIIe–2)

(FyB2**wood silty clay loam, 2 to 6 percent slopes, eroded Fay**).—This gently sloping, moderately eroded soil has a surface layer of brown silty clay loam. The subsoil is yellowish-brown silty clay loam in the upper part and silty clay or clay in the lower part. Depth to bedrock ranges from 24 to 30 inches.

This soil has moderate moisture-supplying capacity. Water and air move well through the surface layer and the upper subsoil, but they move somewhat more slowly through the lower part of the profile. Organic matter has been lost through erosion, and generally the amount remaining is low. This low content of organic matter and the moderately fine texture of the surface layer both narrow the range of moisture content within which this soil can be worked.

On some farms this soil has been abused by excessive row cropping because other soils suitable for row crops are scarce. In areas used for row crops, erosion is a moderate hazard and yields are only moderate. (Capability unit IIIe–10)

Faywood silty clay loam, 6 to 12 percent slopes, eroded (FyC2).—This moderately deep, moderately eroded soil has a brown silty clay loam surface layer. The subsoil is yellowish-brown silty clay loam in the upper part and silty clay or clay in the lower part.

Included in mapping were a few acres of a deeper soil and a few severely eroded areas.

This Faywood soil has moderately low to moderately high moisture-supplying capacity, depending on the depth to rock. Permeability is moderate in the surface layer and the upper part of the subsoil, but it is moderately slow in the lower subsoil. Organic matter has been lost through erosion and is low in content. This low content of organic matter and the clay in the plow layer narrow the range of moisture content through which this soil can be worked.

This soil is suited to all locally grown crops, but use for row crops is severely limited, though they can be grown occasionally. Because of erosion, potential yields of row crops are low. (Capability unit IVe–6)

Faywood silty clay loam, 12 to 20 percent slopes, eroded (FyD2).—The surface layer of this moderately eroded, moderately deep soil is brown silty clay loam. The upper third of the subsoil is yellowish-brown silty clay loam, and the lower part is silty clay or clay.

Included in mapping were a few areas where outcrops of rock are common.

This soil has moderately low to moderately high moisture supplying capacity, depending on the depth to rock. Permeability is moderate in the upper subsoil but is moderately slow in the lower subsoil. Organic-matter content is low. Because of the low content of organic matter and the silty clay loam texture of the surface layer, this soil can be worked only through a narrow range of moisture content.

Past erosion and the hazard of additional erosion make this soil unsuitable for cultivation, but it is well suited to pasture and hay crops. (Capability unit VIe–1)

Gullied Land

Gullied land (Gu) consists of sloping to steep soils that are so severely eroded and gullied that they cannot be used as cropland unless landmoving and reclamation are extensive. Individual areas and the total acreage in the county are small. Occurring with this sloping to steep land are areas of McAfee, Brashear, Eden, and Cynthiana soils.

The natural seeding of trees is slowly stabilizing some areas of this land, and farmers are stabilizing other areas by using mulch and by planting seedlings. (Capability unit VIIs–2)

Heitt Series

The Heitt series consists of gently sloping to sloping, well-drained soils that developed in residuum from calcareous shale, siltstone, and thinly interbedded limestone. These soils occupy narrow, sloping ridgetops in the northeastern and northwestern parts of the county. The main layers of a representative profile are—

0 to 6 inches, brown silt loam; friable; slightly acid.
6 to 20 inches, yellowish-red silty clay, variegated with yellowish brown in the lower part; blocky structure; strongly acid.
20 to 26 inches, variegated light yellowish-brown, yellowish-

red, and light olive-gray clay; firm when moist, sticky and plastic when wet; medium acid.
26 to 36 inches, light olive-brown and light yellowish-brown clay; massive; very firm; neutral.
36 inches +, calcareous shale, siltstone, and thinly interbedded limestone.

Depth to bedrock ranges from 30 inches to more than 40 inches.

These soils are inextensive and occur in small narrow areas. They are important to farming, because on some farms they are the only soils that are gently sloping, free of stones, and easily cultivated. Most of the acreage has been cleared.

Heitt silt loam, 2 to 6 percent slopes (HeB).—This deep, gently sloping soil has a brown silt loam surface layer. The subsoil is yellowish-red silty clay or clay variegated with yellowish brown. The subsoil is underlain by material weathered from calcareous shale, siltstone, and thinly interbedded limestone.

This soil has a deep root zone and high moisture-supplying capacity. Water moves well through the plow layer, but it moves through the subsoil at a moderately slow rate. Natural fertility is moderate, and organic-matter content is medium. This soil is easily cultivated and fairly easily kept in good tilth.

All locally grown crops can be grown if the needed lime and fertilizer are added. Erosion is a moderate hazard where row crops are grown. (Capability unit IIe-2)

Heitt silty clay loam, 2 to 6 percent slopes, eroded (HsB2).—This deep soil has a brown silty clay loam plow layer. The subsoil is yellowish-red silty clay variegated with yellowish brown. Erosion has removed part of the original surface layer, and material from the subsoil is mixed into the plow layer.

Included in mapping were small areas where the yellowish-red silty clay subsoil is exposed.

This soil has a deep root zone and high moisture-supplying capacity. Erosion has reduced infiltration into this soil. The movement of water and air is moderately slow through the subsoil. Natural fertility is moderate, and organic-matter content is low. The ease of working this soil has decreased because much of the original surface layer and its organic matter have been lost through erosion. Also the content of clay in the present plow layer is high. Clods and crusts tend to form after showers.

This soil is used for tobacco and for family truck gardens because the soil occurs where other nearly level soils are scarce. It is suited to all locally grown crops, but erosion is a moderate hazard in cultivated areas and has reduced crop yields. (Capability unit IIe–2)

Heitt silty clay loam, 6 to 12 percent slopes, eroded (HsC2).—The plow layer of this sloping soil is brown silty clay loam. It consists of material from the original surface layer mixed with subsoil material. The subsoil is yellowish-red silty clay variegated with yellowish brown. It is underlain by light olive-brown clay. This soil is deep in most places and moderately deep in others.

Included in mapping were areas that are only slightly eroded, if at all. In these areas the plow layer is the original dark grayish-brown surface soil. Also included were small severely eroded areas in which the red subsoil is exposed.

This soil has a deep to moderately deep root zone and high moisture-supplying capacity. An effect of erosion is a reduced rate of infiltration into this soil. The movement of water through the subsoil is moderately slow. Natural fertility is moderate. Working this soil is somewhat difficult because erosion has left a clayey plow layer low in content of organic matter.

This soil is suited to all locally grown crops if management is good. Erosion is a severe hazard in cultivated areas. (Capability unit IIIe–2)

Huntington Series

The Huntington series consists of well-drained, almost neutral, alluvial soils along streams throughout the county. These soils formed mostly in material washed from soils that formed in residuum from limestone. The main layers of a representative profile are—

0 to 10 inches, dark grayish-brown silt loam; granular structure; friable; neutral.
10 to 24 inches, dark-brown silt loam; neutral.
24 to 48 inches +, dark-brown silt loam; few grayish-brown mottles; friable; mildly alkaline.

The alluvium ranges from 2 to 15 feet in thickness. In some places mottles do not occur above a depth of 36 inches or more.

These soils are suited to all locally grown crops. Generally, they are not used for tobacco because flooding is a hazard.

Huntington channery silt loam, shallow (0 to 2 percent slopes) (Ht).—This nearly level, moderately deep to shallow soil is channery or flaggy throughout the profile. Depth to bedrock is less than 24 inches. This soil is along streams and is subject to frequent and rapid flooding.

The root zone, limited by underlying rock, is shallow to moderately deep. Moisture-supplying capacity is moderately high to moderately low, and permeability is moderate to moderately rapid.

Shallowness, coarse fragments, and the hazard of rapid flooding severely limit the use of this soil for farming. Pasture plants grow well, and some areas are used for pasture. Much of this soil is covered with willows, water maples, and box elders. (Capability unit Vs–1)

Huntington silt loam, 0 to 4 percent slopes (HuA).—The plow layer of this deep, level to gently sloping soil is dark grayish-brown silt loam 8 to 10 inches thick. The underlying material is dark-brown silt loam.

Included in mapping were a few acres that have a fine silt loam surface layer.

This soil has a deep root zone and very high moisture-supplying capacity. Water and air move well through the soil. Natural fertility is high, and organic-matter content is medium to high. This soil can be worked through a wide range of moisture content without clodding or crusting.

All locally grown crops are suited to this soil and produce favorable yields. Corn is most commonly grown. Because flooding is a hazard, tobacco is seldom grown. This soil is suited to intensive use and is seldom damaged by erosion. In some areas diversion channels are needed to intercept the water that runs off from adjacent slopes above this soil. (Capability unit I–1)

Huntington silt loam, 4 to 20 percent slopes (HuD).—This gently sloping to strongly sloping soil has a plow layer of dark grayish-brown silt loam 8 to 10 inches thick. The underlying layers are dark-brown silt loam. Soil material is sometimes deposited during a flood, but this material may be removed during a succeeding flood, especially in areas of row crops or fallow.

This soil has a deep root zone and high moisture-supplying capacity. The movement of water and air through the soil is favorable. Organic-matter content is medium, and the range of moisture content through which this soil can be worked is wide. Flooding is a hazard.

This fertile soil can produce favorable yields of locally grown crops, though use is limited by strong slopes and the hazard of flooding and of erosion. Erosion generally is not a serious hazard because soil material removed by one flood is often replaced by another. (Capability unit IIIe–1)

Lanton Series

The Lanton series consists of dark-colored, somewhat poorly drained soils on flood plains throughout the county. The main layers of a representative profile are—

0 to 18 inches, very dark grayish-brown silt loam in the upper part and very dark gray silty clay loam in the lower part; neutral.
18 to 42 inches, very dark gray silty clay loam mottled with yellowish brown and dark grayish brown; firm when moist, sticky and plastic when wet; neutral.
42 to 55 inches, mottled yellowish-brown and very dark grayish-brown silty clay loam; many, small, hard concretions; sticky and plastic when wet; neutral.
55 inches +, limestone.

The alluvium ranges from 3 to 10 feet in thickness.

These soils generally occur in small plots and are cultivated in the same way as are other soils in the same field. They are suited to corn, soybeans, pasture, and hay crops. They are too wet and susceptible to flooding to be used for tobacco.

Lanton silt loam (0 to 2 percent slopes) (La).—This nearly level soil is on flood plains. The surface layer is very dark grayish-brown silt loam. It is underlain by very dark gray silty clay loam mottled with yellowish brown and very dark grayish brown.

Included in mapping were some areas that have a silty clay loam surface layer. Also included were a few acres that are slightly better drained than Lanton silt loam and have a dark yellowish-brown, more developed subsoil. Other inclusions are a few acres that are very poorly drained.

In undrained areas a seasonally high water table restricts root growth. Moisture-supplying capacity is high, and water and air move somewhat slowly through the subsoil. Natural fertility is high, and organic-matter content is high. This soil is easy to cultivate, and tilth is easily maintained. It is subject to flooding.

This soil is suited to most of the crops and pasture plants grown in the county. Because the water table is high, the use of this soil for cultivated crops is limited. (Capability unit IIw–5)

Lawrence Series

The Lawrence series consists of somewhat poorly drained soils that have a fragipan. These soils are mostly on terraces along the main streams in the county. The water table is high in wet periods. The main layers of a representative profile are—

0 to 7 inches, grayish-brown silt loam; weak granular structure; friable neutral.
7 to 16 inches, pale-brown silty clay loam faintly mottled with yellowish brown; friable; slightly acid.
16 to 29 inches, light yellowish-brown silty clay loam (fragipan) mottled with light brownish gray and light gray in the lower part; compact and brittle; many concretions in lower part; medium acid.
29 to 48 inches +, mottled brown, pale-brown, and light-gray silty clay loam; massive; firm; strongly acid.

The concretionary layer is absent in some places. Depth to the fragipan ranges from 14 to 18 inches.

These soils are not extensive in this county. They occur in small areas in or adjacent to larger areas of better drained soils and generally are farmed in fields with these soils. Most of the acreage is used for corn and hay, but some is in pasture.

Lawrence silt loam (0 to 2 percent slopes) (Lc).—This nearly level soil has a fragipan. The surface layer is grayish-brown silt loam. The subsoil is pale-brown silty clay loam mottled with yellowish brown and gray.

Included in mapping were a few poorly drained areas that have a mottled surface layer.

The root zone of this soil is shallow, and moisture-supplying capacity is moderately low. The movement of water and air is good above the fragipan, but it is very slow in the fragipan. Surface runoff is slow, and water stands in some depressional areas after a rain. Except during the wet periods, this soil can be easily worked. Natural fertility and organic-matter content are moderately low.

This soil is suited to pasture and hay plants that can withstand moderate wetness. Tiling is generally not feasible for draining this soil, but surface drainage is satisfactory in some areas. Because of the fragipan, this soil is too wet in wet periods and tends to be too dry during dry periods. Yields are low during extremely dry or extremely wet periods. (Capability unit IIIw–1)

Lindside Series

The Lindside series consists of moderately well drained, productive, almost neutral soils. These soils are on flood plains throughout this county. The main layers of a representative profile are—

0 to 18 inches, brown silt loam; granular structure; friable when moist, slightly sticky when wet; neutral.
18 to 24 inches, brown heavy silt loam mottled with brownish gray and pale brown; small brown and black concretions; neutral.
24 to 44 inches, mottled brown, pale-brown, light grayish-brown, and light-gray heavy silt loam; dark-brown concretions and concretionary material; massive; firm; neutral or mildly alkaline.

The alluvium ranges from 3 to 10 feet or more in thickness.

These soils are widely scattered throughout the county, though their total acreage is not large. Some strips along small streams are too narrow for cultivation and are commonly used for bluegrass pasture. Some of the larger areas in the wider valleys are used mostly for corn, but tobacco is grown occasionally.

Lindside silt loam (0 to 2 percent slopes) (Ld).—This nearly level soil is on flood plains. Its surface layer is brown or dark grayish-brown silt loam. The surface layer is underlain by material that is similar to that of the surface layer but that is mottled and slightly lighter colored.

Included in mapping were a few small poorly drained areas in the narrow valleys.

The root zone is deep, but it may be limited for a short period when the water table rises. The moisture-supplying capacity is high, and water and air move through the soil at a moderate rate. Natural fertility is high, and organic-matter content is medium. This soil is easily worked and maintained. It is slightly wet early in spring and during prolonged periods when rainfall is heavy.

This soil is suited to all locally grown crops. Some areas are in bluegrass pasture, and some are in trees. In some areas diversion channels are needed to intercept runoff from hillsides above this soil. (Capability unit I–1)

Loradale Series

The Loradale series consists of deep, fertile, well-drained soils on uplands. These soils developed in residuum from moderately phosphatic limestone and calcareous shale. They occur mostly in the southern half of the county. The main layers of a representative profile are—

0 to 13 inches, dark-brown silt loam; fine granular structure; friable; slightly acid.
13 to 30 inches, strong-brown silt loam or silty clay loam in the upper part and silty clay in the lower part; blocky structure; firm when moist, sticky and plastic when wet; common dark concretions; slightly acid or neutral.
30 to 40 inches, yellowish-brown silty clay or clay mottled with brown and light yellowish brown; very firm when moist, very sticky and very plastic when wet; many concretions; medium acid.
40 to 48 inches, mottled olive-brown, yellowish-brown, and grayish-brown clay; massive; very firm when moist, very sticky and plastic when wet; mildly alkaline.
48 inches +, limestone interbedded with thin layers of calcareous shales.

Depth to bedrock ranges from 4 to 15 feet or more.

These soils are among the better soils for farming in this county, but on many farms, particularly the larger ones, use for general crops is not intensive. Cropping systems normally consist of 1 or 2 years of row crops followed by 6 or more years of meadow or pasture. This soil is desirable for producing high-quality tobacco.

Loradale silt loam, 2 to 6 percent slopes (LoB).—This gently sloping soil has a dark-brown, friable silt loam surface layer. The subsoil is brown silty clay loam in the upper part and is clay in the lower part.

Included in mapping were a few moderately eroded acres where the surface layer is thinner than it is in uneroded areas and consists of a mixture of the original surface soil and material from the subsoil.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the soil at a favorable rate. This soil is easily worked and maintained. Natural fertility is relatively high, and organic-matter content is medium to moderately high.

This soil is one of the better soils in the county for farming. It is suited to all locally grown crops (fig. 7). Crop yields are favorable. Where this soil occurs with the shallower, stronger sloping soils, it is used intensively for cultivated crops. Some areas are used as permanent sites for tobacco. Erosion is a moderate hazard in cultivated areas. Lime is needed to correct soil acidity, and additional plant nutrients are needed to obtain favorable yields of high-quality crops. Potash is especially needed in some areas. (Capability unit IIe–2)

Loradale silt loam, 6 to 12 percent slopes, eroded (LoC2).—The plow layer of this moderately eroded, sloping soil is dark-brown silt loam about 5 inches thick. The subsoil is brown silty clay loam in the upper part and is sticky and plastic silty clay at a depth of about 18 inches. Depth to rock is about 4 feet. In some areas the present surface layer is a mixture of material from the original surface layer and material from the subsoil.

Included in mapping were a few acres that have had little or no erosion. In these areas the surface layer is 5 to 13 inches thick. Also included were a few severely eroded areas that have a silty clay loam surface layer.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the soil at a favorable rate. This soil is easily worked and easily kept in good tilth. Natural fertility is high, and organic-matter content is medium to low.

This soil is suited to all locally grown crops, but erosion is a severe hazard in cultivated areas. Row crops are grown mainly where this soil occurs with shallower, more strongly sloping soils. (Capability unit IIIe–1)

Made Land

Made land (Ma) is a miscellaneous land type that consists of areas in which the soil material has been moved, reworked, or graded by earth-moving operations. Most areas are used for lawns and playgrounds, as sites for tobacco warehouses and industrial centers, and for other nonfarm purposes. The soil material varies so much from place to place that examinations are needed on the site to determine suitability for specific uses. Consequently, it has not been assigned to a capability unit.

Maury Series

The Maury series consists of deep, well-drained, highly productive soils that developed in residuum chiefly from moderately to highly phosphatic limestone. These soils are in the south-central part of the county. They range from gently sloping to sloping. The main layers of a representative profile are—

0 to 7 inches, dark-brown silt loam; friable; granular structure; slightly acid.
7 to 16 inches, reddish-brown silty clay loam in the upper part and silty clay in the lower part; friable; blocky structure; slightly acid or medium acid.
16 to 40 inches, red or yellowish-red clay or silty clay; blocky structure; firm when moist, sticky and plastic when wet; common black concretions; strongly acid.
40 to 60 inches +, yellowish-red clay mottled with brown; firm when moist, sticky and plastic.

These soils are highly prized for farming and are suited to all locally grown crops. They produce high-quality tobacco and bluegrass pasture, as well as other crops.

Maury silt loam, 2 to 6 percent slopes (MrB).—This gently sloping soil has a dark-brown silt loam surface layer 7 to 14 inches thick. The subsoil extends to a depth of 40 inches or more and is reddish-brown or yellowish-red silty clay loam in the upper part but is redder and finer textured below.

Included in mapping were a few moderately eroded areas that have a silty clay loam surface layer. In these areas subsoil material has been mixed with material from the original surface soil.

Figure 7.—**Pasture on Loradale silt loam, 2 to 6 percent slopes. This soil is commonly kept in bluegrass for several years.**

This soil has a deep root zone and high moisture-supplying capacity. Permeability is moderately rapid. This soil is easily worked and maintained and can be tilled soon after a shower. Natural fertility and organic-matter content are medium.

This soil is suited to all locally grown crops, particularly tobacco of high quality. Erosion is a moderate hazard in cultivated areas. (Capability unit IIe–1)

Maury silt loam, 6 to 12 percent slopes, eroded (MrC2).—The plow layer of this sloping soil is dark-brown silt loam about 7 inches thick. The subsoil is reddish-brown silty clay loam that is redder and finer textured as depth increases. In a few places plowing has exposed the reddish-brown subsoil material. In some areas the present surface layer is a mixture of the original surface soil and material from the subsoil.

Included in mapping were a few uneroded areas that have a dark-brown silt loam surface layer 7 to 14 inches thick. Also included were a few severely eroded areas in which very little of the original surface layer remains. In these areas the plow layer is reddish-brown silty clay loam.

This soil has a deep root zone and high moisture-supplying capacity. Water and air move through the soil at a moderately rapid rate. This soil is naturally fertile and is medium to low in organic-matter content. It is easily tilled and maintained.

All locally grown crops are suited to this soil, but erosion is a severe hazard in cultivated areas. (Capability unit IIIe–1)

McAfee Series

The McAfee series consists of well-drained soils that developed in residuum from moderately to highly phosphatic limestone. Most areas of these soils are in the southern half of the county. The main layers of a representative profile are—

0 to 6 inches, dark-brown silt loam; fine granular structure; friable; slightly acid.

6 to 14 inches, brown silty clay loam in the upper part and reddish-brown silty clay in the lower part; blocky structure; friable or slightly firm when moist, slightly sticky and plastic when wet; slightly acid.

14 to 30 inches, reddish-brown clay; massive; very firm when moist, sticky and very plastic when wet; neutral.
30 inches +, limestone.

A few stones or boulders are at a depth of less than 30 inches, and rock crops out in some places.

Although these soils are slightly droughty and are of limited use for cultivated crops, they are used for the locally grown crops, including tobacco. Yields are generally low in dry periods. Most of the acreage is now in pasture or hay crops.

McAfee silt loam, 6 to 12 percent slopes, eroded (MsC2).—This sloping, moderately deep soil has a dark-brown silt loam surface layer. The subsoil is brown silty clay loam that grades to reddish-brown silty clay.

Included in mapping were some uneroded areas and a few gently sloping areas.

This soil has a moderately deep root zone and moderately high to moderately low moisture-supplying capacity. Permeability is moderate in the upper half of the subsoil and is moderately slow below. This soil is naturally fertile, generally high in phosphorus content, and low in organic-matter content. It is fairly easy to cultivate, and good tilth is easily maintained.

This soil can be cultivated only occasionally, because it is droughty, shallow to rock, and severely susceptible to erosion. (Capability unit IVe–6)

McAfee silt loam, 12 to 20 percent slopes, eroded (MsD2).—This strongly sloping soil has a surface layer of dark-brown silt loam. The subsoil is brown silty clay loam in the upper part and reddish-brown silty clay in in the lower part. Depth to rock ranges from 18 to 30 inches. Rock occurs in the subsoil and also crops out in a few places. In most areas material from the original surface layer has been mixed with material from the subsoil through cultivation.

Included in mapping were a few severely eroded areas. Here, most of the original surface layer has been lost through erosion, and the surface layer is silty clay loam. Rock is near the surface in a few areas.

The root zone of this soil is moderately thick and is limited by limestone. Moisture-supplying capacity is moderately high, and permeability is moderate to moderately slow. Organic-matter content is low, natural fertility is moderately high, and the phosphorus content is generally high.

Because this soil is shallow, slightly droughty, and severely susceptible to erosion, it is not suitable for cultivation. It is suited to all locally grown pasture and hay plants, including alfalfa and grass mixtures. (Capability unit VIe–1)

Mercer Series

The Mercer series consists of moderately well drained, moderately productive soils that have a fragipan. The soils developed in residuum from limestone and calcareous shale. They are in the south-central part of the county. The main layers of a representative profile are—

0 to 15 inches, dark grayish-brown silt loam; fine granular structure; friable; neutral.
15 to 23 inches, yellowish-brown silty clay loam mottled with light yellowish brown; slightly sticky when wet; few, small, dark concretions; neutral.
23 to 42 inches, pale-brown to light yellowish-brown silty clay loam (fragipan) mottled with yellowish brown and light gray; slightly compact and brittle; many, small, black concretions; strongly acid.
42 to 48 inches +, yellowish-brown clay mottled with pale brown; very firm when moist, sticky and plastic when wet; medium acid.

Depth to the fragipan ranges from 18 to 26 inches. These soils are used mostly in long rotations in which corn or tobacco is followed by grasses, generally bluegrass and legumes. The grasses and legumes are used for hay or pasture.

