SOIL SURVEY OF

Calloway and Marshall Counties, Kentucky

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Kentucky Agricultural Experiment Station

Issued December 1973

Major fieldwork for this soil survey was done in the period 1962–66. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1967. 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 Soil and Water Conservation Districts of Calloway and Marshall Counties.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Calloway and Marshall Counties are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number 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. This guide lists all the soils of the counties in alphabetical order by map symbol and gives the capability classification and woodland suitability group of each. It also shows the page where each soil is described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. 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 from the descriptions and woodland suitability groups and from the section, "Use of the Soils for Crops and Pasture."

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the counties are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Use of Soils for Town and County Planning."

Engineers and builders can find, under "Use of the Soils in Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

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

Newcomers in the area 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 Area."

Cover picture: **Landscape in the Grenada-Calloway association near Sinking Springs Church in Calloway County. The soils are Falaya silt loam on the flood plain along the stream and Grenada silt loam, 2 to 6 percent slopes, in other areas.**

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SOIL SURVEY OF CALLOWAY AND MARSHALL COUNTIES, KENTUCKY

BY MAURICE E. HUMPHREY, FRANK L. ANDERSON, RAYMOND A. HAYES, AND JOHN D. SIMS, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

CALLOWAY AND MARSHALL COUNTIES are in the southwestern part of Kentucky (fig. 1). Marshall County is immediately north of Calloway County, Kentucky, which is bounded on the south by Henry County, Tennessee. Kentucky Lake is the eastern boundary of both Calloway and Marshall Counties.

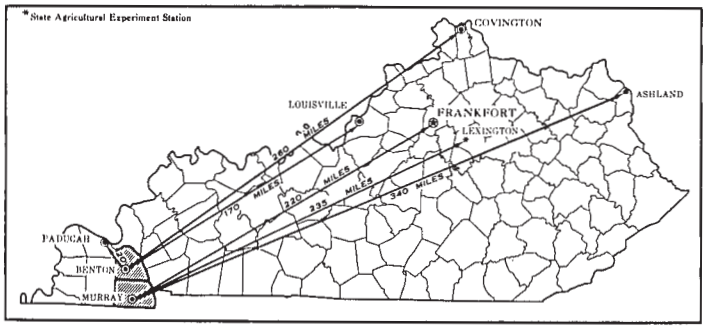

Figure 1.—Location of Calloway and Marshall Counties in Kentucky.

There are 245,760 acres (384 square miles) in Calloway County and 193,920 acres (303 square miles) in Marshall County. In 1960, Murray, the county seat and largest town in Calloway County, had a population of 9,303, and Calloway County had a population of 20,972; Benton, the county seat and largest town in Marshall County, had a population of 3,074, and the county population was 16,736.

Calloway and Marshall Counties have a temperate, humid, continental climate. Winters are brief and are characterized by short cold spells, frequent sharp changes in temperature, and high humidity. Summers are longer than winters, but hot spells are generally brief. Precipitation is fairly well distributed throughout the year.

All but 24 square miles of the survey area lies within the Tennessee River drainage basin. The topography is a plain that slopes gently to the north. Most of the soils formed in loess overlying very gravelly Coastal Plains sediment. The loess is about 6 feet thick on smooth uplands, 2 to 3 feet thick on rough uplands, and in places there is no loess at all. Some soils near Kentucky Lake formed in very cherty limestone residuum or thin loess over very cherty limestone residuum.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Calloway and Marshall Counties, where they are located, and how they can be used. The soil scientists went into the counties knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

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 (*17*).[1] The soil series and the soil phase are the categories of soil classification most used in a local survey.

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. Calloway and Memphis, 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 affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Brandon silt loam, 6 to 12 percent slopes, is one of several phases within the Brandon series.

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

[1] Italic numbers in parentheses refer to Literature Cited, page 80.

photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication 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 the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. 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 phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such mapping unit is the soil complex. A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Saffell-Guin complex, 12 to 20 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gullied land is a land type in Calloway and Marshall Counties.

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 soil 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 soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then 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 Calloway and Marshall Counties. 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 land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in Calloway and Marshall Counties are discussed in the following pages.

1. Grenada-Calloway Association

Nearly level to sloping, moderately well drained and somewhat poorly drained, silty soils on uplands

This association consists of nearly level to sloping silty soils on broad, slightly dissected uplands (fig. 2). It lies in large areas scattered throughout the two counties. Elevation ranges from 540 to 560 feet. The dominant soils formed in loess more than 4 feet thick.

This association occupies about 35 percent of Calloway County, 21 percent of Marshall County, and 29 percent of the total survey area. The Grenada soils make up about 60 percent of this association and Calloway soils, 20 percent. The remaining 20 percent consists of Lax, Henry, and Brandon soils on uplands, and Falaya, Collins, Vicksburg, and Waverly soils on flood plains.

The Grenada soils are moderately well drained, and the Calloway soils are somewhat poorly drained. In both soils a compact layer in the subsoil causes a seasonal high water table and limits the depth to which roots can penetrate.

The soils of this association are used for crops and for pasture and meadow in rotation. Woodland tracts are small and are gradually being cleared. Large farm machines are easily used on these level to sloping soils. The main limitations are moderate erosion hazard on sloping areas and wetness. In some years the latter delays planting in spring.

This association is well suited to farming, and most farms are of the commercial type. Some of this association is being used as sites for urban development. The soils have some qualities that make them suitable for building sites, but when homes are built beyond the reach of central sewage systems, care must be taken in locating septic disposal systems. Sewage effluent often comes to the surface during winter and spring on the major soils of this association. Water districts have been developed to supply water for home and industrial use in many of the rural areas as well as urban areas.

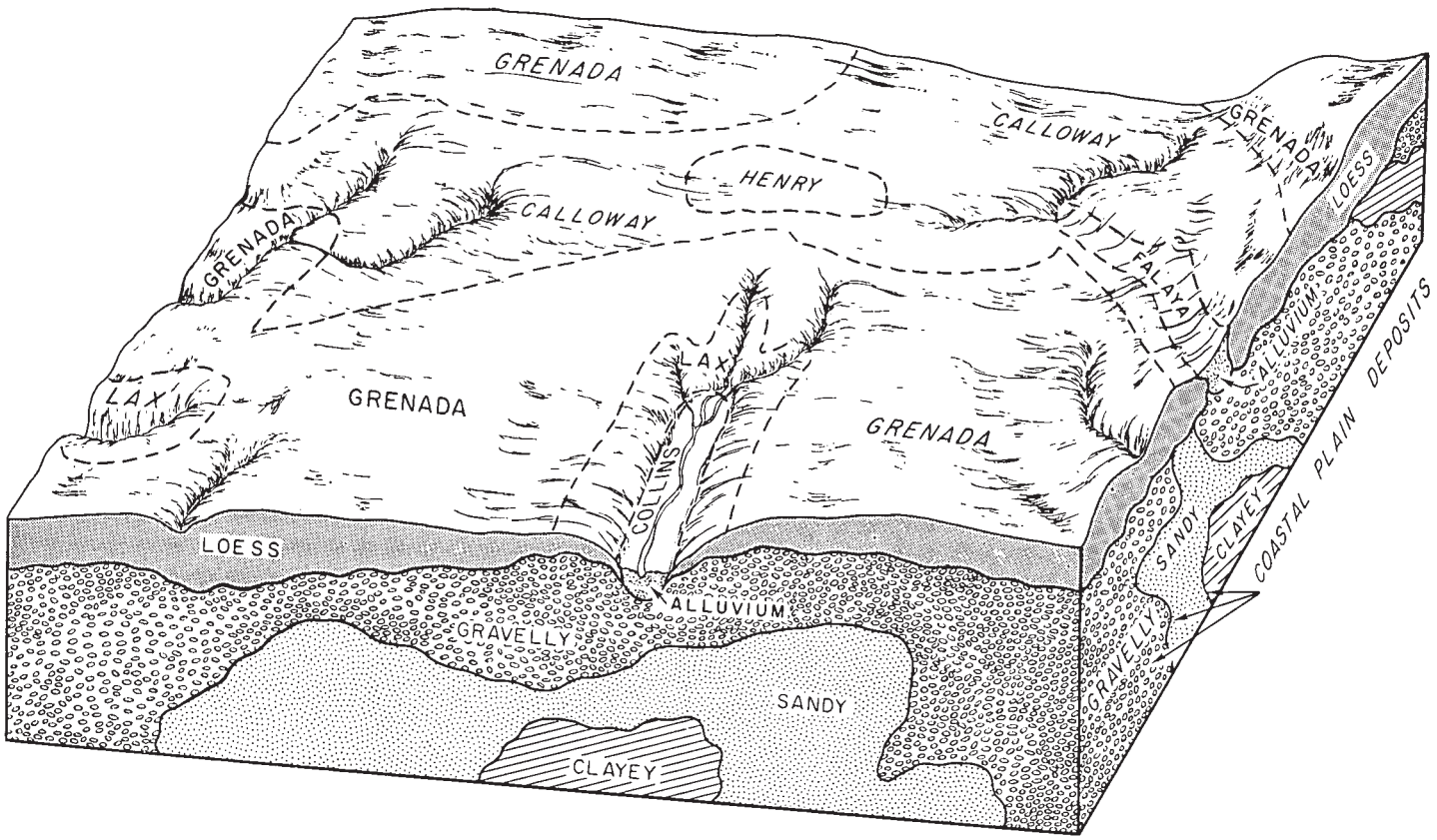

Figure 2.—Typical pattern of soils and underlying material in the Grenada-Calloway association.