Mercer silt loam, 2 to 6 percent slopes (MtB).—This gently sloping soil has a dark grayish-brown silt loam surface layer 12 to 15 inches thick. The upper part of the subsoil is yellowish-brown silty clay loam, and the lower part, at a depth of about 23 inches, contains a fragipan. The subsoil is mottled a faint gray.

Included in mapping were a few nearly level areas and a few moderately eroded areas.

The root zone and moisture-supplying capacity are limited by the fragipan. This soil is slightly wet during wet periods because water and air move through the surface layer and the upper subsoil at a moderate rate and move slowly through the fragipan. Although this soil is slow in drying out in spring, it is easily tilled and easily kept productive. Natural fertility is moderately high.

Most of the locally grown crops are suited to this soil, but erosion is a moderate hazard in cultivated areas. Alfalfa and other deep-rooted crops do not grow well on this soil, and they tend to die out in 2 or 3 years. Tobacco is sometimes damaged during extremely wet or dry periods. (Capability unit IIe–6)

Newark Series

The Newark series consists of somewhat poorly drained, almost neutral soils. These soils formed in young alluvium that washed mainly from soils of limestone and calcareous shale origin. They are in small areas along most of the streams in the county. The main layers of a representative profile are—

0 to 8 inches, dark grayish-brown silt loam mottled with grayish brown; neutral.
8 to 15 inches, brown silt loam mottled with grayish brown in the upper part and dominantly with grayish brown in the lower part; neutral.
15 to 42 inches +, light brownish-gray to pale-brown silt loam; massive; neutral.

The alluvium ranges from 3 to 10 feet in thickness. In some areas the texture is heavy silt loam.

Some areas of these soils are along small streams and in very narrow valleys. These areas are too narrow to be cultivated, but they can be included in the surrounding pasture. Small spots of these soils occur with larger areas of well-drained soils. If these spots are drained, they can be used and managed in the same way as the rest of the field.

Newark silt loam (0 to 2 percent slopes) (Ne).—This nearly level soil is on the flood plains and is similar to the soil described for the series. Its grayish underlying material is several feet thick.

In this soil the growth of roots is restricted by a seasonally high water table unless the soil is artificially drained. In drained areas the root zone is deep. Water and air move through the soil at a moderate rate, and moisture-supplying capacity is high. This soil is easy to work except during rainy periods. It is subject to flooding.

Most all of the commonly grown crops except alfalfa are suited to this soil. Corn and soybeans are the most suitable row crops. Tile drainage increases the yields of most crops. (Capability unit IIw–5)

Rock Land

Rock land (Rk) is in two kinds of areas in this county. One of these is along the major streams and consists of bluffs that are mostly limestone outcrops. Large rocks are on the surface in some places. Slopes generally are more than 30 percent. The soil material between the outcrops is shallow, but it is very fertile and generally supports a stand of hardwoods. Some trees grow large enough and are of good enough quality for use as timber.

The other areas of Rock land are on the steeper slopes where a considerable amount of rock crops out or where erosion has removed the soil material and exposed the underlying rock. These areas generally are less suited to trees than are the limestone bluffs, because slopes are steep and erosion is more active. In some areas redcedars furnish a protective cover. (Capability unit VIIs–2)

Use and Management of Soils

The soils of Harrison County are used extensively for cultivated crops and pasture. This section explains how the soils can be managed for these main purposes and also as woodland, for wildlife, and for building of highways, farm ponds, and other engineering structures. It also discusses use of soils as building sites and for recreational facilities.

The section is a general guide for managing the soils and does not suggest specific management for individual soils. Detailed information about managing the soils can be obtained from the local staff of the Soil Conservation Service, from the Extension Service, or from the Agricultural Experiment Station.

General Principles of Soil Management

Some principles of management are general enough to apply to the soils on all the farms in the county, though the individual soils or groups of soils require different kinds and degrees of management. These general principles of management are discussed in the following paragraphs. The management of specified groups of soils is discussed in the subsection "Management by Capability Units."

On many soils in the county, additions of lime, fertilizer, or both, are needed, the amounts depending on the natural content of lime and plant nutrients, on past cropping and management, on the need of the crop, and on the level of yield desired. Suggestions for additions of lime and fertilizer are only general in this survey because such additions should be based on laboratory analyses of soil samples.

The soils of Harrison County are naturally rather low in content of organic matter, and building up this content is not economical. It is important, however, to maintain a supply of organic matter by adding farm manure, by leaving plant residue on the surface, and by using other practices that insure extensive root systems and vigorous growth.

Tillage is needed to prepare a seedbed and to control weeds, but it should be kept to a minimum because it generally tends to break down the structure of the soil. Also helpful in preventing a breakdown of structure are adding organic matter and growing sod crops, cover crops, and green-manure crops.

All of the sloping cultivated soils in the county are susceptible to erosion and to loss of organic matter and plant nutrients from the surface layer. Because most erosion occurs when the cultivated crop is growing, or soon after the crop has been harvested, a cropping sequence should be selected that keeps the loss of soil and water to a minimum. This cropping sequence is most effective if it is used with one or more other practices of erosion control. These practices are contour farming, terracing, stripcropping, construction of diversions, grassing of waterways, using minimum tillage, using crop residue effectively, seeding cover crops, and applying fertilizer and lime if needed.

On most wet soils in the county, yields of cultivated crops can be increased by removing excess water through open ditches or tile drains. Tile drains are expensive to install, though they generally provide better drainage than open ditches. Soils that have a fragipan are difficult to drain, but they can be drained better by open ditches than by tile. Open ditches are most effective if they intercept the water as it moves horizontally on top of the pan. For drainage by either tile or open ditches, suitable outlets are required.

Capability Groups of Soils

The capability classification is a grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

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

Class I. Soils have few limitations that restrict their use.

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

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

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

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife food and cover.

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

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. There are no soils in class VIII in Harrison County.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Harrison County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are 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 designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units [2]

In this subsection each capability unit is described, and the crops and management suited to the soils in each unit are suggested. About the same kind of management is needed on all the soils in any one capability unit because limitations to use and risks of damage are similar. To find the names of the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this soil survey.

In the discussions of the capability units, medium and high levels of management are mentioned for cropland and for pasture. For cropland, medium, or ordinary, and high levels of management are defined in the subsection "Estimated Yields." Pasture is managed at a medium level if only enough fertilizer is added and management is only intensive enough to keep the forage from deteriorating. A high level of pasture management provides fertilization, grazing control, drainage, and other practices that are adequate for maintaining the highest production of forage that is economically feasible.

[2] WALTER J. GUERNSEY, conservation agronomist, Soil Conservation Service, assisted in the preparation of this subsection.

CAPABILITY UNIT I-1

This capability unit consists of deep, well drained and moderately well drained soils that have a silt loam surface layer. These soils occur on nearly level flood plains, and they may be slightly damaged in small areas by scouring during severe floods. Crops are occasionally damaged by floods during prolonged wet periods and flash floods during the growing season. Erosion, however, is not likely.

The soils in this unit have a deep root zone and high moisture-supplying capacity. They permit favorable movement of water and air. These soils are fertile and easily worked. They are almost neutral.

The soils in this unit are well suited to all of the row crops and hay and pasture plants grown in the county. Under a high level of management, favorable yields of tobacco, corn, and small grain can be produced year after year. Irrigation is feasible on crops of high value. Hay and pasture plants grow well if the level of management is medium or high.

The organic-matter content and tilth of these soils can be maintained or improved by using cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT I-3

This capability unit consists of deep, well-drained, fertile soils that have a silt loam surface layer. These soils occur along the larger streams in the county and are above the normal level of floods. They formed in alluvium that washed mainly from soils underlain by limestone. Erosion is not a hazard, but flooding is likely in some of the lower lying areas.

The soils in this unit have a deep root zone and high moisture-supplying capacity. Water and air move in these soils at a favorable rate. These soils can be easily worked through a wide range of moisture content. Acidity is slight.

These soils are well suited to all of the row crops and hay and pasture plants grown in the county. Under a high level of management, favorable yields of tobacco, corn, and small grain can be produced year after year (fig. 8). Irrigation is feasible on crops of high value. Pasture and hay plants grow well on these soils if the level of management is medium or high.

The content of organic matter and the tilth of these soils can be maintained or improved by using cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system. These soils produce favorable yields without additions of fertilizer, but fertilizer is needed if the favorable yields are to be continuous.

CAPABILITY UNIT IIe-1

This capability unit consists of deep, well-drained, gently sloping soils that have a silt loam surface layer. These soils formed in old mixed alluvium washed from soils that were derived mainly from limestone. In some areas flooding is a hazard during extremely wet periods.

Figure 8.—**Setting tobacco on Elk silt loam, 0 to 2 percent slopes.**

The soils in this unit have a deep root zone and high moisture-supplying capacity. The movement of water and air is good. These soils are generally acid, are moderate to high in fertility, and are easily worked.

These soils are suited to all of the crops and pasture plants grown in the county. They can produce favorable yields of corn, tobacco, and small grain. Irrigation may be desirable where crops of high value are grown. If the level of management is at least medium, hay or pasture plants that produce favorable yields are Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, timothy, alfalfa, red clover, Ladino clover, white clover, and Korean lespedeza.

If these soils are used for cultivated crops, a suitable combination of a cropping system and management is needed so that runoff is slowed and erosion is controlled. For example, on a slope of Maury silt loam that is 100 feet long and has a gradient of 4 percent, corn can be grown continuously if the crop residue is left on the surface through winter and a high level of management is practiced.

The organic-matter content and tilth of these soils can be maintained or improved by using cover crops and greenmanure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIe-2

This capability unit consists of deep, well-drained, gently sloping soils. These soils have a silt loam or silty clay loam surface layer and a clayey subsoil. Heitt silty clay loam, 2 to 6 percent slopes, eroded, is the only eroded soil in this unit.

The soils in this unit have a deep root zone and high moisture-supplying capacity. Except for the eroded soil, they can be easily worked throughout a wide range of moisture content without crusting. The movement of water and air is somewhat restricted in the lower part of the clayey subsoil.

These soils are suited to nearly all crops and pasture plants grown in the county. They can produce favorable yields of corn, tobacco, and small grain. Irrigation may be desirable where crops of high value are grown. Some of the suitable pasture and meadow plants are alfalfa, Kentucky 31 fescue, Kentucky bluegrass, orchardgrass, smooth bromegrass, red clover, Ladino clover, white clover, and Korean lespedeza. Yields of these plants are fair to good if a medium level of management is followed. The yields of alfalfa, smooth bromegrass, and Kentucky bluegrass can be increased by following a high level of management.

If these soils are used for cultivated crops, a suitable combination of a cropping system and management is needed so that runoff is slowed and erosion is controlled. For example, on a slope of Brashear silt loam that is 100 feet long and has a gradient of 4 percent, contour farming is used with a cropping system consisting of 2 years of corn and 1 year of meadow, if the corn is harvested for silage and management is at a high level.

The organic-matter content and tilth of these soils can be maintained or improved by planting cover crops and green-manure crops, by returning crop residue to the soils, and by including sod crops in the cropping system.

CAPABILITY UNIT IIe-6

This capability unit consists of moderately deep, moderately well drained, nearly level and gently sloping soils that have a fragipan. These soils have a silt loam surface layer.

In these soils the root zone is limited by the fragipan, which begins about 20 to 24 inches below the surface. Water and air move well through the surface layer and the upper subsoil, but they move slowly through the fragipan. The moisture-supplying capacity is moderately high. These soils are acid and have moderate natural fertility. They are easily worked after they dry in spring, but this drying is a little slow. These soils tend to be too wet in wet periods and too dry in dry periods.

The soils in this unit are suited to most of the crops and pasture plants grown in the county. They can produce favorable yields of corn, tobacco, and small grain. Some of the better suited pasture and meadow plants are Kentucky 31 fescue, Ladino clover, red clover, Kentucky bluegrass, timothy, sericea lespedeza, and Korean lespedeza. Yields of these plants are good if the level of management is medium. Yields of Kentucky bluegrass and red clover can be increased by using a high level of management. These soils are not well suited to alfalfa and orchardgrass, because the fragipan is near the surface and the water table is seasonally high.

A suitable combination of a cropping system and management is needed to slow runoff and control erosion. For example, on a slope of Mercer silt loam that has a gradient of 4 percent and is 100 feet long, contour farming is used, the cropping system consists of 2 years of corn and 1 year of meadow, and a high level of management is practiced. The first corn crop is harvested for silage and is followed by a winter cover crop. The second corn crop is harvested for grain, and the crop residue is left on the surface.

The organic-matter content and tilth of these soils can be maintained or improved by planting cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIw-5

This capability unit consists of deep, somewhat poorly drained, nearly level soils that occur on flood plains and are likely to be flooded in some places. These soils have a silt loam surface layer.

Except in drained areas, a high water table limits the root zone during wet periods. The moisture-supplying capacity of these soils is high. Water and air generally move somewhat slowly in the subsoil. These soils are almost neutral. Most of the time they are easy to work, but they are slow to dry out in spring.

The soils in this unit are suited to most of the crops and the pasture plants grown in the county. At a high level of management, favorable yields of tobacco, corn, and small grain can be produced year after year in drained areas, but these crops may be damaged by flooding. Irrigation is feasible on crops of high value. If management is at a medium level, a suitable cropping system is 2 years of row crops and 2 years of meadow. Plants that withstand slight wetness are well suited to these soils. Some of these plants are Kentucky 31 fescue, redtop, alsike clover, Ladino clover, Korean lespedeza, Kobe lespedeza, and reed canarygrass. These plants produce satisfactory yields if the level of management is medium.

Organic-matter content and tilth can be maintained or improved by using cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIIe-1

This capability unit consists of deep, well-drained, sloping soils. These soils have a friable silt loam or loam surface layer. The subsoil is friable to firm silty clay loam or loam in the upper part and ranges from loam to clay in the lower part.

Through a wide range of moisture content, these soils are easily tilled without clodding or crusting. The erosion hazard is moderate in cultivated areas.

The soils in this unit are suited to all of the crops and pasture plants grown in the county. They can produce satisfactory yields of corn, tobacco, and small grain. Irrigation may be desirable where crops of high value are grown. Some of the suitable pasture and meadow plants are Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, timothy, alfalfa, red clover, Ladino clover, white clover, and Korean lespedeza. These plants produce fairly good yields if the level of management is at least medium. Yields of alfalfa, smooth bromegrass, and Kentucky bluegrass are increased by practicing a high level of management.

If these soils are used for cultivated crops, a suitable combination of a cropping system and management is needed so that runoff is slowed and erosion is controlled. For example, on a slope of Maury silt loam that is 100 feet long and has a gradient of 8 percent, contour farming

is used with a cropping system consisting of 2 years of corn and 2 years of meadow. Management is at a high level. The first corn crop is harvested for silage and is followed by a cover crop. The second corn crop is harvested for grain, and crop residue is left on the surface.

The organic-matter content and tilth of these soils can be maintained or improved by using cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIIe-2

This capability unit consists of well drained and moderately well drained, sloping soils that have a silt loam or silty clay loam surface layer. The subsoil is silty clay loam in the upper part and silty clay to clay in the lower part.

These soils generally have a moderately deep or deep root zone. Erosion is slight to moderate.

The soils in this unit are suited to all of the crops and the pasture plants grown in the county. They can produce satisfactory yields of tobacco, corn, and small grain. Irrigation may be desirable where crops of high value are grown. Some of the suitable pasture and meadow plants are Kentucky bluegrass, orchardgrass, Kentucky 31 fescue, timothy, alfalfa, red clover, Ladino clover, white clover, and Korean lespedeza. Yields of these plants are at least fair if management is at a medium level. Yields of alfalfa, orchardgrass, and Kentucky bluegrass are excellent if a high level of management is used.

If these soils are used for cultivated crops, a suitable combination of a cropping system and management is needed to slow runoff and to control erosion. For example, on a slope of Brashear silt loam that is 100 feet long and has a gradient of 8 percent, contour farming is used with a cropping system consisting of 2 years of corn and 1 year of meadow, and management is at a high level.

The organic-matter content and tilth of these soils can be maintained or improved by planting cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIIe-10

Faywood silty clay loam, 2 to 6 percent slopes, eroded, is the only soil in this capability unit. It is a moderately deep, well-drained, gently sloping soil that is slightly droughty.

This soil is suited to most of the crops and pasture and hay plants in the county. It can produce satisfactory yields of tobacco, corn, and small grain. Irrigation may be desirable where crops of high value are grown. Some of the suitable pasture and hay plants are orchardgrass, Kentucky bluegrass, Kentucky 31 fescue, timothy, alfalfa, Ladino clover, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza. Yields of Kentucky bluegrass, Kentucky 31 fescue, sericea lespedeza, and Korean lespedeza are good if management is at a medium or high level. Yields of alfalfa, Ladino clover, and orchardgrass are increased if the level of management is high.

If this soil is used for cultivated crops, a suitable combination of a cropping system and management is needed for slowing runoff and controlling erosion. For example, on a slope of Faywood silty clay loam that is 100 feet long and has a gradient of 5 percent, contour farming is used with a cropping system consisting of 2 years of corn and 1 year of meadow, if management is at a high level.

The organic-matter content and tilth of these soils can be maintained or improved by using cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IIIw-1

Lawrence silt loam is the only soil in this capability unit. This nearly level soil has a fragipan and is somewhat poorly drained. Its surface layer is friable silt loam, and its subsoil is friable to firm silty clay loam. The fragipan is at a depth of about 14 to 18 inches, and above it is a perched water table.

The root zone of this soil is shallow, and moisture-supplying capacity is moderate. The movement of water and air is good above the fragipan. This soil is acid and moderately low in natural fertility. It is late in drying out in spring, but after it has dried out, it can be easily worked.

This soil is poorly suited to most row crops, but under a high level of management, moderate yields of corn and small grain can be produced in drained areas. The corn can be grown year after year. Even in drained areas, however, yields of tobacco are low. Pasture plants that can withstand moderate wetness are well suited to this soil. Some of these plants are Kentucky 31 fescue, redtop, alsike clover, Ladino clover, Korean lespedeza, Kobe lespedeza, and reed canarygrass. These plants produce moderate yields under a medium level of management and high yields under a high level of management.

If the level of management is medium, a cropping system consisting of 1 year of a row crop and 2 years of meadow is suitable. The content of organic matter and tilth can be maintained or improved by planting cover crops and green-manure crops, by managing crop residue well, and by including sod crops in the cropping system.

CAPABILITY UNIT IVe-1

This capability unit consists of deep, well-drained soils that are strongly sloping and occur on eroded stream terraces and foot slopes. These soils formed in mixed alluvium or colluvium. Their surface layer is loam, silt loam, or silty clay loam. The subsoil generally ranges from loam to silty clay loam.

The soils in this unit have a deep root zone and high moisture-supplying capacity. Water and air move through these soils at a moderate rate. Through a wide range of moisture content, most of the soils are easy to work without clodding or crusting. Some areas may be flooded during periods of extremely high water. These soils are acid and moderately high in natural fertility.

These soils are suited to most of the crops and pasture plants grown in the county. At a high level of management, yields of tobacco, corn, and small grain are moderate and yields of Kentucky bluegrass, smooth bromegrass, alfalfa, and Ladino clover are good. Yields of Kentucky 31 fescue, orchardgrass, red clover, sericea lespedeza, and Korean lespedeza are good if the level of management is medium or high.

A high level of management that includes contour tillage and a suitable cropping system is needed to reduce runoff and help control erosion. A suitable cropping system is 2 years of corn and 3 years of meadow on a slope of Alle-

gheny loam that is 75 feet long and has a gradient of 12 percent.

The organic-matter content and tilth of the soils can be maintained or improved by using cover crops and green-manure crops, by returning crop residue to the soils, and by including sod crops in the cropping system.

CAPABILITY UNIT IVe-6

This unit consists of deep, moderately deep, and shallow, well-drained and somewhat excessively drained, sloping soils. The plow layer is silt loam, silty clay loam, and silty clay, and the subsoil ranges from silty clay loam to clay. In many areas limestone flagstones are numerous on the surface and throughout the profile. Tillage is easy in some areas and is difficult in others. Erosion is a severe hazard in cultivated areas.

The soils in this unit are poorly suited to most row crops, but at a high level of management moderate or moderately low yields of tobacco, corn, and small grain can be produced. Pasture plants are better suited than row crops. Kentucky bluegrass, timothy, alfalfa, White Dutch clover, and red clover can be grown if the level of management is high. Yields of Kentucky 31 fescue, orchardgrass, sericea lespedeza, and Korean lespedeza are satisfactory at a medium or high level of management.

If these soils are used for cultivated crops, a suitable combination of a cropping system and management is needed to slow runoff and control erosion. For example, on a slope of McAfee silt loam having a gradient of 8 percent and length of 75 feet, a cropping system consisting of 1 year of corn and 3 years of meadow is suitable, if contour farming is practiced and the level of management is high.

The organic-matter content and tilth of these soils can be maintained or improved by planting cover crops and green-manure crops, by returning crop residue to the soil, and by including sod crops in the cropping system.

CAPABILITY UNIT Vs-1

Huntington channery silt loam, shallow, is the only soil in this capability unit. It is a shallow, well-drained, nearly level soil that formed in coarse material deposited along the main streams in the county. This soil is stony, and it is subject to frequent and rapid flooding. Erosion, however, is not likely.

Because this soil is shallow, channery, and subject to overflow, it is not well suited to row crops or to alfalfa grown for hay. It is better suited to pasture. Some of the suitable pasture plants are Kentucky 31 fescue, redtop, red clover, alsike clover, Korean lespedeza, Kobe lespedeza, sericea lespedeza, Ladino clover, and orchardgrass. Yields of these plants are good if the level of management is medium or high.

CAPABILITY UNIT VIe-1

This capability unit consists of well-drained, strongly sloping soils that are mostly moderately deep to limestone bedrock, which crops out in places. The plow layer is mostly silt loam and silty clay loam. The subsoil ranges from silty clay loam in the upper part to silty clay in the lower part.

The soils in this unit have a moderately deep root zone and moderately high moisture-supplying capacity. Water and air move well through these soils. Except in the eroded areas, these soils can be worked through a moderately wide range of moisture content without crusting or clodding.

These soils are so erodible that they are not suited to cultivated crops. They are fairly well suited to Kentucky bluegrass, orchardgrass, timothy, and red clover grown for pasture and hay, and yields are moderate if the level of management is high. Yields of alfalfa are moderately low even if management is at a high level. At a medium level of management, these soils produce fair yields of Kentucky 31 fescue, sericea lespedeza, and Korean lespedeza.

Because erosion is a hazard, management that provides a protective ground cover is important. Plant mixtures should be selected that produce satisfactory yields of forage and that provide a ground cover requiring little renovation. Continuous grazing is not advisable, for rest periods are needed after each grazing period so that the plants can regain their vigor.

CAPABILITY UNIT VIe-3

This capability unit consists of well-drained and somewhat excessively drained, strongly sloping to moderately steep soils that are hilly and severely eroded. These soils have a silty clay surface layer and subsoil. Limestone flagstones are scattered on the surface and throughout the profile.

Most of the original surface layer has been lost through erosion, and the present plow layer is low in organic-matter content. The root zone, however, is generally deep because roots penetrate the underlying weathered shale. In these soils moisture-supplying capacity is moderately low, and the movement of water and air is slow. Tillage is limited to a narrow range of moisture content. In dry periods moisture is lost through cracks that form during these periods.

The soils in this unit are so erodible that they are not suited to row crops. They are better suited to pasture and hay. Kentucky 31 fescue and sericea lespedeza are better suited than other pasture plants. Yields of these plants are moderate if the level of management is medium or high. Kentucky bluegrass, orchardgrass, timothy, red clover, sweetclover, and Korean lespedeza can be grown, but their stands are not long lived.

Because erosion is a hazard, management that provides a ground cover is important. Plant mixtures should be selected that produce satisfactory yields of forage and that provide a protective ground cover requiring little renovation. Continuous grazing is damaging, and rest periods are needed after each grazing period so that the plants can regain their vigor.

CAPABILITY UNIT VIs-1

This capability unit consists of shallow, well-drained and somewhat excessively drained, sloping to moderately steep soils. These soils have a silty clay loam or silt loam surface layer. The underlying material is shattered rock, and there are many limestone fragments throughout the profile.

In these soils the moisture-supplying capacity is low, and the movement of water and air is slow. Tillage is limited to a narrow range of moisture content and, in some places, by limestone rocks on the surface and in the soil. These soils are almost neutral, have moderately high natural fertility, and are low in organic-matter content.

These soils are so rocky and erodible that they are not suitable for row crops. The loose rocks and rock outcrops interfere with tillage and with the preparation of the seedbed.

Pasture is a good use. Deep-rooted pasture plants grow well because their roots penetrate the underlying material where the rocks are not large or close to the surface. Kentucky 31 fescue and sericea lespedeza are better suited than other pasture plants, and they provide better protective cover. At a high level of management, Kentucky bluegrass, orchardgrass, timothy, red clover, sweetclover, and Korean lespedeza can be grown, but their stands are not vigorous or long lived.

Because erosion is a hazard, management that provides a ground cover is important. Plant mixtures should be selected that produce satisfactory yields of forage and that provide a protective cover requiring little renovation. Continuous grazing is damaging, for rest periods are needed after each grazing period so that the plants can regain their vigor.

CAPABILITY UNIT VIs-2

This capability unit consists of shallow, well-drained and excessively drained soils that are sloping to strongly sloping and severely eroded. Erosion has removed most of the original surface layer, and the present surface layer is clay. These soils developed in residuum from limestone and calcareous shale. Limestone rocks or flagstones of various sizes occur throughout the profile, and there are a few rocks on the surface.

These soils are so stony and shallow that they are not suited to row crops. Loose stones, rock outcrops, and the clay in the surface layer make preparation of the seedbed difficult, especially early in spring when grasses are usually seeded.

Pasture is a better use for these soils than hay crops. At any level of management, Kentucky 31 fescue and sericea lespedeza are better suited than other pasture plants. Sweetclover and Korean lespedeza are frequently used in the pasture mixtures, but their yield of forage is small.

On these soils management is needed that provides a protective ground cover requiring little renovation. Continuous grazing is not advisable, for rest periods are needed after each grazing period so that plants can regain their vigor.

CAPABILITY UNIT VIIs-2

This unit consists mostly of moderately steep and steep soils and land types that are shallow and very rocky or extremely rocky. The steep soils occur on the bluffs along the Licking River. Outcrops of limestone are common, some of them forming ledges. In the moderately steep areas most of the original surface layer has been lost because of overgrazing or other unwise use. Many deep gullies have formed in some places.

The effective root zone of these soils extends into the weathered underlying material in many places. Moisture-supplying capacity is moderate to low.

The soils and land types in this unit are suited to trees and to pasture on which grazing is limited. Kentucky 31 fescue and sericea lespedeza are better suited than other pasture plants, but their yields are low, even at the highest practical level of management. Any other pasture plants are extremely short lived and are not suited to these soils.

Because rocks are abundant and slopes are steep, operating farm machines is extremely difficult and hazardous. A protective ground cover is needed to help control erosion. Continuous grazing is damaging, and rest periods are needed after each grazing period so that the plants can regain their vigor.

Estimated Yields

Estimated average yields of crops and pasture plants commonly grown in the county are given in table 2 for each soil mapped. Except for tobacco, the yields are for a medium or a high level of management. Tobacco is grown only on soils managed at a high level, and the yields estimated are for management at that level. Gullied land, Made land, and Rock land are not generally used for crops and pasture and are not listed in table 2. The yields are averages over a period of several years. In any one year, yields may be lower than the average because of bad weather, disease, or some other adverse factor, or they may be higher than the average because weather and other conditions have been favorable.

Yields in columns A are those obtained at a medium level of management. This is the management ordinarily followed by most farmers in the county. In this management not enough care has been taken in adding lime and fertilizer, in selecting the most suitable varieties, in preparing the seedbed, or in other practices. Ordinary management is the minimum that will prevent the soils from deteriorating and that will enable them to produce yields that bring some profit.

Yields expected under a high level of management are listed in columns B. A high level of management includes: (1) Use of adapted crop varieties; (2) proper seeding rates, inoculation of legumes, dates of planting, and harvesting methods; (3) control of weeds, insects, and diseases; (4) application of fertilizer equal to or above the current recommendations of the University of Kentucky Agricultural Experiment Station, or equal to or above the needs indicated by properly interpreted soil tests; (5) adequate additions of lime; (6) drainage of wet soils where feasible; (7) choice of cropping systems that help to control erosion and to maintain tilth, soil structure, and organic-matter content; (8) contour tillage, terracing, contour stripcropping, and sodding of waterways; (9) use of cover crops, crop residue, or both to increase the supply of organic matter and to help control erosion; (10) all applicable practices of pasture management; (11) minimum tillage; and (12) interseeding of winter crops in crop rows.

Differences in estimated yields under medium and high levels of management indicate response of soils to management and, as such, are guides in selecting a safe, profitable system of management for the different soils.

Woodland [3]

Forest originally covered nearly all of Harrison County. On uplands the deep soils over limestone supported northern red oak, white oak, black walnut, black locust, yellow-poplar, and other desirable hardwoods. Growing in the

[3] By WILLIAM M. MORRILL, woodland conservationist, Soil Conservation Service.

TABLE 2.—*Estimated average acreage yields of crops*

[Yields in columns A are those to be expected under a medium level of management; those in columns B, under a high level of management. Absence of yield indicates soil is not suited to the crop specified, or the crop is not commonly grown at that level of management]

Soil	Corn		Corn (silage)		Tobacco	Wheat		Alfalfa		Red clover		Lespedeza		Pasture	
	A	B	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Lb.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Allegheny loam, 2 to 6 percent slopes	75	110	16.0	21.0	2,500	31	43	2.9	4.2	2.2	3.2	1.6	2.3	169	245
Allegheny loam, 6 to 12 percent slopes, eroded	65	94	14.0	19.0	2,150	25	36	2.5	3.6	2.1	3.1	1.4	2.0	145	225
Allegheny loam, 12 to 20 percent slopes, eroded	63	90			1,800	24	35	2.4	3.5	2.0	3.0			145	225
Ashton silt loam, 0 to 2 percent slopes	98	140	18.0	25.0	2,700	35	50	3.2	4.5	2.5	3.5	1.7	2.5	150	260
Ashton silt loam, 2 to 6 percent slopes	90	130	18.0	25.0	2,700	35	50	3.2	4.5	2.5	3.5	1.7	2.5	150	260
Ashton silt loam, 6 to 12 percent slopes	80	120	17.0	23.0	2,500	30	45	3.0	4.2	2.3	3.3	1.5	2.4	140	250
Brashear silt loam, 2 to 6 percent slopes	64	110	15.0	22.0	2,150	26	42	2.3	4.2	2.0	2.8	1.5	2.4	160	250
Brashear silt loam, 6 to 12 percent slopes	62	105	14.0	20.0	2,050	25	38	2.4	3.5	1.8	2.6	1.5	2.2	165	245
Brashear silty clay loam, 6 to 12 percent slopes, eroded	61	92	9.5	18.0	1,950	23	35	2.2	3.3	1.8	2.4	1.3	2.0	165	238
Brashear silty clay loam, 12 to 20 percent slopes, eroded	46	76			1,450	17	26	1.8	2.9		2.2			160	235
Captina silt loam, 0 to 2 percent slops	60	90	14.0	18.0	2,200	24	35	1.5	2.4	1.8	3.0	1.6	2.3	145	240
Captina silt loam, 2 to 6 percent slopes	60	90	14.0	18.0	2,250	24	35	1.5	2.5	1.8	3.0	1.6	2.3	140	238
Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded								1.5	2.2		2.0			147	210
Cynthiana very stony silty clay loam, 12 to 20 percent slopes, eroded								1.5	2.2					132	195
Cynthiana very stony silty clay loam, 20 to 30 percent slopes eroded														130	188
Cynthiana very stony clay, 6 to 12 percent slopes, severely eroded								1.5	2.2					132	195
Cynthiana very stony clay, 12 to 20 percent slopes, severely eroded								1.4	2.1					126	180
Cynthiana very rocky clay, 20 to 30 percent slopes, severely eroded														70	95
Eden flaggy silty clay, 6 to 12 percent slopes, severely eroded					1,350			1.5	2.2		1.8			58	200
Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded								1.4	2.1					55	200
Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded								1.3	2.0					50	200
Egam silt loam	81	115	15.0	22.0	2,250	28	40	2.5	3.7	2.1	3.0	1.8	2.4	163	250
Elk silt loam, 0 to 2 percent slopes	98	140	18.0	25.0	2,700	35	50	3.2	4.5	2.5	3.5	1.7	2.5	150	260
Elk silt loam, 2 to 6 percent slopes	93	130	17.5	23.0	2,700	36	48	3.0	4.3	2.5	3.5	1.7	2.5	175	255
Elk silt loam, 6 to 12 percent slopes	83	115	16.0	21.5	2,550	34	45	2.6	4.0	2.3	3.4	1.4	2.0	172	253
Elk silt loam, 12 to 20 percent slopes, eroded	50	75	10.0	14.0	1,800	21	30	2.4	3.2	2.2	2.8	1.2	1.7	135	215
Etowah silt loam, 2 to 6 percent slopes	90	128	15.0	20.5	2,650	32	42	2.8	4.3	2.5	3.5	1.7	2.5	172	253
Etowah silt loam, 6 to 12 percent slopes, eroded	78	110	13.0	18.0	2,200	26	38	2.0	3.5	2.2	3.2	1.3	1.9	160	245
Fairmont and Cynthiana extremely rocky soils, 20 to 30 percent slopes														64	107
Fairmont and Cynthiana extremely rocky soils, 30 to 50 percent slopes														50	72
Faywood silt loam, 2 to 6 percent slopes	55	80	11.0	16.0	1,900	19	30	2.0	3.6	1.8	2.9	1.3	2.0	145	215
Faywood silt loam, 6 to 12 percent slopes	45	75	9.0	15.0	1,800	15	25	1.9	3.0	1.7	2.8	1.0	1.8	140	210
Faywood silty clay loam, 2 to 6 percent slopes, eroded	55	80	11.0	16.0	1,900	15	25	2.0	3.3	1.7	2.8	1.0	1.8	140	210
Faywood silty clay loam, 6 to 12 percent slopes, eroded	45	75	9.0	15.0	1,700	15	25	1.9	3.2	1.6	2.6	.9	1.6	145	215
Faywood silty clay loam, 12 to 20 percent slopes, eroded								1.6	2.6	1.2	2.4			130	200
Heitt silt loam, 2 to 6 percent slopes	65	100	13.0	20.0	2,200	28	38	2.8	4.0	2.0	3.2	1.5	2.2	155	235

See footnote at end of table.

TABLE 2.—*Estimated average acreage yields of crops*—Continued

Soil	Corn		Corn (silage)		Tobacco	Wheat		Alfalfa		Red clover		Lespedeza		Pasture	
	A	B	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Lb.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Heitt silty clay loam, 6 to 12 percent slopes, eroded	50	85	10.0	17.0	1,900	20	30	2.2	3.5	1.8	3.0	1.2	1.9	140	210
Heitt silty clay loam, 2 to 6 percent slopes, eroded	60	95	12.0	19.0	2,100	25	35	2.6	3.7	1.9	3.1	1.4	2.1	150	225
Huntington channery silt loam, shallow														145	200
Huntington silt loam, 0 to 4 percent slopes	98	140	18.0	25.0	2,700	35	50	3.2	4.5	2.5	3.5	1.7	2.5	180	260
Huntington silt loam, 4 to 20 percent slopes	92	130	15.0	21.0	2,500	30	45	2.8	4.1	2.3	3.3	1.3	1.9	180	260
Lanton silt loam	77	110	14.0	19.0	2,400	21	30			1.8	2.8	1.5	2.1	160	230
Lawrence silt loam	35	70	6.6	14.0							1.9	1.1	1.9	155	225
Lindside silt loam	79	115	14.0	20.0	2,400	23	35	2.0	3.5	2.0	3.1	1.3	2.0	180	260
Loradale silt loam, 2 to 6 percent slopes	79	115	15.0	22.0	2,500	30	40	2.5	4.0	2.1	3.2	1.4	2.2	162	250
Loradale silt loam, 6 to 12 percent slopes, eroded	64	95	13.0	19.0	2,200	26	36	2.0	3.7	1.9	3.0	1.1	1.9	140	230
Maury silt loam, 2 to 6 percent slopes	79	125	15.0	22.0	2,700	35	50	2.6	4.0	2.3	3.4	1.5	2.1	162	250
Maury silt loam, 6 to 12 percent slopes, eroded	64	95	13.0	19.0	2,300	26	38	2.0	3.4	2.0	3.1	1.2	1.9	157	245
McAfee silt loam, 6 to 12 percent slopes, eroded	37	58	7.0	10.5	1,350	13	20	1.6	2.7		2.2		1.1	138	200
McAfee silt loam, 12 to 20 percent slopes, eroded														128	185
Mercer silt loam, 2 to 6 percent slopes	60	90	14.0	18.0	2,250	23	32	1.5	2.5	1.7	2.7	1.2	1.8	160	230
Newark silt loam	65	101	11.0	19.0	1,950	21	32	1.8	3.1	1.6	2.6	1.2	1.8	162	235

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. This value is obtained by multiplying the number of animal units carried per acre by the number of days the pasture is grazed during a single grazing season without injury to the sod. (One animal unit is one cow, steer, or horse; five hogs; or seven sheep.)

uplands on the shallow soils over limestone were black oak, chestnut oak, white oak, hickory, Virginia pine, and redcedar in stands of fair to low quality. The alluvial soils along streams supported mainly pin oak, sweetgum, cottonwood, sycamore, hackberry, elm, ash, willow, boxelder, and red maple.

Lumbering began when the county was first settled, and by 1850 the production of staves for whisky barrels was important. Since then the economy of the county has been based mainly on tobacco and livestock. No sawmills are currently operating in the county, but there are fairly good markets for woodland products of good quality. Among these are fence posts for farm use.

Less than one-fifth of the county remains in woodland. Most of the choice timber has been logged on the soils that are deep over limestone, but these areas are not farmed. The overmature trees that remain in fields serve mainly for shade. Nearly all of the lowlands have been cleared and drained and are used for pasture and cultivated crops. In the foreseeable future, it is not likely that soils good for farming will be used to produce trees, either those that come back naturally or those that are planted.

Except for redcedar, there is little or no demand for the trees that grow in a fairly large acreage of the shallow to moderately deep, strongly sloping to steep very stony Cynthiana soils, the very rocky Cynthiana soils, the flaggy Eden soils, and the extremely rocky Fairmount soils. Redcedar is of some commercial value, but only limited management for this tree is justified.

On the soils of this county, site index ranges from 40 to 50 for upland oaks and from 30 to 50 for redcedar. Limitations to the use of equipment are severe on rocky soils and on slopes of more than 12 percent. The erosion hazard is severe on slopes of more than 6 percent. Seedling mortality is severe in the eroded areas during the dry periods that generally occur in the early part of the growing season and last for 2 or 3 weeks. In these periods the loss of newly planted trees and of newly germinated seedlings is severe.

Managing the Soils for Wildlife

For the successful management of any area as wildlife habitat, it is necessary that food, cover, and water are available in a suitable combination. Lack of any one of these necessities, an unfavorable balance between them, or inadequate distribution, may seriously limit the number or account for the absence of the desired wildlife species. Knowledge about the soils is a valuable tool in establishing, maintaining, or improving suitable food, cover, and water for wildlife. It is also helpful in indicating areas that are not suitable as wildlife habitat.

Most wildlife habitat is managed by planting suitable vegetation, by manipulating existing vegetation so as to increase or improve desirable plants, or by a combination of these measures. Also, water areas can be created or improved for use by wildlife. In all of these purposes information about the soils is useful.

Elements of habitat and kinds of wildlife

In table 3 the soils of Harrison County are rated for their relative suitability for establishing, maintaining, or improving eight elements of wildlife habitat. On the basis of these ratings for selected elements, the soils are also rated according to their suitability for three broad classes of wildlife. The numerical ratings used in table 3 are 1 for well suited, 2 for suited, 3 for poorly suited, and 4 for unsuited.

The verbal ratings of suitability can be further explained. A soil is *well suited* to an element of wildlife habitat if there are few or no limitations to use and the element is easily established, maintained, or improved. A soil is *suited* if there are moderate limitations to use, but the element can be established, maintained, or improved by using moderate management that provides fairly frequent attention. A soil is *poorly suited* if there are severe limitations to use and if establishing, maintaining, or improving the element is questionable. Management of poorly suited soils is difficult and expensive. A soil is *unsuited* to an element of wildlife habitat if establishing, maintaining, or improving the element is impractical or cannot be done.

The eight elements of wildlife habitat given in table 3 are described in the following paragraphs.

Grain and seed crops consist of grains or seed-producing annuals that are planted to produce food for wildlife. Examples are corn, sorghum, wheat, oats, millet, buckwheat, soybeans, and sunflower.

Grasses and legumes are perennial grasses and herbaceous legumes that are planted to furnish food and cover for wildlife. Examples are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and panicgrass.

Wild herbaceous upland plants are native or introduced perennial grasses and forbs that generally are established naturally and that provide food and cover mainly for upland wildlife. Examples are bluestem, indiangrass, wheatgrass, wild ryegrass, oatgrass, pokeweed, strawberries, lespedeza, beggarweed, wild beans, nightshade, goldenrod, and dandelions.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce fruit, nuts, buds, catkins, twigs (browse), or foliage that are used extensively as food by wildlife and that commonly are established naturally but also may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grapes, honeysuckle, blueberry, briers, greenbriers, autumn-olive, and multiflora rose.

Coniferous woody plants are cone-bearing trees and shrubs that are important to wildlife mainly as cover, but that also furnish food in the form of browse, seeds, or cones. These trees and shrubs are commonly established naturally, but they also may be planted. Examples are spruce, pine, white-cedar, hemlock, balsam fir, redcedar, juniper, and yew.

Wetland food and cover plants are on moist to wet sites and consist of annual and perennial grasses and wild herbaceous plants, exclusive of submerged or floating aquatics. Wetland food and cover plants are used mainly by wetland wildlife. Examples are smartweed, wild millet, bulrush, spikesedge, other sedges, rushes, burreed, wildrice, rice cutgrass, mannagrass, and cattail.

Shallow water developments are areas of water no more than 6 feet deep that have been made by building dikes or levees, by digging excavations and level ditches, or by using devices to control the water level of marshy drainageways or channels.

Excavated ponds are dug-out areas or combinations of dug-out areas and areas dammed by low dikes that hold enough water of suitable quality and depth for the production of fish or wildlife. These ponds are built on nearly level land and have a surface area of at least one-fourth acre and an average depth of 6 feet in at least one-fourth of their area. Also required is a water table that is permanently high or another dependable source of water.

Definitions are also needed for the three main classes of wildlife given in table 3.

Openland wildlife consists of birds and mammals that normally make their homes on cropland, in pastures and meadows, on lawns, and in areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, meadow larks, field sparrows, doves, cottontail rabbits, red foxes, and woodchucks.

Woodland wildlife consists of birds and mammals that normally make their homes in areas of hardwood trees and shrubs, coniferous trees and shrubs, or a mixture of these plants. Examples are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, gray squirrels, gray foxes, white-tailed deer, raccoons, and wild turkeys.

Wetland wildlife consists of birds and mammals that normally make their homes in ponds, marshes, swamps, and other wet areas. Examples are ducks, geese, herons, shore birds, mink, muskrat, and beaver.

Engineering Applications [4]

Soils engineering deals with soils that are used as structural material and as foundation material upon which structures are built. Some properties of soils are of special interest to the engineer 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 properties most important to the engineer are shear strength, soil drainage, grain size, plasticity, and permeability. Also important are shrink-swell potential, depth to the water table, depth to bedrock, topography, available water capacity, flooding hazard, and degree of acidity or alkalinity.

Information in this survey can be used to—

1. Make studies of soil and land use that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the soil properties that are important in planning agricultural drain-

[4] By WILLIAM M. ADAMS, civil engineer, Soil Conservation Service.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*

[A rating of 1 denotes well suited, or above average; 2 denotes suited, or average; 3 denotes poorly suited, or below average; and 4 denotes unsuited]

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Allegheny:											
AlB, AlC2	2	1	1	1	2	4	4	4	1	1	4
AlD2	3	1	1	1	2	4	4	4	1	1	4
Ashton:											
AsA	1	1	1	1	3	4	4	4	1	1	4
AsB, AsC	2	1	1	1	3	4	4	4	1	1	4
Brashear:											
BrB, BrC, BsC2	2	1	1	1	3	4	4	4	1	1	4
BsD2	3	1	1	1	3	4	4	4	1	1	4
Captina:											
CaA	2	1	1	1	3	3	3	3	1	1	3
CaB	2	1	1	1	3	4	4	4	1	1	4
Cynthiana:											
ChC2	3	2	2	2	2	4	4	4	2	2	4
ChD2, ChE2, CnC3, CnD3	4	3	2	2	2	4	4	4	3	2	4
CrE3	4	3	3	2	2	4	4	4	4	3	4
FcE, FcF	4	3	2	2	2	4	4	4	3	2	4
Eden:											
EdC3	3	2	1	1	2	4	4	4	2	1	4
EdD3, EdE3	4	3	2	2	2	4	4	4	3	2	4
Egam:											
Eg	1	1	1	1	3	4	4	4	1	1	4
Elk:											
EkA	1	1	1	1	3	4	4	4	1	1	4
EkB, EkC	2	1	1	1	3	4	4	4	1	1	4
EkD2	3	1	1	1	3	4	4	4	1	1	4
Etowah:											
EtB, EtC2	2	1	1	1	3	4	4	4	1	1	4
Fairmount:											
FcE, FcF	4	3	2	2	2	4	4	4	3	2	4
Faywood:											
FwB, FyB2, FwC, FyC2	2	1	1	1	3	4	4	4	1	1	4
FyD2	3	2	1	1	3	4	4	4	2	2	4
Gullied land:											
Gu	4	4	3	3	2	4	4	4	3	3	4
Heitt:											
HeB, HsC2, HsB2	2	1	1	1	3	4	4	4	1	1	4
Huntington:											
Ht	4	3	2	3	3	4	4	4	3	2	4
HuA	1	1	1	1	3	4	4	4	1	1	4
HuD	2	1	1	1	3	4	4	4	1	1	4
Lanton:											
La	1	1	1	1	3	4	4	4	3	2	4
Lawrence:											
Lc	3	2	2	2	3	2	2	2	2	3	2
Lindside:											
Ld	2	1	1	1	3	3	3	3	1	1	3
Loradale:											
LoB, LoC2	2	1	1	1	3	4	4	4	1	1	4
Made land:											
Ma											
Maury:											
MrB, MrC2	2	1	1	1	3	4	4	4	1	1	4
McAfee:											
MsC2	2	1	1	1	3	4	4	4	1	1	4
MsD2	4	2	1	1	3	4	4	4	2	2	4
Mercer:											
MtB	2	1	1	1	3	4	4	4	1	1	4
Newark:											
Ne	2	1	1	1	3	3	2	3	1	1	3
Rock land:											
Rk	4	4	3	3	1	4	4	4	4	3	4

age systems, farm ponds, irrigation systems, and diversion terraces.
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 at the selected locations.
4. Locate probable sources of sand, gravel, and other construction materials.
5. Correlate performance of engineering structures with soil mapping and thus develop information that will be useful in planning, designing, and maintaining the structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information from other published maps and reports and from aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to a particular area.

With the use of the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized, however, that the interpretations may not eliminate the need for sampling and testing at the site of specific engineering works where loads are heavy and where the excavations are deeper than 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.

Many of the terms used by the soil scientists may not be familiar to the engineer, and some terms may have a special meaning in soil science. Several of these terms are defined in the Glossary at the back of this soil survey.

Other parts of this survey may be useful to engineers, particularly the sections "Descriptions of the Soils," and "Formation and Classification of Soils."

Engineering properties of soils

Table 4 gives estimates of some soil properties significant in engineering, and of the agricultural and engineering classification of the soil material in the principal horizons. This table excludes the land types Made land, Gullied land, and Rock land. On-site studies are necessary to determine the engineering potential of these land types because their soil material is variable. The columns in table 4 are explained in the following paragraphs.