2. Brandon-Loring-Lax Association

Gently sloping to steep, well drained and moderately well drained, silty and gravelly soils on uplands

This association consists of gently sloping to steep soils on fairly broad, highly dissected uplands (fig. 3). It lies in large areas scattered throughout the two counties. There are many narrow ridgetops and long side slopes in this association. The Brandon and Lax soils formed in 2 to 4 feet of silty loess overlying gravelly Coastal Plain sediments. The Loring soils formed on ridgetops, where the silty material is more than 4 feet thick over the Coastal Plain sediment.

This association occupies about 45 percent of Calloway County, 49 percent of Marshall County, and 47 percent of the total survey area. The Brandon soils make up 40 percent of this association; Loring soils, 10 percent; and Lax soils, about 9 percent. The remaining 41 percent consists of Saffell, Guin, Grenada, Lexington, Memphis, and Ruston soils on uplands; and Waverly, Vicksburg, Ochlockonee, Mantachie, Iuka, and Bibb soils on flood plains.

The Brandon soils are well drained. They have a silty subsoil underlain by gravelly material at a depth of about 27 inches. Loring and Lax soils are moderately well drained, but a compact layer in their subsoil causes a seasonal water table that limits the depth to which roots can penetrate.

The soils of this association are used for woodland, pasture, meadow, and crops. About 50 percent is forested. The strong slopes and numerous natural drainageways make the use of large machinery difficult, and the hazard of erosion in many cultivated areas is severe to very severe. Some areas formerly cultivated are now idle or have reverted to forest. There are some full-time commercial farms but most of the farms in this association are owned by part-time farmers or absentee owners.

In this association are many pits where gravel has been mined, and a few where sand or clay has been mined. The nearness to the surface of the Coastal Plain deposits makes mining easy and cheap.

The part of this association near Kentucky Lake is used for parks, resorts, sites for cottages and camping, and other forms of outdoor recreation. The soils and topography of this association are suited to the development of recreation facilities of some types, but care must be taken in selecting the sites.

3. Henry-Grenada-Calloway Association

Nearly level to gently sloping, poorly drained to moderately well drained, silty soils on stream terraces

This association consists of nearly level to gently sloping soils on stream terraces, generally 10 to 20 feet higher than the flood plains (fig. 4, p. 5). It borders the Tennessee River in the northern part of Marshall County. The dominant soils formed in deep silty alluvium.