Depth to rock generally is the depth to noncompressible material, which may be shale or sandstone bedrock. *Depth to seasonally high water table* is the estimated depth to the level of ground water during a prolonged period of rainfall. The *flooding hazard* gives the probability of the area being subject to flooding. *Depth from surface* shows the thickness of each layer and its depth from the surface.

In table 4, for the principal horizons, the classification of the soil material is listed according to the systems used by the U.S. Department of Agriculture (USDA) (*9*), the American Association of State Highway Officials (AASHO) (*1*), and the Corps of Engineers, U.S. Army (Unified) (*10*). Also listed are the estimated percentages of material that will pass sieves Nos. 4, 10, and 200.

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The USDA system of classifying soil texture is used mainly by agricultural scientists, but it is also useful to engineers. In this system the textural class of a soil is estimated on the basis of proportions of sand (2.0 millimeters to 0.05 millimeter in size), silt (0.05 to 0.002 millimeter), and clay (less than 0.002 millimeter) (*9*). For example, silt loam contains 50 percent or more silt and 12 to 27 percent clay, or 50 to 80 percent silt and less than 12 percent clay.

The Unified soil classification system (*10*) is based on the textural and plastic qualities of soils and the performance of soils as construction materials. Soils are classified on the basis of (1) the percentage of gravel, sand, and fines; (2) the shape of the grain-size distribution curve; and (3) the plasticity characteristics. Fines are particles that pass a No. 200 sieve. The three broad classes of soils in the Unified system are coarse grained, fine grained, and highly organic.

The coarse-grained soils contain less than 50 percent of material that is smaller than openings in the No. 200 sieve (0.074 millimeter). These soils are subdivided into gravel (G) and sand (S). The gravelly soils are those having greater percentage of the coarse fraction (material held on No. 200 sieve) retained on the No. 4 sieve (4.7 millimeters). Sands are those soils having the greater percentage passing the No. 4 sieve. The soils in each of these groups are further classified on the basis of the amount of fines, the plasticity characteristics, and the shape of the grain-size distribution curve. Gravelly soils are identified by the symbols GW (well graded), GP (poorly graded), GM (silty), and GC (clayey). Sandy soils are identified by the symbols SW (well graded), SP (poorly graded), SM (silty), and SC (clayey).

More than 50 percent of the material that is in the fine-grained soils is made up of particles smaller than openings in the No. 200 sieve. These soils are subdivided into silts (M) and clays (C), depending on their liquid limit and plasticity index. Each of these groups is further classified on the basis of whether the soils have a relatively low (L) or high (H) liquid limit. Silts and clays that have a low liquid limit are identified by the symbols ML and CL, and silts and clays that have a high liquid limit are identified by the symbols MH and CH.

The AASHO system (*1*) is based on the field performance of soils used in highways. Soils having about the same general capacity for load carrying and service are placed in seven basic groups ranging from A-1 through A-7. The soils in the A-1 group are best for road subgrades, whereas soils in the A-7 group are the poorest.

The textural soil fractions that are used in classification are gravel, coarse sand, fine sand, and combined silt and clay. The soil materials are classified as granular and silt-clay. The No. 200 sieve passes 35 percent of the material in granular soils and more than 35 percent of the material in silt-clay soils. If the plasticity index of a soil is 10 or less, the soil is silty, if the plasticity index is more than 10, the soil is clayey.

The granular soils are classified as A-1, A-2, and A-3. The soils in the A-1 group are well-graded mixtures that consist of coarse to fine material and a nonplastic or slightly plastic soil binder. Soils in the A-2 group may be poorly graded and contain inferior binder material. Soils in the A-3 group are sands that are deficient in soil binder and coarse material.

TABLE 4.—*Estimated engineering*

[No estimates are given for Gullied

Soil series and map symbol	Depth to rock	Depth to seasonally high water table	Flooding hazard	Depth from surface	Classification		
					USDA texture	Unified	AASHO
	Feet	*Feet*		*Inches*			
Allegheny (AlB, AlC2, AlD2)	>10	5+	None.	0–8	Loam	ML	A–4
				8–13	Loam	ML	A–4
				13–30	Loam	ML	A–4
				30–48	Gravelly sandy clay loam, sandy loam.	CL, SC	A–6, A–2
Ashton (AsA, AsB, AsC)	5 to 15	5+	Subject to infrequent flooding.	0–9	Silt loam	ML	A–4
				9–38	Silt loam or clay loam.	ML, CL	A–4, A–6
				38–48	Silt loam	ML, CL	A–4, A–6
Brashear (BrB, BrC, BsC2, BsD2).	4+	4+	None.	0–7	Silt loam	ML, CL	A–4, A–6
				7–18	Silty clay loam	CL	A–6, A–7
				18–40	Silty clay	CL, CH	A–7, A–6
				40–48	Clay	CH	A–7
Captina (CaA, CaB)	5 to 25	1½ or 2	Subject to infrequent flooding in low areas.	0–8	Silty loam	ML, CL	A–4, A–6
				8–20	Silt loam	ML, CL	A–4, A–6
				20–37	Silty clay loam	CL	A–6
				37–50	Silty clay	CL, CH	A–6, A–7
Cynthiana (ChC2, ChD2, ChE2, CnC3, CnD3, CrE3).	1 to 2	5+	None.	0–5	Silty loam	ML, CL	A–4, A–6
				5–15	Silty clay	CL, CH	A–6, A–7
				15–18	Clay	CH	A–7
				18	Bedrock.		
Eden (EdC3, EdD3, EdE3)	1½ to 3	5+	None.	0–4	Flaggy silty clay	CL, CH	A–6, A–7
				4–13	Flaggy silty clay	CL, CH	A–7
				13–30	Flaggy clay	CH, CL	A–7
				30	Bedrock.[1]		
Egam (Eg)	4 to 10	2+	Subject to flooding.	0–16	Silt loam	ML, CL	A–4, A–6
				16–24	Silty clay loam	CL	A–6
				24–41	Silt loam	CL	A–6
Elk (EkA, EkB, EkC, EkD2)	5+	5+	Some areas are subject to infrequent flooding.	0–16	Silt loam	ML	A–4
				16–48	Silty clay loam	CL	A–6
Etowah (EtB, EtC2)	5 to 15+	5+	None.	0–7	Silt loam	ML or CL	A–4
				7–22	Silty clay loam	CL	A–6
				22–37	Silty clay	CH, CL	A–7, A–6
				37–50	Silty clay loam	CL	A–6
Fairmount (FcE, FcF). (For properties of the Cynthiana soils in these mapping units, see the Cynthiana series.)	½ to 2	5+	None.	0–4	Extremely rocky silty clay loam.	CL	A–6, A–7
				4–13	Silty clay	CL, CH	A–7
				13–20	Silty clay	CL, CH	A–7
				20	Bedrock.		
Faywood (FwB, FwC, FyB2, FyC2, FyD2).	1½ to 3½	5+	None.	0–10	Silt loam	ML, CL	A–4, A–6
				10–15	Silty clay loam	CL	A–6
				15–25	Silty clay	CL, CH	A–6, A–7
				25–36	Clay	CH	A–7
				36	Rock.		
Heitt (HeB, HsB2, HsC2)	2 to 4	3+	None.	0–6	Silt loam	ML, CL	A–4, A–6
				6–20	Silty clay	CL, CH	A–6, A–7
				20–36	Clay	CH	A–7
				36	Bedrock.[2]		
Huntington (HuA, HuD)	5 to 10+	4+	Subject to flooding.	0–10	Silt loam	ML, CL	A–4, A–6
				10–24	Silt loam	ML, CL	A–4, A–6
				24–48	Silt loam	ML, CL	A–4, A–6

See footnotes at end of table.

properties of the soils

land, Made land, and Rock land]

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
			Inches per hour	*Inches per inch of soil*	*pH*	
90–100	85–100	65–85	2. 0–6. 3	0. 14–0. 18	6. 6–7. 3	Low.
90–100	85–100	65–85	0. 63–2. 0	0. 14–0. 18	6. 6–7. 3	Low.
90–100	85–100	60–85	0. 63–2. 0	0. 14–0. 18	5. 6–6. 0	Low.
85–100	80–100	30–55	0. 63–2. 0	0. 10–0. 18	5. 6–6. 0	Low.
95–100	95–100	80–95	2. 0–6. 3	0. 18–0. 23	6. 6–7. 3	Low.
95–100	95–100	80–95	0. 63–2. 0	0. 18–0. 23	6. 1–6. 5	Low to moderate.
95–100	95–100	75–95	0. 63–2. 0	0. 18–0. 23	6. 1–6. 5	Low to moderate.
95–100	95–100	90–100	0. 63–2. 0	0. 18–0. 23	6. 1–6. 5	Low to moderate.
95–100	95–100	90–100	0. 2–0. 63	0. 19–0. 21	6. 1–6. 5	Moderate.
90–100	90–100	85–100	0. 2–0. 63	0. 15–0. 18	6. 1–6. 5	Moderate to high.
90–100	90–100	80–95	0. 2–0. 63	0. 15–0. 18	6. 1–7. 3	High.
95–100	95–100	80–95	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
95–100	90–100	80–95	0. 63–2. 0	0. 18–0. 23	5. 1–6. 0	Low to moderate.
95–100	90–100	75–95	<0. 2	0. 19–0. 21	5. 1–5. 5	Moderate.
95–100	90–100	75–95	0. 2–0. 63	0. 15–0. 18	5. 1–5. 5	Moderate to high.
85–100	80–100	75–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
85–100	80–100	80–100	0. 2–0. 63	0. 15–0. 18	6. 1–6. 5	Moderate to high.
85–100	80–100	70–100	<0. 2	0. 15–0. 18	6. 6–7. 3	High.
85–100	80–100	80–100	0. 2–0. 63	0. 13–0. 15	6. 6–7. 3	Moderate to high.
85–100	80–100	80–100	<0. 2	0. 10–0. 15	6. 6–7. 3	High.
85–100	80–100	70–100	<0. 2	0. 10–0. 15	7. 4–8. 4	High.
95–100	90–100	75–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low.
95–100	90–100	75–100	0. 2–0. 63	0. 19–0. 21	6. 6–7. 3	Moderate.
90–100	85–95	70–95	0. 2–0. 63	0. 18–0. 23	6. 1–7. 3	Moderate.
95–100	90–100	80–95	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low.
95–100	90–100	85–100	0. 63–2. 0	0. 19–0. 21	6. 1–6. 5	Moderate.
95–100	90–100	75–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
90–100	90–100	80–100	0. 63–2. 0	0. 19–0. 21	5. 6–6. 5	Moderate to high.
90–100	80–100	80–100	0. 63–2. 0	0. 15–0. 18	5. 1–5. 5	Moderate.
90–100	85–100	80–100	0. 63–2. 0	0. 19–0. 21	5. 1–5. 5	Moderate.
85–100	80–100	80–95	0. 2–0. 63	0. 19–0. 21	7. 4–7. 8	Moderate.
75–100	75–95	75–95	0. 2–0. 63	0. 15–0. 18	7. 4–7. 8	Moderate to high.
70–90	70–90	65–85	0. 2–0. 63	0. 15–0. 18	7. 4–7. 8	Moderate to high.
95–100	90–100	85–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
95–100	90–100	85–100	0. 63–2. 0	0. 17–0. 21	6. 1–6. 5	Moderate to high.
95–100	90–100	85–100	0. 2–0. 63	0. 15–0. 18	5. 6–6. 0	Moderate to high.
90–100	85–100	70–95	0. 2–0. 63	0. 15–0. 18	5. 6–6. 0	High.
95–100	95–100	85–100	0. 63–2. 0	0. 18–0. 23	6. 1–6. 5	Low to moderate.
95–100	95–100	85–100	0. 63–2. 0	0. 15–0. 18	5. 1–5. 5	Moderate to high.
95–100	95–100	85–100	0. 2–0. 63	0. 15–0. 18	5. 6–7. 3	High.
95–100	95–100	70–100	2. 0–6. 3	0. 18–0. 23	6. 6–7. 3	Low.
85–100	95–100	70–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low.
85–100	95–100	65–100	0. 63–2. 0	0. 18–0. 23	7. 4–7. 8	Low.

TABLE 4.—*Estimated engineering*

Soil series and map symbol	Depth to rock	Depth to seasonally high water table	Flooding hazard	Depth from surface	Classification		
					USDA texture	Unified	AASHO
	Feet	*Feet*		*Inches*			
Huntington (Ht)	1½ to 2	3+	Subject to flooding.	0–24	Channery silt loam.	GM, ML	A–4
Lanton (La)	3 to 10	0 to 1	Subject to flooding.	0–18	Silt loam or silty clay loam.	ML, CL	A–4, A–6
				18–42	Silty clay loam	CL	A–6
				42–55	Silty clay loam	CL	A–6
Lawrence (Lc)	6 to 12	1½ to 2	Subject to infrequent flooding.	0–7	Silt loam	ML, CL	A–4, A–6
				7–16	Silty clay loam	CL	A–6
				16–25	Silty clay loam	CL	A–6
				25–29	Silty clay loam	GC, SC	A–2, A–4
				29–48	Silty clay loam	CL	A–6
Lindside (Ld)	3 to 10+	1½ to 2	Subject to flooding.	0–18	Silt loam	ML	A–4
				18–44	Silt loam	ML, CL	A–4, A–6
Loradale (LoB, LoC2)	4 to 15	5+	None.	0–17	Silt loam	CL, ML	A–6, A–4
				17–25	Silty clay loam	CL	A–6
				25–40	Silty clay, clay	CL, CH	A–7, A–6
				40–48	Clay	CH	A–7
				48	Bedrock.[3]		
Maury (MrB, MrC2)	3 to 8	5+	None.	0–7	Silt loam	ML, CL	A–4, A–6
				7–13	Silty clay loam	CL	A–6
				13–16	Silty clay	CL, CH	A–6, A–7
				16–50	Clay	CH	A–7
McAfee (MsC2, MsD2)	1½ to 3	4+	None.	0–6	Silt loam	ML, CL	A–4, A–6
				6–11	Silty clay loam	CL	A–6
				11–14	Silty clay	CL, CH	A–6, A–7
				14–30	Clay	CH	A–7
				30	Bedrock.		
Mercer (MtB)	4 to 10	1½ to 2	None.	0–15	Silt loam	ML, CL	A–4, A–6
				15–23	Silty clay loam	CL	A–6
				23–31	Silty clay loam	CL	A–6
				31–42	Silty clay	CL, CH	A–7, A–6
				42–48	Clay	CH	A–7
Newark (Ne)	3 to 10	½ to 1	Subject to flooding.	0–15	Silt loam	ML	A–4
				15–42	Silt loam	ML, CL	A–4, A–6

[1] Interbedded shale and siltstone and thin beds of limestone.
[2] Interbedded limestone, siltstone, and shale.

The silt-clay soils are classified as A-4, A-5, A-6, and A-7. The soils in the A-4 group consist mostly of silt and contain moderate to small amounts of coarse material and small amounts of sticky, colloidal clay. When dry, these soils provide a firm riding surface, and they rebound little after loading. When they absorb water rapidly, these soils expand, lose stability, and are subject to frost heave. The soils in the A-5 group are similar to those in the A-4 group but include very poorly graded soils that have elastic properties and very low stability. These soils are elastic because they contain silt particles of one size, organic matter, mica flakes, or lime carbonate. The soils in the A-6 group are mostly clay that contains moderate to small amounts of coarse material. These soils have good bearing capacity when compacted to maximum dry density, but they lose this bearing capacity when they absorb moisture. The A-7 group consists mostly of clay soils. At some moisture contents, the soils in the A-7 group deform quickly under a load and rebound when the load is removed.

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.

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.

Reaction, the estimated degree of acidity or alkalinity, is expressed in pH value. A notation of pH 7.0 indicates

properties of the soils—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
			Inches per hour	*Inches per inch of soil*	*pH*	
55–85	50–85	35–80	0. 63–6. 3	0. 10–0. 15	7. 4–7. 8	Low.
95–100	90–100	80–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
95–100	90–100	80–100	0. 2–0. 63	0. 19–0. 21	6. 6–7. 3	Moderate to high.
95–100	80–100	70–95	0. 2–0. 63	0. 19–0. 21	6. 6–7. 3	Moderate to high.
95–100	95–100	85–95	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
95–100	95–100	85–95	0. 63–2. 0	0. 19–0. 21	6. 1–6. 5	Moderate.
95–100	90–100	80–95	>0. 2	0. 19–0. 21	5. 6–6. 0	Moderate.
55–85	30–50	25–45	>0. 2	0. 10–0. 15	5. 6–6. 0	Low.
95–100	85–100	75–95	0. 2–0. 63	0. 19–0. 21	5. 1–5. 5	Moderate.
95–100	95–100	75–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low.
95–100	95–100	65–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 8	Low.
95–100	95–100	85–95	0. 63–2. 0	0. 18–0. 23	6. 1–6. 5	Low.
95–100	90–100	85–100	0. 63–2. 0	0. 19–0. 21	6. 6–7. 3	Moderate to high.
95–100	90–100	80–95	0. 2–0. 63	0. 15–0. 18	5. 6–6. 5	High.
95–100	90–100	80–95	0. 2–0. 63	0. 15–0. 18	7. 4–7. 8	High.
95–100	95–100	85–95	2. 0–6. 3	0. 18–0. 23	6. 1–6. 5	Low to moderate.
95–100	95–100	85–95	2. 0–6. 3	0. 19–0. 21	6. 1–6. 5	Moderate.
95–100	90–100	80–95	2. 0–6. 3	0. 15–0. 18	5. 6–6. 0	Moderate to high.
95–100	85–100	80–95	2. 0–6. 3	0. 15–0. 18	5. 1–5. 5	High.
90–100	90–100	85–100	2. 0–6. 3	0. 18–0. 23	6. 1–6. 5	Low to moderate.
90–100	90–100	85–95	0. 63–2. 0	0. 19–0. 21	6. 1–6. 5	Moderate.
90–100	85–100	85–95	0. 63–2. 0	0. 15–0. 18	6. 1–6. 5	Moderate to high.
85–100	80–100	70–95	0. 2–0. 63	0. 15–0. 18	6. 6–7. 3	High.
95–100	80–100	75–95	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low to moderate.
95–100	90–100	80–95	0. 63–2. 0	0. 19–0. 21	6. 6–7. 3	Moderate.
95–100	85–100	80–95	<0. 2	0. 19–0. 21	5. 1–5. 5	Moderate.
95–100	85–100	80–95	<0. 2	0. 15–0. 18	5. 1–5. 5	High.
95–100	80–100	75–95	0. 2–0. 63	0. 15–0. 18	5. 6–6. 0	High.
95–100	80–100	80–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 4	Low.
95–100	80–100	70–100	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low.

[3] Shaly limestone interbedded with soft shale.

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.

Shrink-swell potential indicates the volume change to be expected with a change in moisture content, that is, shrinking of the soil when it dries and swelling when it takes up moisture. Ratings are *high*, *moderate*, and *low*. They were estimated primarily on the basis of the amount and kind of clay in the soil. In general, soils classified as CH or A-7 have a high shrink-swell potential. Structureless soils (clean sand and gravel) and soils containing a small amount of nonplastic to slightly plastic fines, as well as most nonplastic to slightly plastic soils, have low shrink-swell potential.

Engineering interpretations of soils

Table 5 gives, for each soil series, suitability ratings for specific purposes and soil features that limit suitability for engineering structures that help conserve soil and water on farmland. The data in this table are based on the estimates given in table 4, on observations of the soils in the field, and on past experiences with the soils or with similar soils. The miscellaneous land types—Gullied land, Made land, and Rock land—are excluded from this table because their soil material is so variable. The columns in table 5 are described in the following paragraphs.

Susceptibility to frost action is rated *low*, *moderate*, or *high* in table 5. Frost action includes the heave caused by ice lenses as they form in a soil and the subsequent loss of

strength caused by the added moisture in the soil as the ice lenses thaw. Thus, the ratings denote the degree of shrinking and swelling. Frost action depends on the amount of water in the soil during the freezing period and the length of the freezing period. The water may be capillary water, water held within the voids of the soil material, water that has infiltrated into the soil material, and water that makes up the water table.

A rating of *good, fair,* or *poor* is given to show suitability as a source of topsoil and road fill when the soil is not subject to frost action. Topsoil, as used here, refers to soil material that is suitable for dressing slopes, roadbanks, lawns, gardens, and other earth structures that require a vegetated cover for protection. Preferably this material contains a large amount of organic matter. The suitability of a soil for road fill depends, to a large extent, on its susceptibility to frost action. The suitability is greatly reduced if the soil is subject to frost heaving.

Topography, as well as the kind of soil, influences the *location of highways,* but the interpretations in table 5 are

TABLE 5.—*Interpretations of*

[Gullied land, Made land, and Rock land are so variable that interpretations for them were not made.

Soil series	Susceptibility to frost action	Suitability as a source of—		Soil features adversely affecting—
		Topsoil	Road fill	Location of highways
Allegheny (AlB, AlC2, AlD2)	Moderate to high	Fair	Fair	
Ashton (AsA, AsB, AsC)	Moderate to high	Good	Fair	Infrequent flooding
Brashear (BrB, BrC, BsC2, BsD2)	Moderate to high	Poor	Poor	Shallowness to bedrock in some areas; subject to slipping.
Captina (CaA, CaB)	Moderate	Fair to poor.	Fair	Seasonally high water table; infrequent flooding.
Cynthiana (ChC2, ChD2, ChE2, CnC3, CnD3, CrE3).	Moderate	Poor	Poor	Shallowness to bedrock; stoniness; some steep slopes.
Eden (EdC3, EdD3, EdE3)	Moderate to high	Poor	Poor	Shallowness to bedrock; steep slopes; subject to slipping.
Egam (Eg)	Moderate to high	Fair	Fair	Seasonally high water table; subject to flooding.
Elk (EkA, EkB, EkC, EkD2)	Moderate to high	Fair	Fair	Subject to flooding in some areas.
Etowah (EtB, EtC2)	Moderate to high	Fair	Fair	
Fairmount (FcE, FcF): (Interpretations for the Cynthiana soil in these mapping units are the same as for Fairmount.)	Moderate	Poor	Poor	Shallowness to bedrock; rockiness; steep slopes.
Faywood (FwB, FwC, FyB2, FyC2, FyD2)	Moderate	Fair	Fair to poor.	Shallowness to bedrock.

based only on the soils. Where rock influences the location of the gradeline, the engineer must determine the difficulty of excavating the rock, the probability of slides occurring in the rock strata, and of water seeping along or through the bedrock. On wet soils and soils that are subject to flooding, the roadway should be constructed on a continuous embankment that is several feet above the high water table or above the flood line. Interceptor ditches or underdrains may be needed where there is subsurface seepage. Seepage in back slopes or cuts may cause overlying material to slump or to slide.

Soil features adversely affecting the construction of farm ponds, drainage systems, irrigation systems, terraces, and diversions, and waterways are estimated in table 5. Many of the soils in this county are subject to seepage, and some have a high water table. Wet soils that have a fragipan are not generally suitable for drainage by tile. If suitable outlets are available, however, the other wet soils can be drained by tile.

engineering properties of soils

Absence of data indicates that there are no soil features that adversely affect suitability for stated use]

Soil features adversely affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Reservoir area	Embankment				
Seepage in substratum	Fair stability; subject to piping.	Not needed	Erodibility in strongly sloping areas.	Some slopes are more than 8 percent.	
Infrequent flooding; seepage in some areas.		Not needed			
Creviced bedrock in some areas.	Poor compactibility	Not needed	Moderately slow permeability; erodibility in strongly sloping areas.	Some slopes more than 8 percent.	
Infrequent flooding; seepage in substratum in some areas.		Not needed on slopes of more than 2 percent; fragipan at a depth of about 20 inches.	Slow permeability in fragipan.		Seepage on side slopes.
Excessive seepage	Small amount of soil material; stoniness.	Not needed	Shallowness to bedrock; stoniness; some steep slopes.	Shallowness to bedrock; stoniness; some steep slopes.	Shallowness to bedrock; stoniness; some steep slopes.
Shallowness to rock; excessive seepage; some steep slopes.	Small amount of soil material; poor compactibility.	Not needed	Steep slopes; shallowness to bedrock; slow permeability.	Some slopes are more than 8 percent; shallowness to bedrock.	Shallowness to bedrock; some steep slopes.
Subject to flooding		Moderately slow permeability.	Moderately slow permeability.	Not needed	
Subject to flooding in some areas; moderate permeability.		Not needed	Strongly sloping in some areas.	Some slopes are more than 8 percent.	
Moderate permeability		Not needed			
Excessive seepage; shallowness to bedrock.	Shallowness; rockiness.	Not needed	Steep slopes; shallowness to bedrock; rockiness.	Steep slopes; shallowness to bedrock.	Steep slopes; shallowness to bedrock; rockiness.
Seepage in some areas; shallowness to rock in some areas.	Shallowness in some areas; poor compactibility below 15 inches.	Not needed	Some strongly sloping areas; moderately slow permeability.	Some slopes of more than 8 percent.	

TABLE 5.—*Interpretations of*

Soil series	Susceptibility to frost action	Suitability as a source of—		Soil features adversely affecting—
		Topsoil	Road fill	Location of highways
Heitt (HeB, HsB2, HsC2)	Moderate	Fair to poor.	Poor	Moderately deep to bedrock; plastic material.
Huntington (Ht, HuA, HuD)	Moderate	Generally good; poor in channery soil.	Generally fair; fair to good in channery soil.	Subject to flooding
Lanton (La)	High	Fair	Fair	Seasonally high water table; subject to flooding.
Lawrence (Lc)	High	Poor	Fair	Seasonally high water table; infrequent flooding.
Lindside (Ld)	Moderate to high	Good	Fair	Seasonally high water table; subject to flooding.
Loradale (LoB, LoC2)	Moderate	Fair	Fair to a depth of 25 inches; poor below 25 inches.	
Maury (MrB, MrC2)	Moderate	Fair	Fair to a depth of 13 inches; poor below 13 inches.	Shallowness to bedrock in some areas.
McAfee (MsC2, MsD2)	Moderate	Poor	Poor	Shallowness to bedrock.
Mercer (MtB)	High	Poor	Fair	Subject to flooding; seasonally high water table.
Newark (Ne)	High	Good	Fair	Subject to flooding; seasonally high water table.

Use of Soils for Building Sites and Recreational Facilities

Although the population of Harrison County has remained about the same since 1950, the number of people in Cynthiana has increased 16.3 percent between 1950 and 1960 while rural areas have lost about this same percentage. Many newly developed areas are near Cynthiana.

In other developments along main roads (fig. 9), areas have been divided into large lots and new houses have been built. Some of these developments are distant from existing community centers. The construction of new homes along the main roads is expected to continue or to increase as water lines are extended. In addition to the construction along main roads, many less sturdy farmhouses have been replaced by well-constructed homes. For all of these new developments, except those near

engineering properties of soils—Continued

Soil features adversely affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Reservoir area	Embankment				
Creviced bedrock in some areas.	Poor compactibility.	Not needed	Moderately slow permeability.		
Permeable subsoil; subject to flooding.	Subject to piping	Not needed		Not needed	
Subject to flooding	Poor compactibility to a depth of 18 inches; fair below 18 inches.	Moderately slow permeability.	Moderately slow permeability; high water table.	Terraces not needed; subject to flooding.	High water table.
Subject to infrequent flooding		Fragipan at a depth of about 18 inches; slow permeability.	Slow permeability		High water table.
Permeable subsoil; subject to flooding.	Subject to piping			Terraces not needed.	Subject to flooding.
Creviced bedrock in some areas.	Poor compactibility below 25 inches.	Not needed	Moderately slow permeability.		
Permeable subsoil; creviced bedrock in some areas.	Poor compactibility below 16 inches.	Not needed			
Shallowness to creviced bedrock.	Small amount of soil material; poor compactibility below 14 inches.	Not needed	Shallowness; moderately slow permeability.	Shallowness; some slopes are more than 8 percent.	Shallowness.
		Fragipan at a depth of 24 inches.	Slow permeability		Seepage on side slopes.
Subject to flooding; excessive seepage in subsoil.	Subject to piping			Terraces not needed.	Seasonally high water table.

Cynthiana, a system for sewage disposal is needed because a central system is not available. Also needed are planned recreational areas.

In table 6 the soils of Harrison County are rated *slight*, *moderate*, or *severe*, according to the degree of their limitations for community development and recreational uses. If the rating is moderate or severe, the main limitation is also listed. The limitations for shrink-swell and frost action are defined in the subsection "Engineering Applications." Most of the limitations given in the table can be overcome, though costs may be prohibitive. An investigation on the site is needed before an area is selected for intensive development. Location was not considered when the soils were rated, though it may be important. Gullied land (Gu), Made land (Ma), and Rock land (Rk) are so variable that they are not included in table 6.

A rating of *slight* indicates that the soil has no limitation or only minor ones that can be easily overcome.

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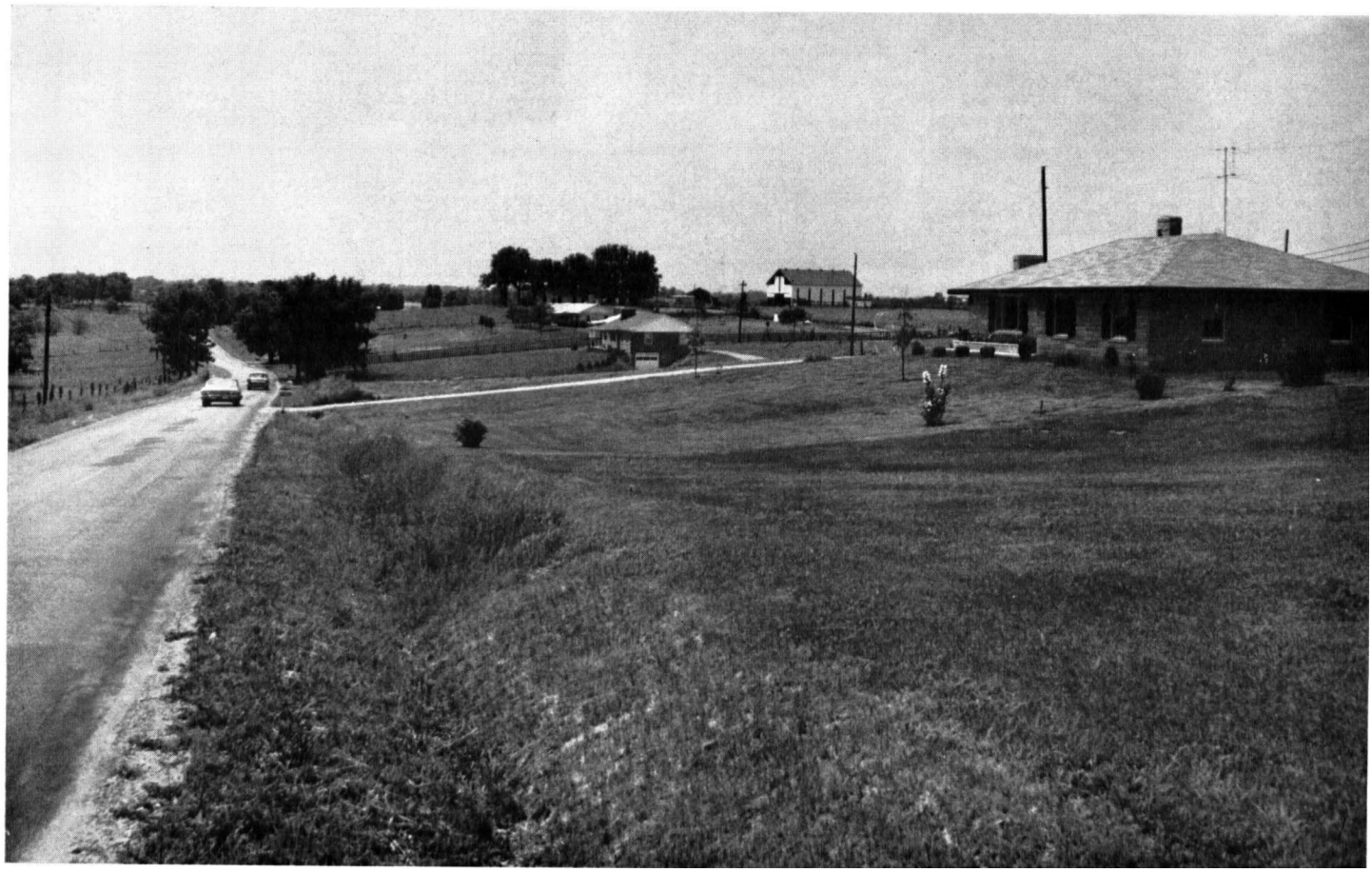

Figure 9.—**A housing development on Faywood and Loradale soils. These soils are moderately limited as sites for houses and are severely limited as sites for septic tank filter fields.**

TABLE 6.—*Estimated limitations of*

Map symbol	Soil	Buildings		Septic tank filter fields
		With basements	Without basements	
AlB	Allegheny loam, 2 to 6 percent slopes	Slight	Slight	Slight
AlC2	Allegheny loam, 6 to 12 percent slopes, eroded.	Moderate: slope	Moderate: slope	Moderate: slope
AlD2	Allegheny loam, 12 to 20 percent slopes, eroded.	Moderate: slope	Moderate: slope	Severe: slope
AsA	Ashton silt loam, 0 to 2 percent slopes [1]	Slight	Slight	Slight
AsB	Ashton silt loam, 2 to 6 percent slopes [1]	Slight	Slight	Slight
AsC	Ahton silt loam, 6 to 12 percent slopes [1]	Moderate: slope	Moderate: slope	Moderate: slope
BrB	Brashear silt loam, 2 to 6 percent slopes	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: permeability
BrC	Brashear silt loam, 6 to 12 percent slopes	Moderate: shrink-swell; slope.	Moderate: shrink-swell; slope.	Severe: permeability
BsC2	Brashear silty clay loam, 6 to 12 percent slopes, eroded.	Moderate: shrink-swell; slope.	Moderate: shrink-swell; slope.	Severe: permeability
BsD2	Brashear silty clay loam, 12 to 20 percent slopes, eroded.	Moderate: shrink-swell; slope.	Moderate: shrink swell; slope.	Severe: slope; permeability.
CaA	Captina silt loam, 0 to 2 percent slopes [1]	Moderate: water table.	Moderate: water table; frost action.	Severe: water table; permeability.
CaB	Captina silt loam, 2 to 6 percent slopes [1]	Moderate: water table.	Moderate: water table; frost action.	Severe: water table; permeability.

See footnotes at end of table.

Moderate indicates that the soil has one or more moderate limitations and that somewhat difficult and expensive measures are generally needed before the soil can be put to the specified use. A rating of *severe* indicates that the soil has one or more severe limitations that are very difficult or impractical to overcome. A rating of severe, however, does not mean that the soil cannot be used for the specified purpose.

The criteria used for evaluating the soils as building sites and for recreational areas are explained in the following paragraphs.

BUILDINGS.—In this survey buildings refer to dwellings and to industrial, commercial, and institutional structures of not more than three stories. In rating the limitations of the soils as sites for buildings with basements, the properties considered were shrink-swell potential, permeability, slope, depth to rock, depth to the water table, and susceptibility to flooding. In addition to these properties, susceptibility to frost action was considered in rating the limitations of the soils used for buildings without basements.

SEPTIC TANK FILTER FIELDS.—The soil properties that affect use for septic tank filter fields are permeability, depth to hard rock, depth to the water table, slope, and susceptibility to flooding.

ROADS.—In table 6, roads refer to low-cost surfaced roads that are used by light vehicles. Slope, susceptibility to flooding, and depth to rock were considered in determining the degree of limitation.

GOLF FAIRWAYS, LAWNS, AND LANDSCAPING.—In evaluating the soils for these purposes, the ease of establishing and maintaining lawns, trees, and shrubs was considered. The ratings are for relatively undisturbed soils and were estimated on the basis of slope, susceptibility to flooding, soil texture, depth to hard rock, natural drainage, and productivity.

ATHLETIC FIELDS.—Athletic fields are areas used for baseball, football, and volleyball, and other organized games. The properties considered in rating the soils are slope, susceptibility to flooding, susceptibility to erosion, soil texture, depth to hard rock, and depth to the water table.

CAMPSITES (suitable for tents).—The properties considered in rating the soils for campsites are slope, depth to the water table, surface rockiness, and susceptibility to flooding. Nearness to a stream, lake, or forest was not considered.

PICNIC AREAS AND PLAYGROUNDS.—Limitations to use of soils as picnic areas and playgrounds are slope, susceptibility to erosion, surface rockiness, depth to the water table, and susceptibility to flooding. Nearness to ponds, lakes, or streams and the presence of trees was not considered in estimating the ratings.

Formation and Classification of Soils

Discussed first in this section are the factors affecting soil formation and the influence of these factors on the formation of soils in Harrison County. Then the soil series of the county are placed in categories of two systems of classification. Each series, including a profile representative of the series, is described.

Factors of Soil Formation

Each individual soil is formed through the complex interaction of parent material, relief, climate, living organisms, and time. If any one of these factors changes, there is a change in the soil-forming process that affects the resulting soil characteristics. In hilly or rugged areas, erosion removes soil material and reduces the time that

soils used in community development

Roads	Lawns, landscaping, and golf fairways	Athletic fields	Campsites (tents)	Picnic areas and playgrounds
Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight	Slight.
Slight: slope	Slight	Moderate	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Slight	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: water table.	Slight	Moderate: water table.	Moderate: water table.	Slight.
Moderate: water table.	Slight	Moderate: slope; water table.	Moderate: water table.	Slight.

TABLE 6.—*Estimated limitations of*

Map symbol	Soil	Buildings		Septic tank filter fields
		With basements	Without basements	
ChC2	Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded.	Severe: shrink-swell; depth to rock.	Severe: shrink-swell; depth to rock.	Severe: depth to rock; permeability.
ChD2	Cynthiana very stony silty clay loam, 12 to 20 percent slopes, eroded.	Severe: shrink-swell; slope; depth to rock.	Severe: shrink-swell; slope; depth to rock.	Severe: permeability; depth to rock; slope.
ChE2	Cynthiana very stony silty clay loam, 20 to 30 percent slopes, eroded.	Severe: slope; depth to rock.	Severe: shrink-swell; slope; depth to rock.	Severe: permeability; depth to rock; slope.
CnC3	Cynthiana very stony clay, 6 to 12 percent slopes, severely eroded.	Severe: depth to rock; shrink-swell.	Severe: shrink-swell; depth to rock.	Severe: permeability; depth to rock.
CnD3	Cynthiana very stony clay, 12 to 20 percent slopes, severely eroded.	Severe: shrink-swell; slope; depth to rock.	Severe: shrink-swell; slope; depth to rock.	Severe: permeability; depth to rock; slope.
CrE3	Cynthiana very rocky clay, 20 to 30 percent slopes, severely eroded.	Severe: shrink-swell; slope; depth to rock.	Severe: shrink-swell; slope; depth to rock.	Severe: permeability; depth to rock; slope.
EdC3	Eden flaggy silty clay, 6 to 12 percent slopes, severely eroded.	Severe: shrink-swell; depth to rock.	Severe: shrink-swell; depth to rock.	Severe: permeability; depth to rock.
EdD3	Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded.	Severe: shrink-swell; depth to rock.	Severe: shrink-swell; depth to rock.	Severe: slope; permeability; depth to rock.
EdE3	Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded.	Severe: shrink-swell; slope; depth to rock.	Severe: shrink-swell; slope; depth to rock.	Severe: slope; permeability; depth to rock.
Eg	Egam silt loam	Severe: flooding; water table.	Severe: flooding	Severe: flooding; permeability.
EkA	Elk silt loam, 0 to 2 percent slopes [1]	Slight	Slight	Slight
EkB	Elk silt loam, 2 to 6 percent slopes [1]	Slight	Slight	Slight
EkC	Elk silt loam, 6 to 12 percent slopes [1]	Slight	Slight	Moderate: flooding
EkD2	Elk silt loam, 12 to 20 percent slopes, eroded [1].	Moderate: slope	Moderate: slope	Severe: slope
EtB	Etowah silt loam, 2 to 6 percent slopes	Slight	Slight	Slight
EtC2	Etowah silt loam, 6 to 12 percent slopes, eroded.	Moderate: slope	Moderate: slope	Moderate: slope
FcE	Fairmount and Cynthiana extremely rocky soils, 20 to 30 percent slopes.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.
FcF	Fairmount and Cynthiana extremely rocky soils, 30 to 50 percent slopes.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.
FwB	Faywood silt loam, 2 to 6 percent slopes	Moderate: shrink-swell; depth to rock.	Moderate: shrink-swell	Severe: permeability; depth to rock.
FwC	Faywood silt loam, 6 to 12 percent slopes	Moderate: shrink-swell; slope; depth to rock.	Moderate: shrink-swell; slope.	Severe: permeability; depth to rock.
FyB2	Faywood silty clay loam, 2 to 6 percent slopes, eroded.	Moderate: shrink-swell; depth to rock.	Moderate: shrink-swell	Severe: permeability; depth to rock.
FyC2	Faywood silty clay loam, 6 to 12 percent slopes, eroded.	Moderate: shrink-swell; depth to rock; slope.	Moderate: shrink-swell; slope.	Severe: permeability; depth to rock.
FyD2	Faywood silty clay loam, 12 to 20 percent slopes, eroded.	Moderate: shrink-swell; slope; depth to rock.	Moderate: shrink-swell; slope.	Severe: permeability; slope; depth to rock.
HeB	Heitt silt loam, 2 to 6 percent slopes	Moderate: shrink-swell; depth to rock.	Moderate: shrink-swell	Severe: permeability; depth to rock.
HsB2	Heitt silty clay loam, 2 to 6 percent slopes, eroded.	Moderate: shrink-swell; depth to rock.	Moderate: shrink-swell	Severe: permeability; depth to rock.
HsC2	Heitt silty clay loam, 6 to 12 percent slopes, eroded.	Moderate: shrink-swell; slope; depth to rock.	Moderate: shrink-swell; slope.	Severe: permeability; depth to rock.
Ht	Huntington channery silt loam, shallow [2]	Severe: flooding; depth to rock.	Severe: flooding	Severe: flooding; depth to rock.
HuA	Huntington silt loam, 0 to 4 percent slopes [2]	Severe: flooding	Severe: flooding	Severe: flooding
HuD	Huntington silt loam, 4 to 20 percent slopes [2]	Severe: flooding	Severe: flooding	Severe: flooding
La	Lanton silt loam	Severe: flooding; water table.	Severe: flooding	Severe: flooding; permeability.
Lc	Lawrence silt loam	Severe: water table; some areas subject to flooding.	Severe: water table; some areas subject to flooding.	Severe: water table; permeability.
Ld	Lindside silt loam	Severe: flooding; water table.	Severe: flooding	Severe: flooding
LoB	Loradale silt loam, 2 to 6 percent slopes	Moderate: shrink-swell.	Moderate: shrink-swell	Severe: permeability
LoC2	Loradale silt loam, 6 to 12 percent slopes, eroded.	Moderate: shrink-swell; slope.	Moderate: shrink-swell; slope.	Severe: permeability

See footnotes at end of table.

soils used in community development—Continued

Roads	Lawns, landscaping, and golf fairways	Athletic fields	Campsites (tents)	Picnic areas and playgrounds
Severe: rock	Severe: depth to rock	Severe: slope; depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Severe: depth to rock; slope.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.
Severe: depth to rock; slope.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope	Severe: slope; depth to rock.
Severe: depth to rock.	Severe: erosion; depth to rock.	Severe: slope; depth to rock.	Severe: surface texture; depth to rock.	Severe: surface texture; depth to rock.
Severe: depth to rock; slope.	Severe: slope; erosion; depth to rock.	Severe: slope; depth to rock.	Severe: slope; surface texture; depth to rock.	Severe: slope; surface texture; depth to rock.
Severe: depth to rock; slope.	Severe: slope; erosion; depth to rock.	Severe: slope; depth to rock.	Severe: slope; surface texture; depth to rock.	Severe: slope; surface texture; depth to rock.
Severe: depth to rock; slippage.	Severe: erosion; surface texture.	Severe: slope; permeability.	Severe: surface texture.	Severe: surface texture.
Severe: slippage; slope.	Severe: slope; erosion	Severe: slope	Severe: slope; surface texture.	Severe: slope; erosion.
Severe: slope; slippage.	Severe: slope; erosion	Severe: slope	Severe: slope; surface texture.	Severe: slope; erosion.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight	Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: flooding; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight.
Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.
Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.
Severe: depth to rock	Moderate: depth to rock	Moderate: slope	Moderate: permeability.	Moderate: depth to rock.
Severe: depth to rock	Moderate: slope; depth to rock.	Severe: slope	Moderate: slope; permeability.	Moderate: slope.
Severe: depth to rock	Moderate: texture; depth to rock.	Moderate: slope; texture; permeability.	Moderate: permeability.	Moderate: depth to rock; texture.
Severe: depth to rock	Moderate: slope; texture	Severe: slope	Moderate: slope; permeability.	Moderate: slope; texture.
Severe: slope; depth to rock.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: depth to rock	Moderate: depth to rock	Moderate: slope	Moderate: permeability.	Moderate: depth to rock.
Severe: depth to rock	Moderate: depth to rock	Moderate: slope	Moderate: permeability.	Moderate: depth to rock.
Severe: depth to rock	Moderate: slope; texture	Severe: slope	Moderate: slope; permeability.	Moderate: slope; texture.
Severe: flooding; depth to rock.	Severe: flooding; rock	Severe: flooding; depth to rock.	Severe: flooding; depth to rock.	Severe: flooding; depth to rock.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: flooding	Severe: flooding	Severe: slopes; flooding	Severe: flooding; slopes	Severe: flooding.
Severe: flooding	Severe: flooding; water table.	Severe: flooding; water table.	Severe: flooding; water table.	Severe: flooding; water table.
Moderate: water table	Moderate: water table	Severe: water table; permeability.	Severe: water table; permeability.	Moderate: water table.
Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight	Slight	Moderate: slope; permeability.	Moderate: permeability.	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.

TABLE 6.—*Estimated limitations of*

Map symbol	Soil	Buildings		Septic tank filter fields
		With basements	Without basements	
MrB	Maury silt loam, 2 to 6 percent slopes	Moderate: shrink-swell; depth to rock.	Slight	Moderate: depth to rock.
MrC2	Maury silt loam, 6 to 12 percent slopes, eroded.	Moderate: shrink-swell; slope; depth to rock.	Moderate: shrink-swell; slope.	Moderate: slope; depth to rock.
MsC2	McAfee silt loam, 6 to 12 percent slopes, eroded.	Severe: depth to rock; shrink-swell.	Severe: depth to rock; shrink-swell.	Severe: depth to rock; permeability.
MsD2	McAfee silt loam, 12 to 20 percent slopes, eroded.	Severe: depth to rock; shrink-swell.	Severe: depth to rock; shrink-swell.	Severe: depth to rock; permeability; slope.
MtB	Mercer silt loam, 2 to 6 percent slopes	Moderate: shrink-swell; water table.	Moderate: shrink-swell; water table.	Severe: water table; permeability.
Ne	Newark silt loam	Severe: flooding; water table.	Severe: flooding; water table.	Severe: flooding; water table.

[1] Ratings based on no flooding; determination of frequency of flooding is needed at the site.

parent material is acted on by the other factors. Also, the soil-forming factors may affect soil development differently in different parts of the county. The Eden soils in the northwestern part of the county differ from the Maury soils in the southeastern corner, mainly because the parent material, relief, and age of these two kinds of soils differ. Variation in time, parent material, and other factors have resulted in different characteristics that give us different kinds of soils.

Climate has been relatively uniform throughout the county and is not responsible for great differences in the soils. The effect of living organisms probably has been rather constant, though the kinds of organisms living in or on the soils have been affected by the other soil-forming factors.

Parent material

The soils of Harrison County developed from two general kinds of parent material. The more extensive parent material is residuum formed by the weathering of rocks in place. The other is material transported by water, gravity, or wind, or by a combination of these forces.