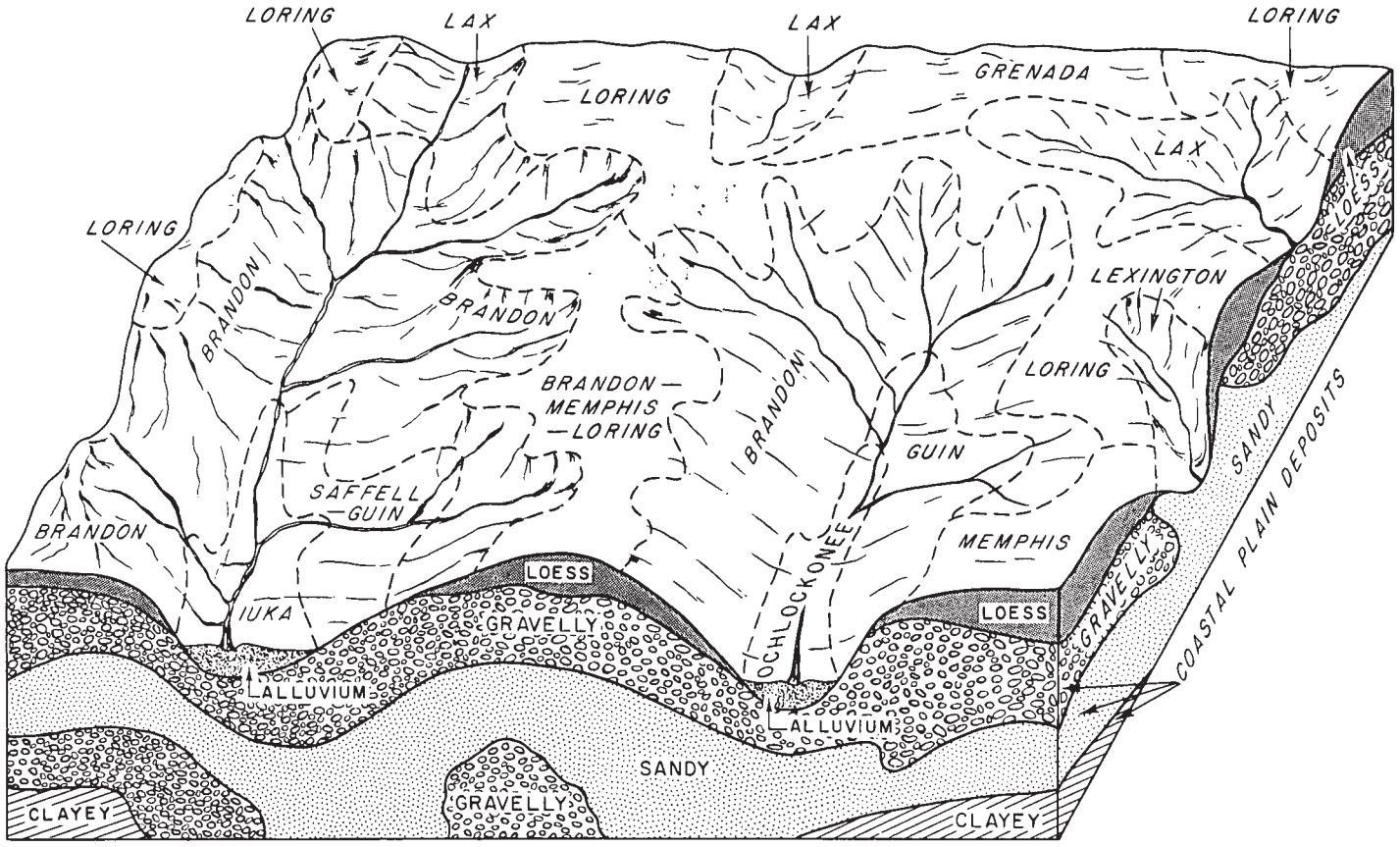

Figure 3.—**Typical pattern of soils and underlying material in the Brandon-Loring-Lax association.**

This association occupies about 11 percent of Marshall County, but only 5 percent of the total survey area. The Henry soils make up about 25 percent of this association; Grenada soils, 20 percent; and Calloway soils, about 14 percent. The remaining 41 percent consists of Wheeling, Forestdale, high clay variant, and McGary soils on stream terraces; and Falaya, Waverly, Egam, Huntington, Melvin, and Newark soils on the flood plains.

Henry, Grenada, and Calloway soils have a compact layer in the subsoil that causes a seasonal high water table and limits the depth to which roots can penetrate. Henry soils are poorly drained, Grenada soils are moderately well drained, and Calloway soils are somewhat poorly drained.

Most of this association has been cleared and used for cultivated crops and for pasture and meadow in rotation. Following the completion of Kentucky Dam in 1945, several large industries built manufacturing plants near the Tennessee River below the dam. This has affected the use of the soils, not only on several thousand acres owned by these plants, but also in all of this association and the surrounding areas. Cultivated crops are mostly grown on the highly productive Huntington and Egam soils on first bottoms or on well-drained Wheeling soils and moderately well drained Grenada soils on terraces. A few beef cattle are raised on the somewhat poorly drained Calloway soils and the poorly drained Henry soils. The main limitations to use of the soils in this association are wetness and slow permeability in the subsoil.

4. Forestdale-Waverly Association

Nearly level, poorly drained, silty and clayey soils on stream terraces and flood plains

This association consists of nearly level soils in an area believed to be an ancient lakebed bordering the East Fork of Clarks River, in the western part of Marshall County (fig. 5, p. 6). Forestdale silt loam, high clay variant, formed at higher elevations in a thin layer of loess and underlying clayey sediments. Waverly soils formed on flood plains in silty alluvium.

This association occupies about 2 percent of Marshall County and 1 percent of the total survey area. Forestdale silt loam, high clay variant, makes up about 37 percent of this association and Waverly soils, 20 percent. The remaining 43 percent consists of Collins, Falaya, and Vicksburg soils on flood plains and Grenada, Henry, Calloway, and Guin soils on stream terraces and uplands.

The Forestdale soils have a clayey subsoil and the Waverly soils have a silty subsoil. Both soils are poorly drained, and the water table is near the surface during wet seasons.