The residual material was derived from limestone or calcareous shale, or from a mixture of the two. Apparently, some material is highly phosphatic, as is indicated by the medium to high content of phosphorus in the Maury soils. Some of the material is high in potash as is reflected by the Eden soils. The highly plastic subsoil of the Eden and Heitt soils suggests that their parent material formed chiefly from shale, and the redder, less plastic subsoil of the Maury and Loradale soils suggests that limestone in the parent material had a greater influence than shale. Although these differences are attributed to parent material, most of the soils in the county that developed in residuum do not show differences indicating that their parent material is highly contrasting.

The Huntington and Egam soils are examples of soils formed in material that has been transported. The Huntington soils have silt loam texture throughout their profile, but the Egam soils have a silty clay loam layer underlying their silt loam surface layer. Since the two soils are young and have similar relief, their differences in texture are attributed to the influence of contrasting parent material.

Relief

Relief influences soil formation, mainly by affecting drainage and the movement of soil material. Where slopes are steep, the soils generally are excessively drained and much soil material has been moved downslope by gravity, erosion, or both. In these steep areas the profile is thin, and the B horizon is thin and weakly developed. In Harrison County, Eden and Fairmount soils are of this kind.

The soil material from the steep slopes accumulates in deposits of colluvium at the foot of the slopes. In these deposits the normal soil-forming processes interact and deep soils that have a normal profile are developed. The Brashear soil is an example of a soil formed on foot slopes. Soils that formed from residuum of bedrock on gentle slopes have normal profiles. The Loradale and Maury soils are of this kind.

In level and depressional areas, the fluctuating water table is generally high or water in the soils is excessive for significant periods each year. This excessive water reduces oxidation and causes iron reduction. The soils that form have a grayish subsoil. Soils of this kind are in the Lawrence, Lanton, and Newark series.

Climate

Climate affects the development of soils primarily through the influence of rainfall and temperature. Rainfall and temperature have much to do in determining the kinds and amounts of plants and animals that live on and in the soil. They are also important in the weathering of rock and minerals, the removal and deposition of material by water, and the rate of soil formation.

The soils of Harrison County formed under a temperate, moist climate. Winters are fairly short, and temperature is extremely low for only short periods. Also, temperature is extremely high for only short periods. The growing season averages about 180 days. The average annual rainfall is about 41 inches and is fairly evenly distributed throughout the year.

soils used in community development—Continued

Roads	Lawns, landscaping, and golf fairways	Athletic fields	Campsites (tents)	Picnic areas and playgrounds
Moderate: depth to rock.	Slight	Moderate: slope	Slight	Slight.
Moderate: slope; depth to rock.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: depth to rock	Moderate: slope; depth to rock.	Severe: slope; depth to rock.	Severe: depth to rock	Moderate: slope.
Severe: depth to rock; slope.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope.
Moderate: water table	Slight	Moderate: slope	Severe: permeability	Slight.
Severe: flooding; water table.	Severe: flooding; water table.	Severe: flooding; water table.	Severe: water table; flooding.	Severe: water table; flooding.

[2] Ratings based on use during flooding; determination of frequency of flooding at the site may change the ratings to slight or moderate.

The soils are moist much of the time and are subject to leaching. Soluble bases and clay minerals have been moved from the surface layer into the subsoil by percolating water. Many of the bases have moved through the subsoil. Because of this transfer of bases and clay minerals, most of the soils in the county are acid and have a clayey subsoil. The Loradale and Faywood soils are of this kind.

Plant and animal life

In the formation of soils in Harrison County, plant life has had a much greater influence than animal life. Soils formed under a hardwood forest have a thinner A1 horizon than those formed under grass. The native vegetation in the county is believed to have been chiefly hardwoods, as is evidenced by the thin, dark-colored surface layer of the Eden, Faywood, Mercer, and other major soils. In contrast, the Maury and Loradale soils generally have the thicker, darker colored surface layer that is characteristic of soils formed under grass.

The animal life on and in the soils affected soil formation a great deal. Some of the small animals, as well as the micro-organisms, act on the plant remains and convert them into organic matter. This organic matter is mixed into the soil and affects its physical and chemical properties.

Man's actions will influence the future course of soil development to some extent. Cultivation, irrigation, and drainage are farming practices that will influence future development.

Time

Time is necessary for any soil to develop from parent material, though less time is required in a warm, moist climate than is required in a cool, dry climate. The age of a soil is reflected more by the degree to which its genetic horizons have developed than by the number of years that the soil has been forming. The Huntington, Lindside, Newark, and similar alluvial soils are young and have had little or no development of horizons. Among the soils of intermediate age that have weakly or moderately developed horizons are the Ashton soils on low stream terraces and the Eden and Fairmount soils on steep uplands. The Maury, Faywood, and Mercer soils developed in residuum on gently sloping uplands and have distinct horizons. They are mature soils.

Classification and Morphology of Soils

Soils are classified so that our knowledge can be organized, the properties of the soils remembered, and the relations of these properties to specific purposes can be better understood (*3*). After individual soils are classified, they can be placed in capability units, woodland suitability groups, and other interpretative groupings. Then the management of these groups can be more easily discussed. Also, information obtained by research or by experience about the soils in one area can be extended to similar soils in other areas.

Two systems of classifying soils are used in the United States. The older of these systems was adapted in 1938 (*2*), and later revised (*7*). The other more current system was placed in general use by the Soil Conservation Service in 1965. The reader who is interested in the current system should search for the latest literature (*6*, *8*). Modifications in the system are made as knowledge of soils increases. In table 7 the soil series of Harrison County are placed in some categories of the current system and in the great soil groups of the older system.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series (*8*). In this system the criteria used as a basis for classification are soil properties that are observable or measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The classes in the current system are briefly defined in the following paragraphs.

ORDER: In the order of the current system of classification, soils are grouped according to common properties that seem to be the result of the same kinds of processes acting to about the same degree on soil material and by this action forming horizons. Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The Entisols, Inceptisols, Mollisols, Alfisols, and Ultisols were recognized in Harrison County.

TABLE 7.—*Soil series classified according to current and old systems of classification*

Series	Current classification [1]			1938 classification
	Family	Subgroup	Order	Great soil group
Allegheny	Fine loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Ashton	Fine silty, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Alluvial soils.
Brashear	Fine, illitic, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Captina	Fine silty, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils (with fragipan).
Cynthiana	Fine, illitic, mesic	Lithic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Lithosols.
Eden	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Lithosols.
Egam	Fine, mixed, thermic [2]	Aquic Fluventic Hapludolls.	Mollisols	Alluvial soils.
Elk	Fine silty, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Etowah	Fine loamy, mixed, thermic.[2]	Humic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Fairmount	Fine, mixed, mesic, shallow	Typic Hapludolls	Mollisols	Rendzina soils.
Faywood	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Heitt	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Huntington	Fine loamy, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Lanton	Fine silty, mixed, noncalcareous, thermic.[2]	Cumulic Haplaquolls	Mollisols	Alluvial soils intergrading toward Humic Gley soils.
Lawrence	Fine silty, mixed, mesic	Aquic Fragiudalfs	Alfisols	Planosols.
Lindside	Fine loamy, mixed, mesic	Aquic Udifluvents	Entisols	Alluvial soils.
Loradale	Fine, mixed, mesic	Typic Argiudolls	Mollisols	Gray-Brown Podzolic soils.
Maury	Clayey, mixed, mesic	Humic Paleudults	Ultisols	Reddish-Brown Lateritic soils intergrading toward Gray-Brown Podzolic soils.
McAfee	Fine, mixed, mesic	Mollic Hapludalfs	Alfisols	Reddish-Brown Lateritic soils intergrading toward Lithosols.
Mercer	Fine silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Red-Yellow Podzolic soils (with fragipan).
Newark	Fine silty, mixed, nonacid, mesic.[3]	Aeric Fluventic Haplaquepts.	Inceptisols	Alluvial soils intergrading toward Low-Humic Gley soils.

[1] Placement of some soil series in the current system of classification may change as more precise information becomes available.
[2] Most areas of these soils have thermic temperatures, but areas mapped in Harrison County have mesic temperatures. If the acreage mapped had been large enough, another series would have been established.
[3] May be thermic when more information is available.

SUBORDER: Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the order. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The suborder is not shown in table 7 for the current classification system.

GREAT GROUP: Soil suborders are separated into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons. The horizons used to make separations are those in which clay, iron, or humus have accumulated. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 7, because it is the last word in the name of the subgroup.

SUBGROUP: Great groups are subdivided into subgroups, one representing the central (typic) segment of the group and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. The subgroups in Harrison County are Aquic Udifluvents, Aeric Fluventic Haplaquepts, Cumulic Haplaquolls, Fluventic Hapludolls, Typic Argiudolls, Mollic Hapludalfs, Typic Hapludalfs, Typic Fragiudalfs, Lithic Hapludalfs, Typic Hapludults, Humic Hapludults, and Aquic Fragiudalfs.

FAMILY: Families are separated within a subgroup primarily on the basis of properties important to plant growth. Some of the properties considered are texture, mineralogy, reaction, soil temperature, permeability, consistence, and thickness of horizons. An example of a family is the fine, mixed, mesic.

Technical Descriptions of Soil Series

This subsection was prepared for those who need more information about the soils in the county than is given elsewhere in the survey. Following a general description of the soil series, a profile of a soil typical of the series is described. In these descriptions the color of the horizons

is for moist soil. The Munsell notations, for example (7.5YR 5/6), are defined in the "Soil Survey Manual" (*9*). The section "Descriptions of the Soils" gives other information about each soil series and descriptions of the soils of the series that were mapped in the county.

ALLEGHENY SERIES

The Allegheny series consists of deep, well-drained, moderately productive soils. These soils formed in alluvium washed mostly from soils of sandstone origin. They occur on old stream terraces, generally above areas of Elk and Captina soils.

Allegheny soils occur with the Elk, Captina, and Lawrence soils on the terraces along the Licking River. These soils are more sandy than the Elk or Captina soils. Allegheny soils are better drained than the Captina soils and, unlike them, do not have a fragipan.

Most areas of Allegheny soils have been cleared and are used for the crops commonly grown in the county.

A representative profile of Allegheny loam, 2 to 6 percent slopes, in a field north of U.S. Highway No. 62 at Claysville:

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) loam; weak to moderate, very fine, granular structure; very friable; neutral; clear, smooth boundary; horizon 7 to 9 inches thick.

A2—8 to 13 inches, brown (10YR 4/3) loam; weak, very fine, granular structure and weak, fine, subangular blocky structure; friable; neutral; clear, smooth boundary; horizon 4 to 6 inches thick.

B1—13 to 21 inches, dark yellowish-brown (10YR 4/4) heavy loam; weak, fine and medium, subangular blocky structure; friable; medium acid; clear, smooth boundary; horizon 6 to 12 inches thick.

B2t—21 to 30 inches, brown (7.5YR 4/4) heavy loam; moderate, medium, subangular blocky structure; thin, patchy clay films; friable; medium acid; gradual, wavy boundary; horizon 8 to 12 inches thick.

C—30 to 48 inches +, strong-brown (7.5YR 5/6) gravelly sandy clay loam or fine sandy loam; gravel content increases with depth; medium acid; horizon 1 foot to more than 5 feet thick.

The Ap horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3), and the B horizon ranges from yellowish brown (10YR 5/4) to brown (7.5YR 4/4). The thickness of the alluvium is 4 to 12 feet. Depth to rock is more than 10 feet.

ASHTON SERIES

The Ashton series consists of deep, well-drained, highly productive soils. These soils developed in alluvium washed mostly from soils of limestone origin. They are on foot slopes and low-lying terraces along the larger streams in the county.

The Ashton soils occur with the Elk and Captina soils on the terraces and with the Huntington and Lindside soils on the bottoms. Horizon development is less in the Ashton soils than in the Elk or Captina soils but is more than in the Huntington or Lindside soils. Ashton soils are better drained than the Lindside or Captina soils.

In this county all of the acreage of Ashton soils has been cleared, and much of it is cultivated intensively.

Representative profile of Ashton silt loam, 0 to 2 percent slopes, in a field 100 yards north of a distillery at Lair along the South Fork Licking River:

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam; weak, medium, granular structure; friable; neutral; abrupt, wavy boundary; horizon 7 to 12 inches thick.

B1—9 to 24 inches, brown (7.5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; slightly acid; gradual, wavy boundary; horizon 12 to 18 inches thick.

B2—24 to 38 inches, brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) light silty clay loam; weak and moderate, medium, subangular blocky structure; clay films on ped surfaces; friable or firm when moist; slightly acid; gradual, wavy boundary; horizon 12 to 20 inches thick.

C—38 to 48 inches +, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; slightly acid; horizon 1 foot to more than 4 feet thick.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 4/3). The B horizon is slightly acid and neutral. The solum ranges from 30 to 50 inches in thickness. The thickness of the alluvium is 3 to 10 feet or more.

BRASHEAR SERIES

The Brashear series consists of well drained and moderately well drained soils that developed in local alluvium washed mainly from areas of Eden soils. Brashear soils generally are on toe slopes and alluvial fans in the hilly part of the county. They are underlain by the Eden formation.

These soils occur with the Eden, Ashton, and Huntington soils. Brashear soils are more clayey than the Ashton soils and are more strongly developed in the B horizon. They have a thicker solum than the Eden soils. The horizons of Brashear soils are more distinct than those of Huntington soils, which have had little or no horizonation.

In this county the Brashear soils are in a small total acreage, but they are important locally because they are the only good tillable soils on some farms. Most areas are used for tobacco, but some are in truck crops or pasture.

Representative profile of Brashear silt loam, 6 to 12 percent slopes, in a field 1 mile east of Hinton:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly acid; gradual, wavy boundary; horizon 6 to 8 inches thick.

B1t—7 to 18 inches, strong-brown (7.5YR 5/6) silty clay loam with small patches of reddish yellow (7.5YR 6/6); weak, medium, subangular blocky structure; patchy clay films; friable or firm when moist; slightly acid; clear, smooth boundary; horizon 6 to 12 inches thick.

B2t—18 to 34 inches, yellowish-brown (10YR 5/6) silty clay with streaks of strong brown (7.5YR 5/6) and few, fine, faint mottles of light yellowish brown (10YR 6/4), light brownish gray (10YR 6/2), and light olive brown (2.5Y 5/4); moderate to strong, medium, angular blocky structure; continuous clay films; firm when moist, sticky and plastic when wet; few concretions that are small, soft, and dark; slightly acid; abrupt, wavy boundary; horizon 10 to 18 inches thick.

B3—34 to 40 inches, yellowish-brown (10YR 5/4) silty clay with common, fine, faint mottles of brown (7.5YR 5/4) to dark brown (7.5YR 4/4) and common, fine, distinct mottles of pale brown (10YR 6/3) and light brownish gray (10YR 6/2); moderate, medium, angular blocky structure; few patchy clay films; firm when moist, sticky and plastic when wet; few concretions that are very soft, fine, and dark; slightly acid; abrupt, wavy boundary; horizon 5 to 8 inches thick.

C1—40 to 44 inches, brown (7.5YR 4/4) clay with few, fine, faint mottles of strong brown (7.5YR 5/6) and few, fine, distinct mottles of light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/4), and pale brown (10YR 6/3); massive; very firm when moist, sticky and plastic when wet; many, soft, black (10YR 2/1) concretions; slightly acid; abrupt, wavy boundary; 3 to 8 inches thick.

C2—44 to 48 inches +, light olive-brown (2.5Y 5/4) clay with few, fine, faint mottles of yellowish brown (10YR 5/6) and common, fine, distinct mottles of light brownish

gray (2.5Y 6/2) and grayish brown (2.5Y 5/2); slightly sticky and plastic when wet; few, small, dark concretions; neutral.

The A horizon ranges from dark brown (10YR 4/3) to brown (10YR 5/3). In places gray mottles occur in the lower part of the B horizon. The B2 horizon ranges from silty clay to clay. The solum ranges from 20 inches to more than 40 inches in thickness. These soils are underlain by thin-bedded limestone and shale.

CAPTINA SERIES

The Captina series consists of moderately well drained, deep soils that have a fragipan. These soils formed in mixed alluvium that washed mostly from soils of limestone origin.

Captina soils occur with the Elk and Lawrence soils on terraces along the larger streams in the county, particularly along the South Fork Licking River and the Licking River. Captina soils are not so well drained as are Elk soils, which do not have a fragipan. They are better drained than the Lawrence soils and have a higher chroma in the B horizon.

The Captina soils generally are used intensively for row crops and small grain, but some areas are in hay and pasture.

Representative profile of Captina silt loam, 2 to 6 percent slopes, in a field about 2 miles southeast of Claysville:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine and very fine, granular structure; friable; neutral; clear, smooth boundary; horizon 6 to 9 inches thick.

B1—8 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary; horizon 5 to 8 inches thick.

B2—14 to 20 inches, yellowish-brown (10YR 5/6) heavy silt loam with common, fine, faint mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; thin patchy clay films; firm; strongly acid; gradual, wavy boundary; horizon 5 to 10 inches thick.

Btx1—20 to 26 inches, yellowish-brown (10YR 5/6) fine silt loam with common, medium, distinct mottles of light olive brown (2.5Y 5/6) and common, fine, distinct mottles of light gray (2.5Y 7/2) and yellowish red (5YR 5/6); weak, medium, subangular blocky structure or massive; slightly compact and brittle in places; strongly acid; gradual, wavy boundary; horizon 5 to 7 inches thick.

Btx2—26 to 37 inches, light-gray (2.5Y 7/2) silty clay loam with many, medium, distinct mottles of strong brown (7.5YR 5/6) and common, fine, distinct mottles of yellowish red (5YR 5/6); massive; brittle and compact in places; strongly acid; gradual, wavy boundary; horizon 10 to 16 inches thick.

C—37 to 50 inches +, dark yellowish-brown (10YR 4/4) silty clay loam with many, medium, distinct mottles of light gray (10YR 7/2) and few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, medium, angular blocky structure; firm when moist, sticky and plastic when wet; common, black (10YR 2/1), soft concretionary material; strongly acid.

The A horizon is dark grayish brown (10YR 4/2) in some places. The B horizon ranges from silt loam to silty clay loam. The solum is 30 to 48 inches thick. Depth to bedrock is 5 to 25 feet.

CYNTHIANA SERIES

The Cynthiana series consists of well-drained and somewhat excessively drained soils that formed in residuum from moderately to highly phosphatic limestone. Bedrock generally is at a depth of less than 20 inches. Slabs of limestone are common throughout the profile and are scattered on the surface. These soils are on sloping to moderately steep uplands.

Cynthiana soils occur with the Faywood, Eden, and Fairmount soils. Compared with the Faywood and Eden soils, Cynthiana soils are more shallow to bedrock. They have a much lighter colored A horizon than the Fairmount soils and a redder B horizon than the Eden soils.

Most of the acreage of Cynthiana soils is used for pasture or hay, but some is in second-growth hardwoods or redcedar.

Representative profile of Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded, in a field of fescue and Korean lespedeza east of culvert on Robinson-Renaker Road:

Ap—0 to 5 inches, brown (10YR 4/3) silty clay loam; weak, fine and medium, granular structure, and fine subangular blocky structure in some places; friable when moist, slightly sticky when wet; neutral; clear, smooth boundary; few flagstones; horizon 3 to 7 inches thick.

B2t—5 to 15 inches, yellowish-brown (10YR 5/4) silty clay or clay streaked with dark brown (10YR 4/3); strong, medium, angular blocky structure; prominent clay skins; firm when moist, plastic when wet; gradual, smooth boundary; common flagstones; abundant roots; slightly acid; horizon 8 to 13 inches thick.

B3t—15 to 18 inches, mottled light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/6) clay; mottles are medium and distinct; strong angular blocky structure; prominent clay skins; very firm when moist, very hard when dry, plastic and sticky when wet; intermittent stones or flagstones; abundant roots; upper part neutral, but some peds in lower part effervesce if acid is added; horizon 3 to 5 inches thick.

R—18 inches +, limestone bedrock.

The Ap horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2) in most places and is dark brown (10YR 3/3) in a few places. In some places the B horizon is brown (7.5YR 4/4 to 5/4). The A and B horizons are slightly acid and neutral. Depth to bedrock ranges from 12 to 20 inches.

EDEN SERIES

The Eden series consists of well-drained to somewhat excessively drained soils in sloping to moderately steep hilly areas. These soils developed in residuum from calcareous shale, siltstone, and thin-bedded limestone.

Eden soils generally occur with the Brashear soils on foot slopes and with the Heitt soils on ridges. In places they are associated with the Cynthiana soils. Eden soils are more shallow than the Brashear soils and have a much thinner B horizon. Their B horizon is less red and thinner than that of the Heitt soils. Eden soils are more yellow and deeper than the Cynthiana soils and are underlain by bedrock containing more calcareous shale.

The Eden soils are used mostly for pasture or hay. Some areas are in second-growth hardwoods or redcedar, and a small acreage is in cultivated or row crops.

Representative profile of Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded, in a field 1 mile east of Hinton:

Ap—0 to 4 inches, olive-brown (2.5YR 4/4) to brown (10YR 4/3) silty clay; moderate, fine and medium, granular structure and weak, fine and medium, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; neutral; gradual, wavy boundary; horizon 3 to 6 inches thick.

B2—4 to 13 inches, yellowish-brown (10YR 5/4) silty clay with many, fine, faint variegations of light olive brown

(2.5Y 5/6); moderate, fine and medium, angular blocky structure; clay films on peds; firm when moist, sticky and plastic when wet; neutral; clear, smooth boundary; horizon 7 to 12 inches thick.

C—13 to 30 inches, light olive-brown (2.5Y 5/4) clay with common, fine, faint variegations of light yellowish brown (2.5Y 6/4), few, fine, faint variegations of yellowish brown (10YR 5/6), and common, medium, faint variegations of pale olive (5Y 6/4); weak, coarse, blocky structure or massive; very firm when moist, very sticky and very plastic when wet; few olive-brown siltstone fragments; mildly alkaline; calcareous; gradual, irregular boundary; horizon 7 to 30 inches thick.

R—30 inches +, interbedded weathered shale, siltstone, and thin-bedded limestone.

Depth to bedrock generally ranges from 20 to 40 inches or more, depending on the slope and the degree of erosion. In many places past erosion has destroyed the A and B horizons. In slightly eroded and moderately eroded areas, the surface layer is dark grayish-brown (10YR 3/2) silt loam or silty clay loam. Stones or flagstones on the surface or in the surface layer range from few to many.

EGAM SERIES

The Egam series consists of deep, well drained or moderately well drained alluvial soils in nearly level and slightly depressional areas of the bottom lands. These soils formed in sediments washed from soils of limestone origin. A typical profile contains an A horizon of a buried soil. This horizon is generally very dark gray and slightly compact.

Egam soils occur with the Huntington and Lanton soils. The Egam soils have a slightly compact lower subsoil and are less well drained than the Huntington soils. Compared with the Lanton soils, the Egam soils are coarser textured in the upper part of their profile, more compact in the lower subsoil, and better drained.

The Egam soils are not extensive in this county. These soils are used for most crops common in the county except tobacco. Some areas are in pasture.

Representative profile of Egam silt loam in a bluegrass pasture near State Route 353 and north of the county line:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; friable; neutral; gradual, smooth boundary; horizon 5 to 10 inches thick.

C—7 to 16 inches, dark-brown (10YR 3/3) silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; somewhat compact; neutral; clear, smooth boundary; horizon 7 to 12 inches thick.

A1b—16 to 24 inches, very dark gray (10YR 3/1) silty clay loam; weak, fine and medium, subangular blocky structure; slightly compact when moist, sticky and slightly plastic when wet; neutral; gradual, smooth boundary; horizon 6 to 12 inches thick.

C1—24 to 31 inches, very dark grayish-brown (10YR 3/2) fine silt loam with weak, fine, faint mottles of grayish brown (10YR 5/2); fine and medium subangular blocky structure; firm and slightly compact when moist, sticky and slightly plastic when wet; few dark-brown concretions; slightly acid; horizon 6 to 14 inches thick.

C2g—31 to 41 inches, dark-gray (10YR 4/1) fine silty clay loam with common, fine and medium, faint mottles of brown (10YR 4/3) and grayish brown (10YR 5/2) and few, fine, distinct mottles of dark brown (7.5YR 4/4); common dark-brown concretions; hard when dry, very firm when moist, plastic when wet; neutral; horizon 10 to 20 inches thick.

The thickness of the dark-brown silt loam deposited on the buried soil ranges from 3 to 18 inches. The surface layer ranges from dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2). The A1b horizon ranges from very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2) to black (10YR 2/1).

ELK SERIES

The Elk series consists of deep, well-drained soils that formed in mixed alluvium, chiefly of limestone origin. These soils are on the terraces along the main streams in the county. The largest acreage is along the South Fork Licking River.

Elk soils generally occur with the Captina and Ashton soils. The Elk soils are better drained than the Captina soils and lack the fragipan that is typical of those soils. Compared with the Ashton soils, Elk soils are older, are generally at a higher elevation, have a better developed profile, and a lighter colored Ap horizon.

Elk soils are desirable for farming. They have been cleared and are used for all locally grown crops.

Representative profile of Elk silt loam, 0 to 2 percent slopes, in a field along State Route 982, north of the distillery at Lair:

Ap—0 to 10 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; neutral; clear, smooth boundary; horizon 6 to 12 inches thick.

B1—10 to 16 inches, brown (7.5YR 4/4) silt loam; fine to medium, moderate, subangular blocky structure; friable; neutral; gradual, wavy boundary; horizon 4 to 10 inches thick.

B21t—16 to 24 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; noticeable clay films; firm when moist, slightly sticky and plastic when wet; few, small, round, black concretions; slightly acid; gradual, smooth boundary; horizon 6 to 12 inches thick.

B22t—24 to 40 inches, strong-brown (7.5YR 5/6 to 5/8) silty clay loam; moderate, medium, angular blocky structure; thin clay films; common, small, round, black concretions; firm; strongly acid; gradual, smooth boundary; horizon 15 to 24 inches thick.

C—40 to 48 inches +, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) silty clay loam; weak, medium, angular blocky structure; firm; strongly acid.

The surface layer ranges from brown (10YR 5/3) to dark brown (10YR 4/3). In some places a few faint mottles of pale brown are in the lower B horizon. The B2 horizon ranges from brown (7.5YR 4/4) to strong brown (7.5YR 5/6 or 5/8). In some places the B horizon is light silty clay loam. The thickness of the alluvium is 3 to 15 feet.

ETOWAH SERIES

The Etowah series consists of deep, well-drained soils that developed in old mixed alluvium. The origin of the alluvium is mostly limestone but partly sandstone and shale. Etowah soils are high above the valley floor and in places are not near the present course of the stream.

In most places Etowah soils occur with the Elk and Captina soils and in some places with the McAfee soils. The Etowah soils are redder in the lower subsoil than the Elk soils and are more clayey in the B horizon. They are better drained than the Captina soils and, unlike them, lack a fragipan. They are considerably deeper to bedrock than the McAfee soils.

The Etowah soils occupy a small total acreage, but they are important on individual farms. They are used for all crops commonly grown in the county.

Representative profile of Etowah silt loam, 2 to 6 percent slopes, in a field 1 mile east of Berry:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable; few very small pieces of chert; neutral; abrupt, smooth boundary; horizon 6 to 10 inches thick.

B1—7 to 13 inches, brown (7.5YR 4/4) light silty clay loam; weak, fine and medium, subangular blocky structure; friable; few roots; common fragments of chert; slightly acid; clear, smooth boundary; horizon 5 to 8 inches thick.

B2lt—13 to 22 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; common chert fragments; medium acid; common clay films; gradual, smooth boundary; horizon 8 to 12 inches thick.

B22t—22 to 32 inches, yellowish-red (5YR 5/6), mixed with brown (7.5YR 4/4), silty clay loam; moderate, medium, subangular blocky structure; common clay films; firm; few roots; common chert fragments; strongly acid; gradual, smooth boundary; horizon 8 to 12 inches thick.

B3t—32 to 37 inches, yellowish-red (5YR 5/6 to 5/8) silty clay with few, fine, faint variegations of reddish yellow (7.5YR 6/6); weak, medium, subangular blocky structure; common clay films; firm; few dark concretions; common chert fragments; strongly acid; gradual, smooth boundary; horizon 4 to 8 inches thick.

Cl—37 to 45 inches, reddish-yellow (7.5YR 6/6) to strong-brown (7.5YR 5/6) silty clay loam with few, medium, faint variegations of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; firm; few, soft, dark concretions ¼ to ½ inch in diameter; common chert fragments; strongly acid; clear, smooth boundary; horizon 6 to 10 inches thick.

C2—45 to 50 inches, yellowish-brown (10YR 5/6) silty clay loam with common, fine, faint variegations of brownish yellow (10YR 6/6); weak, medium, angular blocky structure; firm; many dark concretions ¼ to 1 inch in diameter; common chert fragments; strongly acid.

The thickness of the alluvium ranges from 2 to 15 feet or more. The Ap horizon ranges from dark brown (7.5YR 3/2) to dark brown (10YR 3/3). Hue of the upper B horizon ranges from 7.5YR to 5YR. In the large nearly level areas the profile is generally lighter colored than the one described.

FAIRMOUNT SERIES

The Fairmount series consists of shallow, somewhat excessively drained soils that have a dark-colored surface layer. Limestone fragments are common on the surface and throughout the profile. These soils generally occur on bluffs or steep slopes along streams.

Fairmount soils occur with the Cynthiana soils but have a darker colored surface layer.

Most areas of Fairmount soils are in trees, mostly hardwoods, but some areas are in redcedar. A few areas are used for pasture.

Representative profile of Fairmount extremely rocky silty clay loam, 20 to 30 percent slopes, in a field along U.S. Highway No. 27, about 75 yards north of bridge, 3 miles north of Cynthiana:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silty clay loam; limestone fragments and flagstones make up 20 percent of horizon, by volume; strong, fine, crumb structure; very friable when moist, slightly sticky when wet; mildly alkaline; clear, smooth boundary; horizon 2 to 11 inches thick.

B2—6 to 12 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) clay; blocky structure; very firm; calcareous; abrupt, smooth boundary; horizon 4 to 10 inches thick.

R—12 inches +, interbedded limestone and clay shale.

Depth to bedrock ranges from 6 to 20 inches. Rockiness varies, and in some places Fairmount soils are almost as rocky as Rock land. In severely eroded areas the surface layer is lighter colored than that in the profile described.

FAYWOOD SERIES

The Faywood series consists of gently sloping to strongly sloping, moderately deep or deep, well-drained soils. These soils developed in residuum from calcareous shale and moderately to highly phosphatic limestone.

The Faywood soils occur with the deep, well-drained Loradale soils and the shallow Cynthiana soils. They also occur with the moderately deep, well-drained McAfee soils but are not so red in the B horizon.

The Faywood soils are widespread in the county and are important to farming. These soils are used mostly for pasture, but some areas are in row crops and some are in meadow.

Representative profile of Faywood silt loam, 2 to 6 percent slopes, on Russell Cave Road, 1 mile south of intersection of U.S. Highway No. 62 and State Road 353:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) to brown (10YR 4/3) silt loam; strong, fine and medium, granular structure; friable; neutral; clear, smooth boundary; horizon 6 to 11 inches thick.

B1—10 to 15 inches, brown (10YR 4/3) silty clay loam; moderate, fine, granular structure and moderate, medium, subangular blocky structure; friable when moist, sticky when wet; roots evident; few fine concretions; slightly acid; clear, smooth boundary; horizon 3 to 7 inches thick.

B2t—15 to 25 inches, yellowish-brown (10YR 5/4) silty clay; moderate, fine and medium, subangular blocky and angular blocky structure; evident clay skins; firm when dry, sticky when wet; few fine concretions; medium acid; gradual, smooth boundary; horizon 8 to 15 inches thick.

B3t—25 to 36 inches, yellowish-brown (10YR 5/6) clay mottled with brown (10YR 5/3), pale brown (10YR 6/3), and dark yellowish brown (10YR 4/4); moderate, medium, subangular blocky and angular blocky structure; very sticky and very plastic when wet; prominent clay skins; many fine concretions and soft concretionary material; medium acid; gradual, wavy boundary; horizon 7 to 12 inches thick.

R—36 inches +, limestone interbedded with calcareous shale.

The surface layer is silt loam in most places but is silty clay loam in severely eroded areas. Limestone fragments cover 2 to 20 percent of the surface and make up 2 to 20 percent of the soil mass throughout the profile. In most areas the subsoil has a hue of 10YR and a value of 4 to 6, but in places the hue is 7.5YR. Depth to rock ranges from 20 to 40 inches.

HEITT SERIES

The Heitt series consists of deep, well-drained soils that formed in residuum from thin-bedded limestone and calcareous shale. These soils are on ridgetops.

On some of the ridgetops, the Heitt soils occur with the Eden soils, and on the broader ridgetops they occur with the Cynthiana and Faywood soils. The Heitt soils are deeper and have a thicker, more strongly developed solum than the Eden or Cynthiana soils and have a redder B horizon than Faywood soils.

In this county Heitt soils are in a small total acreage, but they are important on the farms where they occur. They are used mostly for row crops and hay, though some areas are in pasture.

Representative profile of Heitt silt loam, 2 to 6 percent slopes, in a field south of the school at Sunrise:

Ap—0 to 6 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; slightly acid; gradual, wavy boundary; horizon 4 to 8 inches thick.

B21t—6 to 11 inches, yellowish-red (5YR 5/6) silty clay; strong, medium, subangular blocky structure; firm; noticeable clay films; strongly acid; gradual, wavy boundary; horizon 4 to 8 inches thick.

B22t—11 to 20 inches, variegated yellowish-red (5YR 4/6) and yellowish-brown (10YR 5/4) clay or silty clay; moderate, medium, angular blocky structure; evident clay films; very firm; strongly acid; gradual, smooth boundary; horizon 8 to 12 inches thick.

B3t—20 to 26 inches, variegated light yellowish-brown (10YR 6/4), yellowish-red (5YR 4/6), and light olive-gray (5Y 6/2) clay; moderate, medium, angular blocky structure; thin clay films; very firm; medium acid; clear, smooth boundary; horizon 4 to 10 inches thick.

C—26 to 36 inches, light olive-brown (2.5Y 5/4), light yellowish-brown (2.5Y 6/4), and gray clay; massive; very firm; neutral; abrupt, smooth boundary; horizon 6 to 20 inches thick.

R—36 inches +, interbedded limestone, siltstone, and calcareous shale.

The Ap horizon ranges from brown (10YR 4/3 to 5/3) to dark grayish brown (10YR 4/3) or pale brown (10YR 6/3). In most eroded areas the Ap horizon is silty clay loam. The B horizon ranges from 8 to 30 inches in thickness. The B2 horizon generally is yellowish red (5YR 4/6, 4/8, or 5/6). Depth to bedrock ranges from 30 inches to more than 40 inches.

HUNTINGTON SERIES

The Huntington series is made up of deep, well-drained alluvial soils on the flood plains of streams throughout the county. These soils formed in recent alluvium that washed mostly from upland soils underlain by limestone.

Huntington soils occur with the Lindside, Newark, Egam, and Ashton soils. They are better drained and less mottled than the Lindside or Newark soils. Compared with Egam soils, the Huntington soils are coarser textured and lack the dark-colored horizon of a buried soil. The profile of the Huntington soils is not so well developed as that of the Ashton soils.

The Huntington soils are widespread in the county and are good for farming. They are cultivated to most locally grown crops, though the acreage in tobacco is small.

Representative profile of Huntington silt loam, 0 to 4 percent slopes, in a field north of the distillery at Lair, along the South Fork Licking River:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; gradual, smooth boundary; horizon 7 to 12 inches thick.

C1—10 to 24 inches, dark-brown (10YR 4/3-3/3) silt loam; weak, medium, granular structure; friable; neutral; gradual, wavy boundary; horizon 10 to 18 inches thick.

C2—24 to 48 inches +, brown (10YR 4/3) silt loam with few, fine, faint mottles of grayish brown (10YR 5/2); weak, fine, granular structure; friable; mildly alkaline; horizon 1 to 10 feet thick.

The Ap horizon is dominantly silt loam, but in some places it is channery silt loam. In places the C2 horizon is free of mottles. The alluvium generally ranges from 2 to 15 feet in thickness, but it is less than 2 feet thick in some places. Where depth to bedrock is less than 2 feet, the soil material is channery or flaggy throughout the profile.

LANTON SERIES

The Lanton series consists of poorly drained and somewhat poorly drained, dark-colored soils. These soils formed in moderately fine textured and fine textured recent alluvium that washed from soils underlain by moderately to highly phosphatic limestone.

The Lanton soils occur with the Egam, Huntington, and Lindside soils. Compared with the Egam soils, the Lanton soils are not so well drained, and they lack the slightly compact layer at a depth of 24 inches. They are finer textured and more poorly drained than the Lindside or Huntington soils.

The Lanton soils are not extensive in this county and are of minor importance to farming. Some areas are used for corn or soybeans, but most areas are in pasture.

Representative profile of Lanton silt loam in a bluegrass pasture on the Elizabeth McDowell farm:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine and fine, granular structure; friable; neutral; gradual, smooth boundary; horizon 6 to 12 inches thick.

A1b—10 to 18 inches, very dark brown (10YR 2/2) to very dark gray (10YR 3/1) silty clay loam; weak, fine and medium, subangular blocky structure; firm and slightly compact when moist; neutral; gradual, wavy boundary; horizon 8 to 12 inches thick.

C1—18 to 24 inches, very dark grayish-brown (10YR 3/2) silty clay loam mixed with dark grayish brown (10YR 4/2); firm when moist, slightly sticky and slightly plastic when wet; neutral; gradual, wavy boundary; horizon 5 to 7 inches thick.

C2—24 to 36 inches, very dark gray (10YR 3/1) silty clay loam with common, medium, faint, dark-brown (10YR 4/3) mottles and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; firm when moist, slightly sticky and slightly plastic when wet; neutral; gradual, smooth boundary; horizon 10 to 14 inches thick.

C3—36 to 42 inches, very dark grayish-brown (10YR 3/2) silty clay loam with streaks or patches of yellowish brown (10YR 5/6) and dark grayish-brown (10YR 4/2) mottles; mottled material contains many concretions that are small, soft, and dark; firm when moist, sticky and plastic when wet; neutral; abrupt, smooth boundary; horizon 5 to 8 inches thick.

C4—42 to 55 inches, mottled yellowish-brown (10YR 5/6) and dark grayish-brown (10YR 4/2) silty clay loam; firm when moist, sticky and plastic when wet; many, small, hard concretions; neutral; horizon 10 to 20 inches thick.

R—55 inches +, Cynthiana limestone.

The Ap horizon is generally recent overwash, but the overwash is absent in some places. Some horizons are streaked with gray (10YR 5/1), dark gray (10YR 4/1), and very dark grayish brown (10YR 3/2). The alluvium ranges from 3 feet to 10 feet or more in depth to bedrock.

LAWRENCE SERIES

The Lawrence series consists of somewhat poorly drained soils that are shallow or moderately deep to a fragipan. These soils formed in old mixed alluvium on terraces along the Licking River and South Fork Licking River.

Lawrence soils occur with the Elk and Captina soils and are more poorly drained and more strongly mottled than those soils.

In this county the Lawrence soils have been cleared and are used mostly for corn, small grain, and soybeans. Some areas are in hay or pasture.

Representative profile of Lawrence silt loam in a field along county road, 500 feet west of railroad tracks near Poindexter:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) to brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; neutral; gradual, wavy boundary; horizon 5 to 8 inches thick.

B2—7 to 16 inches, pale-brown (10YR 6/3) silty clay loam; common, fine, faint mottles of yellowish brown (10YR 5/4) and dark yellowish brown (10YR 3/4); weak, fine, granular structure and weak, fine, subangular blocky structure; friable; slightly acid; gradual, wavy boundary; horizon 8 to 12 inches thick.

Bx1—16 to 25 inches, light yellowish-brown (10YR 6/4) silty clay loam with common, fine, distinct mottles of light brownish gray (10YR 6/2) and few, fine, distinct mottles of strong brown (7.5YR 5/6); massive; compact and brittle in places, friable when disturbed; few, dark reddish-brown (5YR 3/4), hard concretions ¼ inch across; medium acid; abrupt, clear boundary; horizon 4 to 8 inches thick.

Bx2cn—25 to 29 inches, mottled dark reddish-brown (5YR 3/2 to 2/2), dark-brown (7.5YR 3/2), and light-gray (10YR 6/1) silty clay loam; compact and brittle; many very dark brown concretions; medium acid; gradual, wavy boundary; horizon 5 to 10 inches thick.

C—29 to 48 inches +, strong-brown (7.5YR 5/6) silty clay loam with common, medium, faint mottles of pale brown (10YR 6/3), common, fine, faint mottles of yellowish brown (10YR 5/8), and common, fine, distinct mottles of light gray (10YR 6/1); massive; firm; strongly acid.

The Ap horizon ranges from grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2). The matrix of the B2 horizon ranges from pale brown (10YR 6/3) to light yellowish brown (2.5Y 6/4). In some places the B2 horizon is mottled with light brownish gray (10YR 6/2). The thickness of the alluvium ranges from 4 to 12 feet. Depth to rock is 6 to 12 feet. The concretionary zone (Bx1 and Bx2cn horizons) is absent in some areas.

LINDSIDE SERIES

The Lindside series consists of deep, moderately well drained soils that occur on the flood plains of most streams in the county. These soils formed in recent alluvium that washed from soils underlain by limestone and calcareous shale.

Lindside soils occur with the Huntington and Newark soils on the bottoms and with the Brashear soils on the foot slopes. They are better drained and less mottled than the Newark soils and are not so well drained as the Huntington. The Lindside soils formed in lighter textured, more recent alluvium than Brashear soils and have less horizon development.

Lindside soils are good for farming and are used for all locally grown crops. Some areas are in pasture.

Representative profile of Lindside silt loam, 2 miles southwest of Claysville along U.S. Highway No. 62:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; neutral; gradual, smooth boundary; horizon 5 to 9 inches thick.

C1—8 to 18 inches, brown (10YR 5/3 to 4/3) silt loam; weak, medium, granular structure; friable when moist, slightly sticky when wet; neutral; clear, smooth boundary; horizon 7 to 10 inches thick.

C2—18 to 24 inches, brown (10YR 5/3) heavy silt loam with common, medium, faint mottles of light brownish gray (10YR 6/2) and pale brown (10YR 6/3); few, fine, distinct mottles of dark yellowish brown (10YR 4/4) and common, fine, faint mottles of light gray (10YR 7/2); few, fine, brown and black concretions; weak, fine and medium, granular structure; neutral; gradual, wavy boundary; horizon 4 to 10 inches thick.

C3—24 to 44 inches, mottled brown (10YR 5/3), pale-brown (10YR 6/3), light brownish-gray (10YR 6/2), light-gray (10YR 6/1), and dark-brown (7.5YR 4/4) heavy silt loam; small and medium, dark-brown concretions and concretionary material; medium granular and subangular blocky structure; friable; neutral or mildly alkaline.

The Ap horizon is brown in most places, but it ranges to dark grayish brown. The alluvium ranges from 30 inches to 10 feet or more thick.

LORADALE SERIES

The Loradale series consists of deep, well-drained soils on gently sloping and sloping uplands. These soils developed in residuum from calcareous shale and moderately phosphatic limestone.

Loradale soils occur with the Mercer, Faywood, and Cynthiana soils. Compared with the Mercer soils, Loradale soils have a browner upper B horizon and lack a fragipan. They have a redder B horizon and are deeper than the Cynthiana and Faywood soils.

In this county Loradale soils are widespread, productive, and important to farming. They are used for all locally grown crops. Some areas are in Kentucky bluegrass most of the time.

Representative profile of Loradale silt loam, 2 to 6 percent slopes, in a bluegrass pasture 0.5 mile south of the bridge over the South Fork Licking River on State Route 982:

Ap—0 to 7 inches, dark-brown (7.5YR 3/2) to very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; gradual, smooth boundary; horizon 4 to 9 inches thick.

A3—7 to 13 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure and weak, medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary; horizon 5 to 8 inches thick.

B1—13 to 17 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine and medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary; horizon 3 to 5 inches thick.

B21t—17 to 25 inches, strong-brown (7.5YR 5/6) heavy silty clay loam; moderate, medium, subangular blocky structure; firm; noticeable clay films on peds; many, very small, dark concretions; neutral; gradual, smooth boundary; horizon 6 to 10 inches thick.

B22t—25 to 30 inches, strong-brown (7.5YR 5/6) silty clay; moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; few roots; noticeable clay films; many, small, dark concretions and streaks of soft concretionary material; slightly acid; gradual, smooth boundary; horizon 6 to 8 inches thick.

B3t—30 to 40 inches, yellowish-brown (10YR 5/6) silty clay or clay with common, fine, faint mottles of brown (7.5YR 4/4) and few, fine, faint mottles of light yellowish brown (10YR 6/4); moderate, medium and coarse, angular blocky structure; noticeable clay films; very firm when moist, very sticky and very plastic when wet; many, fine, soft, dark concretions; medium acid; abrupt, smooth boundary; horizon 8 to 12 inches thick.

C—40 to 48 inches, olive-brown (2.5Y 4/4) clay with common, medium, distinct mottles of yellowish brown (10YR 5/6) and common, fine, faint mottles of grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4); massive; very firm when moist, very sticky and very plastic when wet; few pieces of soft, dark concretionary material one-fourth inch across; mildly alkaline.

R—48 inches+, shaly limestone and beds of soft calcareous shale.

The B horizon ranges from yellowish red (5YR 4/6) to yellowish brown (10YR 5/6) or brown (7.5YR 4/4). The B1 horizon ranges from silt loam to silty clay loam, and

the B21t horizon ranges from silty clay loam to silty clay. The solum is 24 to 50 inches thick. Depth to bedrock ranges from 4 to 15 feet.

MAURY SERIES

The Maury series consists of deep, well-drained soils that developed in residuum chiefly from moderately to highly phosphatic limestone. The influence of silty material, possibly loess, is indicated by a friable A horizon and an upper B horizon. These soils occupy gently sloping to sloping uplands.

The Maury soils occur with the Loradale, McAfee, and Faywood soils. Maury soils are deeper to bedrock than the Faywood soils and have a redder, less plastic B horizon. They are less clayey and deeper than the McAfee soils and are more red and less plastic in the lower B horizon than the Loradale soils.

Maury soils are productive, but they are not extensive in this county. They are well suited to all locally grown crops, especially tobacco. Some areas are in pasture most of the time.

Representative profile of Maury silt loam, 2 to 6 percent slopes, in a bluegrass pasture near the Bourbon County line:

Ap—0 to 7 inches, dark-brown (7.5YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; gradual, smooth boundary; horizon 4 to 10 inches thick.

B1—7 to 13 inches, reddish-brown (5YR 4/4) silty clay loam; weak, medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary; horizon 6 to 8 inches thick.

B21t—13 to 16 inches, reddish-brown (5YR 4/4) silty clay; moderate, medium and fine or very fine, subangular blocky structure; common, thin, patchy clay skins; firm when moist, sticky when wet; roots common; few, very fine, dark-brown concretions; medium acid; gradual, smooth boundary; horizon 2 to 8 inches thick.

B22t—16 to 29 inches, red (2.5YR 4/6) clay streaked with reddish brown (5YR 4/4); moderate, medium and fine or very fine, subangular blocky structure; firm when moist, sticky and plastic when wet; few roots; thin, continuous clay films; many, very small, brown concretions that are round and hard; strongly acid; gradual, smooth boundary; horizon 12 to 20 inches thick.

B23t—29 to 40 inches, yellowish-red (5YR 4/6) clay; moderate, medium, subangular blocky structure; thin, continuous clay films; firm when moist, sticky and plastic when wet; many, fine, brown concretions; strongly acid; gradual, wavy boundary; horizon 2 to 14 inches thick.