About 60 percent of this association is in hardwoods. Some areas are cultivated or used for pasture and hay. The hazard of wetness limits the use of the soils in this association for cultivated crops. Flooding is an additional hazard on Waverly soils. These two hazards and the nearness of this association to industrial Calvert City limit its use for cultivated crops.

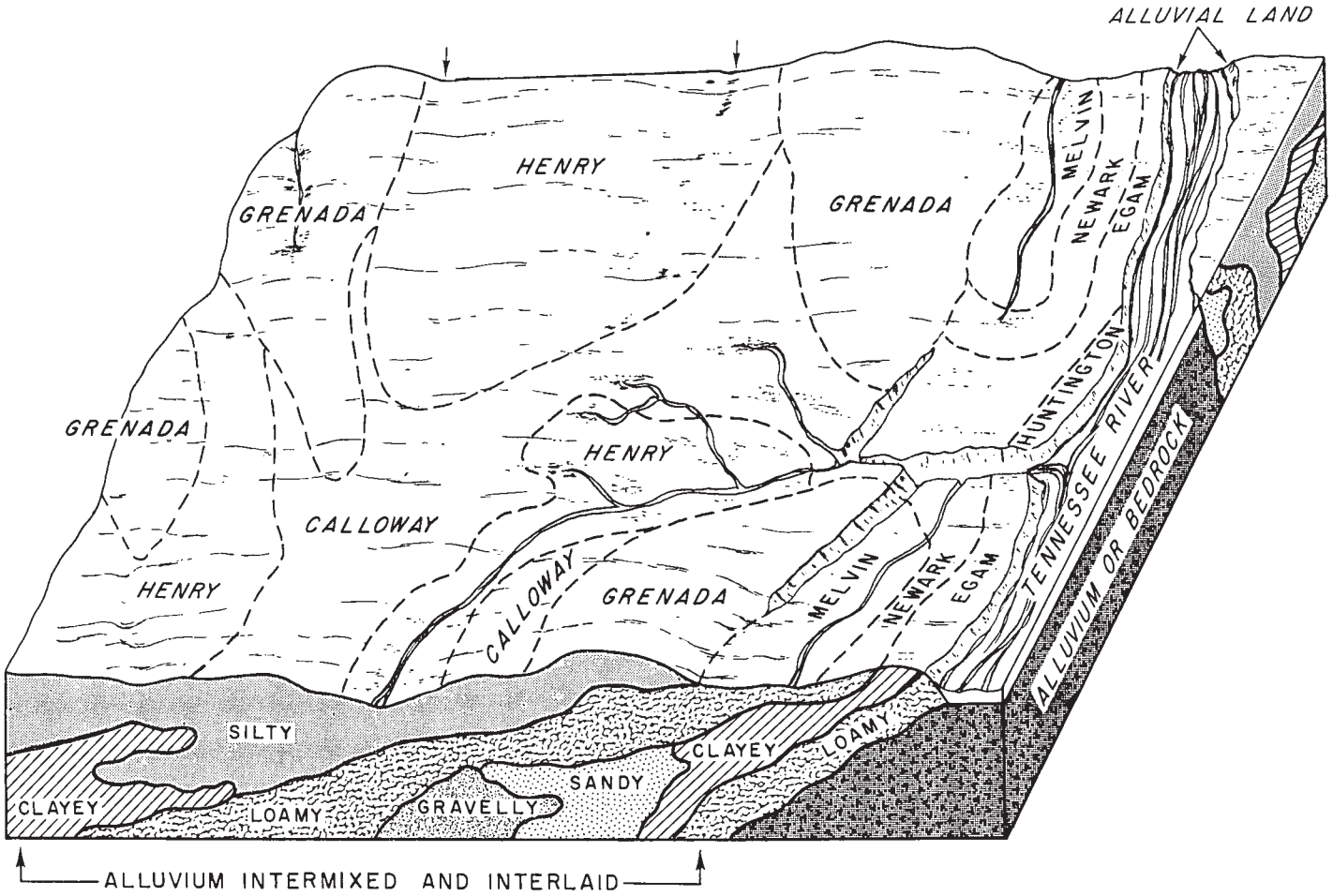

Figure 4.—**Typical pattern of soils and underlying material in the Henry-Grenada-Calloway association.**

5. Falaya-Collins-Waverly Association

Nearly level, moderately well drained to poorly drained, silty soils on flood plains

This association consists of nearly level silty soils on wide flood plains along the East and West Forks of Clarks River and their tributaries (fig. 6, p. 7) The dominant soils formed in silty alluvium.