B3t—40 to 60 inches, yellowish-red (5YR 5/6) clay; weak, medium and coarse, subangular blocky structure; firm when moist, sticky and plastic when wet; few dark concretions; some strong-brown (7.5YR 5/6) pieces of shale one-half inch across; strongly acid.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to reddish brown (5YR 4/4). The B1 horizon ranges from reddish brown (5YR 4/4) to brown (7.5YR 4/4), and from silty clay to silt loam. The B22t horizon ranges from 7.5YR to 2.5YR in hue. Depth to bedrock is 5 to 10 feet.

McAFEE SERIES

The McAfee series consists of moderately deep, well-drained soils that formed in residuum derived from moderately to highly phosphatic limestone. These soils are generally on sloping to strongly sloping uplands.

McAfee soils occur with the Maury, Loradale, Cynthiana, and Faywood soils. The B horizon of McAfee soils is browner than that of the Cynthiana and Faywood soils. McAfee soils are more shallow to rock and are more clayey than the Maury and Loradale soils.

Most areas of McAfee soils are used for pasture or for hay crops.

Representative profile of McAfee silt loam, 6 to 12 percent slopes, eroded, in a bluegrass pasture near U.S. Highway No. 27, 3 miles north of Cynthiana:

Ap—0 to 6 inches, dark-brown (7.5YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; gradual, smooth boundary; horizon 4 to 7 inches thick.

B1—6 to 11 inches, brown (7.5YR 4/4) silty clay loam; weak, medium, subangular blocky structure; firm; slightly acid; gradual, smooth boundary; horizon 4 to 8 inches thick.

B2t—11 to 14 inches, reddish-brown (5YR 4/4) and brown (7.5YR 4/4) silty clay; moderate, medium, angular blocky structure; firm when moist, sticky when wet; few, very fine, dark-brown concretions; slightly acid; gradual, wavy boundary; horizon 3 to 6 inches thick.

C—14 to 30 inches, reddish-brown (5YR 4/4) clay and streaks or patches of brown (7.5YR 4/4) silty clay; massive; very firm when moist, sticky and very plastic when wet; neutral; horizon 12 to 20 inches thick.

R—30 inches +, Cynthiana limestone.

The B horizon ranges from dark brown (7.5YR 4/4) to dark reddish brown (5YR 3/4). Depth to rock ranges from 20 to 36 inches.

MERCER SERIES

The Mercer series consists of moderately well drained soils that are moderately deep to a fragipan. These soils developed in residuum from limestone and calcareous shale. They are on broad, nearly level or gently sloping ridgetops.

Mercer soils occur with the Faywood and Loradale soils, which are better drained and do not have a fragipan.

Mercer soils are used for all locally grown crops except alfalfa and other deep-rooted crops. Some areas are kept in bluegrass pasture for long periods between periods of cultivation.

Representative profile of Mercer silt loam, 2 to 6 percent slopes, in a field near the Bourbon County line:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; clear, smooth boundary; horizon 7 to 9 inches thick.

A2—8 to 15 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine granular and subangular blocky structure; friable; neutral; clear, smooth boundary; horizon 7 to 9 inches thick.

B2t—15 to 23 inches, yellowish-brown (10YR 5/6) silty clay loam with common, fine, faint mottles of light yellowish brown (10YR 6/4); weak, fine and medium, subangular blocky structure; patchy clay films; friable when moist, slightly sticky and slightly plastic when wet; few, small, dark concretions; neutral; clear, smooth boundary; horizon 8 to 10 inches thick.

Bx1—23 to 31 inches, light yellowish-brown (10YR 6/4) to pale-brown (10YR 6/3) silty clay loam with common, fine, distinct mottles of yellowish brown (10YR 5/6), few, fine, distinct mottles of dark yellowish brown (10YR 4/4) and brown (10YR 4/3), and few fine, faint mottles of light gray (10YR 7/2); weak, medium, subangular blocky structure; clay films on ped faces; slightly compact and brittle in places, friable if disturbed; common, small, dark concretions; strongly acid; gradual, wavy boundary; horizon 7 to 9 inches thick.

Bx2—31 to 42 inches, light yellowish-brown (10YR 6/4) silty clay with common, fine, faint mottles of yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/4), pale brown (10YR 6/3), and light gray (10YR 7/2); massive; slightly compact and slightly brittle when moist, sticky and plastic when wet; many, small,

black concretions; strongly acid; gradual, wavy boundary; horizon 10 to 18 inches thick.

C—42 to 48 inches, yellowish-brown (10YR 5/5) clay with common, fine, faint mottles of light yellowish brown (10YR 6/4) and pale brown (10YR 6/3); massive; very firm when moist, sticky and plastic when wet; common, fine, soft, black concretionary material; medium acid; horizon 1 to 4 feet thick.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 3/3 to 4/3). Depth to the fragipan ranges from 18 to 26 inches. Depth to bedrock is about 4 to 10 feet.

NEWARK SERIES

The Newark series consists of somewhat poorly drained soils that formed in recent alluvium washed from soils of limestone and calcareous shale origin. These soils are mostly on the narrow bottoms along the smaller streams. Some of the excessive water in these soils seeps from nearby hills.

Newark soils occur with the Lindside and Huntington soils and are more poorly drained than those soils.

In this county Newark soils are in small areas and have a small total acreage. Most areas are used for pasture, but some are in corn or soybeans.

Representative profile of Newark silt loam in a field 200 feet from Boyd-Kelat Road, one-half mile southeast of Boyd:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam with common, fine, faint mottles of grayish brown (10YR 5/2); weak, fine, granular structure; friable; neutral; clear, smooth boundary; horizon 4 to 8 inches thick.

C1—8 to 12 inches, brown (10YR 5/3) silt loam with common, fine, faint mottles of grayish brown (10YR 5/2) and brown (7.5YR 4/4); weak, fine, granular structure; friable; neutral; gradual, wavy boundary; horizon 4 to 8 inches thick.

C2—12 to 15 inches, grayish-brown (10YR 5/2) silt loam with common, fine, faint mottles of light brownish gray (10YR 6/2) and dark yellowish brown (10YR 4/4); massive; friable; neutral; gradual, wavy boundary; horizon 2 to 6 inches thick.

C3—15 to 25 inches, light brownish-gray to pale-brown (10YR 6/2 to 10YR 6/3) silt loam; massive; friable; neutral; gradual, wavy boundary; horizon 6 to 15 inches thick.

C4—25 to 42 inches +, pale-brown (10YR 6/3) silt loam with common, fine, faint mottles of light brownish gray (2.5Y 6/2) and dark yellowish brown (10YR 4/4); massive; friable; neutral; 12 to 24 inches thick.

Depth to bedrock ranges from 3 to 10 feet.

General Nature of the County

This section describes the history, geology, climate, and agriculture of Harrison County, and other subjects of general interest. Unless otherwise stated, the statistics given are from reports published by the U.S. Bureau of the Census.

History

Harrison County, named for Col. Benjamin Harrison, was established in 1793 from parts of Bourbon and Scott Counties and included areas that extended northward to the Ohio River. Cynthiana was made the county seat.

Most of the early settlers came from Pennsylvania, Virginia, and North Carolina about 1774–75. Some of the early settlers were former soldiers from the Revolutionary War who held land warrants giving them a large acreage as payment for their services during the war.

The population of the county was 18,570 in 1900, but by 1960 it had decreased to 13,704.

Geology, Relief, and Drainage

Harrison County lies within two physiographic regions. The Eden Hills, or Hills of the Bluegrass, form a crescent that extends along the western side of the county, across the northern part, and along the eastern side. The Inner Bluegrass region covers the central and southern parts of the county. The area made up of these two regions is divided into two parts by the South Fork Licking River.

The entire county is underlain by rocks of the Eden and Cynthiana formations of the Ordovician system (*5*). The Eden formation is more than 200 feet thick and consists largely of calcareous shale, but thin layers of limestone make up about 10 percent of the formation. The Cynthiana formation, which is about 100 feet thick, is mainly limestone and partly thin layers of calcareous shale.

The relief of this county is related to the geology. The Eden Hills are rugged and are highly dissected by narrow, winding, V-shaped valleys. Side slopes are long and moderately steep or steep, and ridges are narrow. The Eden soils are dominant in this area, and the Heitt soils occur in a much smaller acreage.

Between the Eden Hills and the Inner Bluegrass region is a strongly sloping to moderately steep transitional area. Faywood, Cynthiana, and Loradale soils are common in the uplands of these areas. The valleys are narrow but are broader than those in the Eden Hills. Along the small streams are narrow strips of colluvial soils.

Most of the Inner Bluegrass region is undulating or gently rolling to rolling. The main streams flow through wide valleys. Most of the acreage of Maury soils is in this region.

Wide, nearly level bottom lands and terraces are along the South Fork Licking River and the Licking River. The Elk and Ashton soils are dominant on terraces, and the Huntington, Lindside, and Newark soils are dominant on bottom lands.

The lowest point in the county, 560 feet above sea level, is on the Bracken County line at the extreme northeastern tip of the county where the North Fork Licking River flows into the Licking River. The highest point, 996 feet above sea level, is on the Scott County line at Alberta.

The Licking River flows along the northeastern border of the county and drains the northeastern part. Beaver Creek is its largest tributary. The South Fork Licking River flows northward through the central part of the county and with its tributaries drains the rest of the county. Twin Creek is the largest tributary, but Raven and Mill Creeks are also important. Also flowing into the South Fork Licking River is Crooked Creek, which forms part of the northern border of the county.

Along the smaller streams, flooding is common in any season. The Licking River and the South Fork Licking River generally overflow late in winter or in spring.

Water Supply

Cisterns are the largest source of domestic water in the county. Although the underlying material in this

county is unpredictable, shallow wells have been dug and a few deeper wells drilled. The water in some of the drilled wells is salty or sulfurous and is undesirable for domestic use. The Licking River and smaller streams supply water for livestock and irrigation. Water from this river is purified and used in Cynthiana. Other towns in the county do not have systems for purifying and supplying water. In areas that do not have access to rivers or smaller streams, ponds supply much of the water for livestock and irrigation.

Industry, Transportation, and Markets

Harrison County is mainly agricultural, but it is a part of the industrial community of Lexington, Ky., and Cincinnati, Ohio. Cynthiana, the county seat, is a center for marketing tobacco, but the marketing is seasonal. Factories in the county manufacture metal products, clothing, and fertilizer. Meat is packed, whiskey is distilled, and limestone is processed.

U.S. Highway No. 27 crosses the country from north to south, and U.S. Highway No. 62 crosses from northeast to southwest. State Routes 36 and 32 connect the eastern part of the county with the western part.

The Louisville and Nashville Railroad crosses the county from north to south. The Southern Railway skirts the western edge of the county. A landing strip at Cynthiana is suitable for small airplanes.

Climate [5]

The climate of Harrison County is temperate continental. Between the moderately cold winters and the warm, humid summers, the range in temperature is wide. Precipitation is fairly evenly distributed throughout the year, though rainfall is relatively light in September and October. Temperature, rainfall, and humidity are within limits suitable for varied plant and animal life.

Data on temperature and precipitation are given in table 8. Not necessarily consecutive are the 4 or more days that, in 2 years out of 10, have the maximum and minimum temperatures listed in table 8.

A daily freeze-thaw cycle is frequent in Harrison County. The temperature drops to 32° F. or below on an average of 105 nights during the year, but it rises above freezing on all but about 20 of the days following these nights. Readings of zero or below average about 4 per winter.

In Harrison County, the average length of the growing season, or the interval between the last freezing temperature in spring and the first in fall, is about 180 days. Table 9 gives the dates of specified risks of freezing temperatures. Several temperatures are given because some crops can stand a lower temperature than others.

The average annual precipitation of Harrison County is about 41 inches. Precipitation in measurable amounts occurs on an average of 130 days each year. In some years, however, precipitation is either inadequate or excessive. Table 8 shows that in 1 year out of 10 some months have an extreme monthly deficiency of precipitation, an extreme monthly excess, or both. For example, the average precipitation in May is 3.44 inches, but on an average of 1 year in 10, May will have less than 1.6 inches of precipitation and, also in 1 year in 10, will have more than 6.9 inches.

Thunderstorms occur on an average of 50 days per year. They are most frequent from March through September, though they may occur in any month. During these storms, mostly in summer, intensive rain falls for short periods. In almost every year, the heaviest rainfall is at

[5] By ALLEN B. ELAM, JR., State climatologist, Environmental Science Services Administration, Weather Bureau, Lexington, Ky.

TABLE 8.—*Temperature and precipitation data*

[Data for period 1931–60]

Month	Temperature [1]				Precipitation			
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with—		Average monthly total	1 year in 10 will have [2]—		Days with 1 inch or more of snow
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Number*
January	45.0	26.0	61	4	4.15	1.6	7.9	2
February	47.7	26.7	63	8	3.22	1.3	6.0	2
March	55.8	32.7	74	17	4.55	2.8	7.6	1
April	68.3	42.5	83	29	3.79	1.9	6.0	1
May	78.0	52.3	89	39	3.44	1.6	6.9	0
June	87.2	61.3	94	50	3.92	2.0	7.9	0
July	90.9	65.1	97	55	3.80	2.2	7.5	0
August	89.3	63.3	96	54	3.33	1.2	5.9	0
September	83.1	56.5	94	45	2.73	1.0	5.2	0
October	71.4	44.8	85	32	2.06	.8	3.8	
November	55.8	33.7	72	19	3.24	1.3	5.5	1
December	45.8	26.9	62	9	3.03	1.5	5.5	1

[1] Data from Cynthiana in Harrison County, Williamstown in Grant County, and Lexington in Fayette County.

[2] Data from Cynthiana.

[3] Less than one-half day.

TABLE 9.—*Probabilities of the last freezing temperatures in spring and first in fall (4)*

Probability	Dates for given probability at temperature of—		
	24° F. or lower	28° F. or lower	32° F. or lower
Spring:			
1 year in 10 later than.	April 18	May 2	May 10
2 years in 10 later than.	April 12	April 27	May 5
5 years in 10 later than.	March 31	April 15	April 25
Fall:			
1 year in 10 earlier than.	October 31	October 10	October 1
2 years in 10 earlier than.	November 4	October 16	October 6
5 years in 10 earlier than.	November 15	October 25	October 16

least 1.2 inches in 1 hour. The chance of rainfall of as much as 1.2 inches in 1 hour is 30 percent in July but only 1 percent from December through February. About once in 10 years, a 24-hour total of 4.25 inches or more can be expected. This large total is more likely in July than in any other month. Less intense rainfall that lasts for several days sometimes occurs late in spring and delays tillage. Long periods of mild, sunny weather in fall are typical and are favorable for harvesting.

Annual free-water evaporation averages about 35 inches, which is 6 inches less than the annual average precipitation. This evaporation is from ponds and shallow lakes, and about 75 percent occurs from May though October.

Relative humidity is affected by temperature and therefore varies during the day. The annual average is about 83 percent at 7 a.m., about 59 percent at 1 p.m., and about 67 percent at 7 p.m.

Winds blow most frequently from the south and southwest. Their average speed is 7 to 9 miles per hour from June through October and 10 to 13 miles per hour during the rest of the year.

Agriculture

The agriculture of Harrison County is somewhat diversified, but most farmers depend on tobacco for most of their cash income. The total gross income for the county is nearly equally divided between tobacco and all other products of the farm, mostly animals and animal products. The U.S. Census of Agriculture reports that, in 1959, of the 188,718 acres in farms, 34,198 acres was cropland harvested; 89,357 acres, cropland used only as pasture; 5,466 acres, cropland not harvested and not pastured. The harvested acreage included 6,285 acres of corn, 4,456 acres of tobacco, and 1,118 acres of wheat. Pasture that was not cropland or woodland accounted for 34,649 acres. Woodland pastured amounted to 13,203 acres, and woodland not pastured amounted to 3,237 acres. The other land on farms totaled 8,608 acres. There were 1,624 farms in the county in 1959, and the average-sized farm consisted of 116.2 acres.

Livestock and livestock products account for about 48 percent of the total farm income in Harrison County. Cattle are more important than other kinds of livestock. According to the census of agriculture, the number of cattle and calves has increased gradually since 1925, but most other kinds of livestock have decreased in number. From 1925 to 1959, the number of cattle and calves increased from 7,823 to 27,087. In the same period, the number of sheep decreased from 62,129 to 26,699. In 1959, there were 15,791 hogs and pigs on farms, a few draft animals, and a few saddle horses. A few dairy farms supply milk for a local cheese plant and for other local needs. Poultry raising is of no great importance to the economy of the county.

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Glossary

Acidity. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

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.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; soil does not hold together in a mass.

Friable.—When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil is 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, soil adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure and is difficult to break between the thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to the terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop that is grown primarily to improve the soil and to protect it between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Crop residue. Parts of plants—leaves, stubble, roots, and straw—that are left in the field after harvest.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer 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. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Green-manure crop. Any crop grown and plowed under for the purpose of improving the soil, especially by the addition of organic matter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

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.

Lime concretion. An aggregate cemented by the precipitation of calcium carbonate ($CaCO_3$).

Moisture-supplying capacity. The relative capability of the soil to take in and supply moisture in amounts favorable to most plants. It is related to the amount of runoff, the rate of infiltration, the depth of the root zone, the depth of the soil, and the moisture extraction pattern. Relative moisture-supplying capacity is expressed as *high, moderately high, moderately low, low,* and *very low.*

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons of the soil profile.

Mottled, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters 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.

Munsell notation. A symbol for designating color by degrees of the three variables—hue, value, and chroma. For example, a notation of 10YR 6/4 designates a color with a hue of 10YR, a value of 6, and a chroma of 4.

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.

Parent material, soil. The horizon of weathered rock or partly weathered soil material from which a soil has formed; the C horizon.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values and in words as follows:

	pH		*pH*
Extremely acid	Below 4. 5	Mildly alkaline	7. 4 to 7. 8
Very strongly acid	4. 5 to 5. 0	Moderately alkaline	7. 9 to 8. 4
Strongly acid	5. 1 to 5. 5	Strongly alkaline	8. 5 to 9. 0
Medium acid	5. 6 to 6. 0	Very strongly alkaline	9. 1 and higher
Slightly acid	6. 1 to 6. 5		
Neutral	6. 6 to 7. 3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Residual material (residuum). 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.

Root zone. The vertical distance between the surface of the soil and any layer, such as a fragipan or bedrock, that inhibits the growth of plant roots. Descriptive terms are as follows: *Very shallow,* less than 10 inches below the surface; *shallow,* 10 to 20 inches below the surface; *moderately deep,* 20 to 36 inches below the surface; and *deep,* 36 inches or more below the surface.

Runoff (hydraulics). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz, but they may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Second bottom. The first terrace above the normal flood plain of a stream.

Silt. As a soil separate, individual mineral particles in a soil 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 that is 80 percent or more silt and less than 12 percent clay.

Solum, soil. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil 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 the 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), *angular blocky* (prisms with sharp corners), *subangular blocky* (prisms with mostly rounded corners), *granular* (granules relatively nonporous), *crumb* (similar to granular but very porous). 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.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace, agricultural. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called *second bottoms*, as contrasted to *flood plains*, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportion of sand, silt, and clay particles in a mass of soil (see also Clay, Sand, and Silt). The basic textural classes, in order of increasing proportions of fine particles, are: *Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terraces. Land above the lowlands along rivers.

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, p. 6, for approximate acreage and proportionate extent of the soils; table 2, p. 27, for the estimated yields; and table 6, p. 40, for the limitations of soils used in community development. The subsection "Engineering Applications" begins on p. 29]

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page
AlB	Allegheny loam, 2 to 6 percent slopes	6	IIe-1	21
AlC2	Allegheny loam, 6 to 12 percent slopes, eroded	6	IIIe-1	23
AlD2	Allegheny loam, 12 to 20 percent slopes, eroded	6	IVe-1	24
AsA	Ashton silt loam, 0 to 2 percent slopes	7	I-3	21
AsB	Ashton silt loam, 2 to 6 percent slopes	7	IIe-1	21
AsC	Ashton silt loam, 6 to 12 percent slopes	7	IIIe-1	23
BrB	Brashear silt loam, 2 to 6 percent slopes	7	IIe-2	22
BrC	Brashear silt loam, 6 to 12 percent slopes	8	IIIe-2	24
BsC2	Brashear silty clay loam, 6 to 12 percent slopes, eroded	8	IIIe-2	24
BsD2	Brashear silty clay loam, 12 to 20 percent slopes, eroded	8	IVe-1	24
CaA	Captina silt loam, 0 to 2 percent slopes	8	IIe-6	23
CaB	Captina silt loam, 2 to 6 percent slopes	8	IIe-6	23
ChC2	Cynthiana very stony silty clay loam, 6 to 12 percent slopes, eroded	9	VIs-1	25
ChD2	Cynthiana very stony silty clay loam, 12 to 20 percent slopes, eroded	10	VIs-1	25
ChE2	Cynthiana very stony silty clay loam, 20 to 30 percent slopes, eroded	10	VIs-1	25
CnC3	Cynthiana very stony clay, 6 to 12 percent slopes, severely eroded	10	VIs-2	26
CnD3	Cynthiana very stony clay, 12 to 20 percent slopes, severely eroded	10	VIs-2	26
CrE3	Cynthiana very rocky clay, 20 to 30 percent slopes, severely eroded	10	VIIs-2	26
EdC3	Eden flaggy silty clay, 6 to 12 percent slopes, severely eroded	11	IVe-6	25
EdD3	Eden flaggy silty clay, 12 to 20 percent slopes, severely eroded	11	VIe-3	25
EdE3	Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded	11	VIe-3	25
Eg	Egam silt loam	11	I-1	21
EkA	Elk silt loam, 0 to 2 percent slopes	12	I-3	21
EkB	Elk silt loam, 2 to 6 percent slopes	12	IIe-1	21
EkC	Elk silt loam, 6 to 12 percent slopes	12	IIIe-1	23
EkD2	Elk silt loam, 12 to 20 percent slopes, eroded	12	IVe-1	24
EtB	Etowah silt loam, 2 to 6 percent slopes	13	IIe-1	21
EtC2	Etowah silt loam, 6 to 12 percent slopes, eroded	13	IIIe-1	23
FcE	Fairmount and Cynthiana extremely rocky soils, 20 to 30 percent slopes	13	VIIs-2	26
FcF	Fairmount and Cynthiana extremely rocky soils, 30 to 50 percent slopes	13	VIIs-2	26
FwB	Faywood silt loam, 2 to 6 percent slopes	14	IIe-2	22
FwC	Faywood silt loam, 6 to 12 percent slopes	14	IIIe-2	24
FyB2	Faywood silty clay loam, 2 to 6 percent slopes, eroded	14	IIIe-10	24
FyC2	Faywood silty clay loam, 6 to 12 percent slopes, eroded	14	IVe-6	25
FyD2	Faywood silty clay loam, 12 to 20 percent slopes, eroded	14	VIe-1	25
Gu	Gullied land	14	VIIs-2	26
HeB	Heitt silt loam, 2 to 6 percent slopes	15	IIe-2	22
HsB2	Heitt silty clay loam, 2 to 6 percent slopes, eroded	15	IIe-2	22
HsC2	Heitt silty clay loam, 6 to 12 percent slopes, eroded	15	IIIe-2	24
Ht	Huntington channery silt loam, shallow	15	Vs-1	25
HuA	Huntington silt loam, 0 to 4 percent slopes	15	I-1	21
HuD	Huntington silt loam, 4 to 20 percent slopes	15	IIIe-1	23
La	Lanton silt loam	16	IIw-5	23
Lc	Lawrence silt loam	16	IIIw-1	24
Ld	Lindside silt loam	16	I-1	21
LoB	Loradale silt loam, 2 to 6 percent slopes	17	IIe-2	22
LoC2	Loradale silt loam, 6 to 12 percent slopes, eroded	17	IIIe-1	23
Ma	Made land	17	------	--
MrB	Maury silt loam, 2 to 6 percent slopes	17	IIe-1	21
MrC2	Maury silt loam, 6 to 12 percent slopes, eroded	18	IIIe-1	23
MsC2	McAfee silt loam, 6 to 12 percent slopes, eroded	19	IVe-6	25
MsD2	McAfee silt loam, 12 to 20 percent slopes, eroded	19	VIe-1	25
MtB	Mercer silt loam, 2 to 6 percent slopes	19	IIe-6	23
Ne	Newark silt loam	19	IIw-5	23
Rk	Rock land	20	VIIs-2	26

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