This association occupies about 11 percent of Calloway County, 13 percent of Marshall County, and 11 percent of the total survey area. The Falaya soils make up about 26 percent of this association; Collins soils, 25 percent; and Waverly soils, 21 percent. The remaining 28 percent consists of Grenada, Calloway, Henry, Wheeling, and Guin soils on stream terraces and Vicksburg, Ochlockonee, Iuka, Mantachie, and Bibb soils on flood plains.

The Falaya soils are somewhat poorly drained, Collins soils are moderately well drained, and Waverly soils are poorly drained. These soils are subject to flooding in winter and early in spring, and, in some years, crops are damaged by floods during the summer.

In Calloway County, and the southern part of Marshall County, most of the soils have been cleared and used for cultivated crops and some for rotation pasture and meadow. The woodland tracts are generally small and near the stream channels. Northwest of Benton about 50 percent of the soils are in hardwoods and the cleared areas are mostly used for cultivated crops or for grasses and legumes. Flooding and a seasonal high water table are the major limitations to the use of the soils in this association (fig. 7, p. 8). The suitability of this association for residential and industrial sites is limited because of the frequency of stream overflow.

6. Calloway-Henry Association

Nearly level, somewhat poorly drained and poorly drained, silty soils on uplands

This association consists of nearly level soils on broad uplands that have little or no dissection (fig. 8, p. 8). It occurs in only one area, which is in south-central Calloway County. The elevation ranges from 540 to 560 feet. The dominant soils formed in loess more than 10 feet thick.

This association occupies about 2 percent of Calloway County and 1 percent of the total survey area. Calloway soils make up about 55 percent of this association and Henry soils, about 24 percent. The remaining 21 percent consists of Grenada soils on uplands and Falaya, Waverly, Mantachie, and Iuka soils on flood plains.

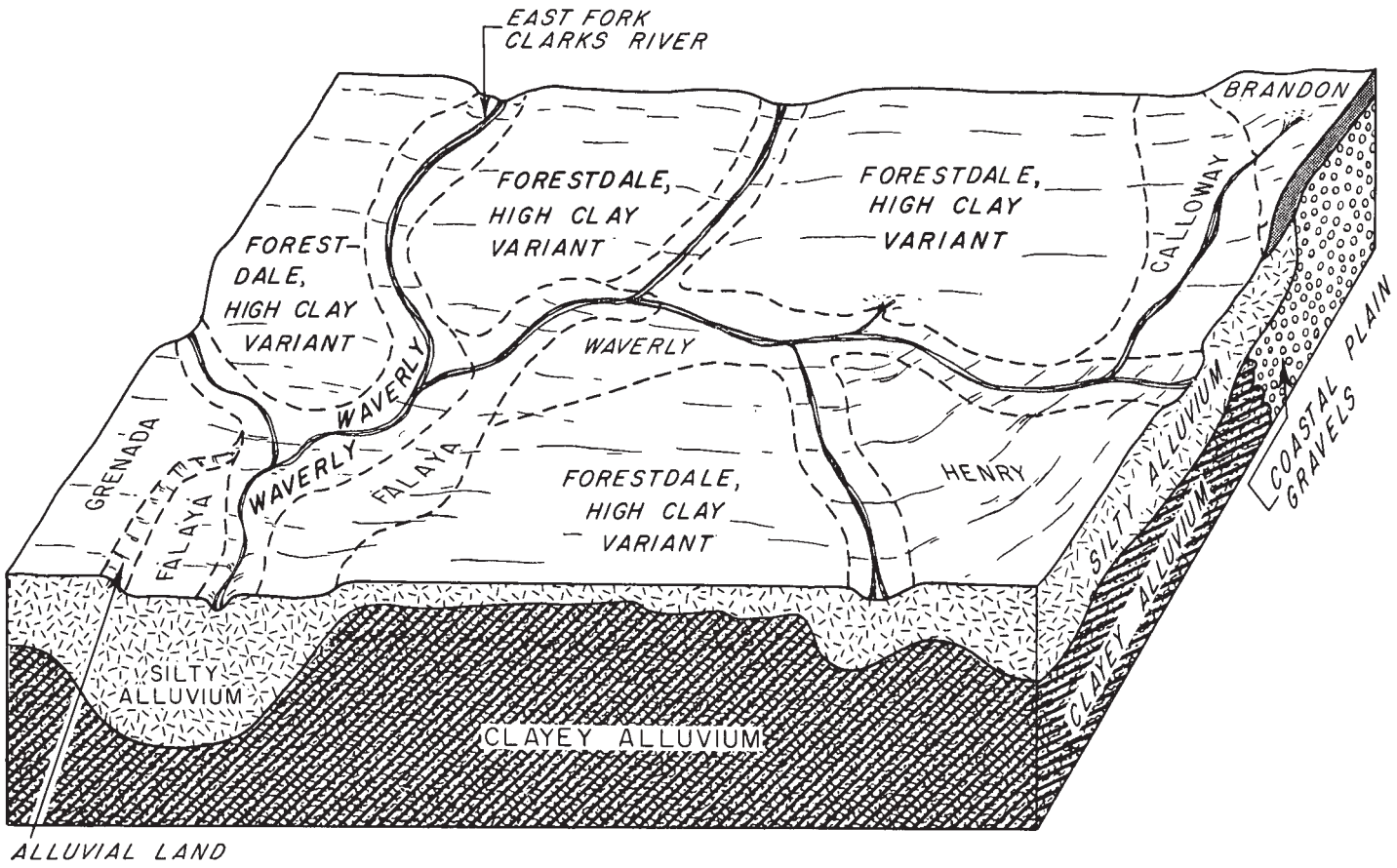

Figure 5.—**Typical pattern of soils and underlying material in the Forestdale-Waverly association.**

The Calloway soils are somewhat poorly drained and the Henry soils are poorly drained. Both soils have a compact layer in the subsoil that causes a seasonal high water table and limits the depth to which roots can penetrate.

The soils are used for cultivated crops and for rotation pasture and meadow. About 20 percent of this association is forested. Some woodland tracts are more than 100 acres in size. The dominant soil in these large woodland tracts is of the poorly drained Henry series.

The nearly level landscape makes the use of farm machinery easy, and there is no erosion hazard. Wetness often delays tillage operations. Better machinery and improvements in technology and management practices are increasing the usefulness of the soils of this association for farming. Most of the farms are commercial, but some are operated by part-time farmers.

7. Brandon-Bodine Association

Sloping to very steep, well-drained to excessively drained, silty and cherty soils on uplands

This association consists of sloping soils on narrow ridges, and moderately steep to very steep soils on long hillsides near Kentucky Lake (fig. 9, p. 8). The Brandon soils formed on ridges and upper side slopes in 2 to 4 feet of loess that overlies gravelly Coastal Plain sediments. Bodine soils formed on the lower side slopes in material that weathered from cherty limestone.

This association occupies about 7 percent of Calloway County, 4 percent of Marshall County, and 6 percent of the total survey area. Brandon soils make up about 50 percent of this association and Bodine soils, about 22 percent. The remaining 28 percent consists of Saffell, Guin, Ruston, Lexington, and Loring soils on uplands and Ochlockonee, Iuka, Vicksburg, Collins, Falaya, Waverly, and Bibb soils on flood plains.

The Brandon soils are well drained and have a silty subsoil underlain by gravelly material at a depth of about 27 inches. Bodine soils are cherty and excessively drained.

About 80 percent of this association consists of a low grade hardwood forest. Much of the forest area has never been cleared or used as pasture. The few areas that have been cleared are mostly idle or have reverted to forest. Most of the cleared areas are in small creek bottoms or on narrow ridgetops. There is little farming of any kind in this association. Near Kentucky Lake the soils are used for parks, sites for resorts, and cottages, and camping and other forms of outdoor recreation. The major limitations are droughtiness and the hazard of erosion. These are caused by the steepness of slope and the high gravel or chert content of most of the soils.

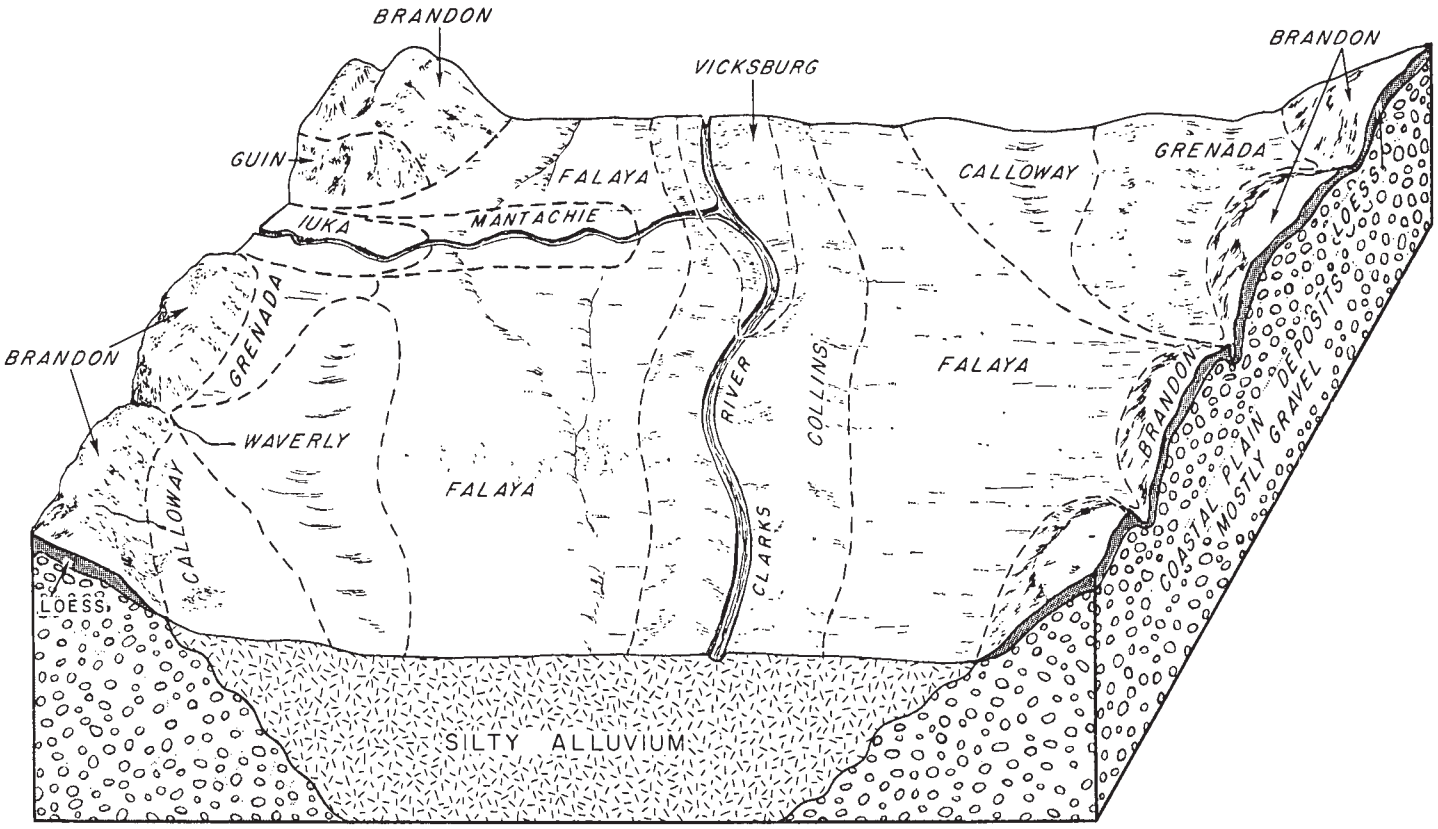

Figure 6.—**Typical pattern of soils and underlying material in the Falaya-Collins-Waverly association.**

Descriptions of the Soils

In this section the soil series and single mapping units represented in these counties are described. The approximate acreage and proportionate extent of each mapping unit are given in table 1, p. 10.

The soils of each series are first described as a group. Important features common to all the soils of the series are listed, and the position of the soils on the landscape is given. Each series description has a short narrative description of a representative profile and a much more detailed description of the same profile, from which highly technical interpretations can be made. Following the profile is a brief statement of the range of characteristics of the soils in the series, as mapped in these counties. Comparisons are made with other soils that either are located nearby or are generally similar to the soils of the series being described.

Each mapping unit in the series is next described. Mapping units are the areas delineated on the map and identified by soil symbols. Generally these descriptions tell how the profile of the soil differs from that described as representative of the series. They also tell about the use and suitability of the soil described and something about management needs.

For full information about any one mapping unit, it is necessary to read the description of the soil series as well as the description of the mapping unit. General information about the broad patterns of soils in these counties is given in the section "General Soil Map." The color names and color symbols given are for moist soil, unless otherwise indicated.

Alluvial Land

Alluvial land (Ad) is a miscellaneous land type that consists of well drained and moderately well drained soils. These soils are on escarpments near the channels of the larger streams, between the first and second bottoms and in long, narrow areas that parallel the main stream. The narrow areas of soils formed in recent alluvium is so variable that the soils can not be classified by series. Slopes range from 12 to 50 percent.

The rooting zone generally is deep or moderately deep, and the available moisture capacity is high. Natural fertility is moderate, and organic-matter content is low. The reaction ranges from neutral to very strongly acid.

Most of this land type is in trees. Its use is very severely limited by erosion and steepness. It is suitable for woodland, wildlife habitat, and, to a limited extent, for pasture. The operation of machinery is limited by steep slopes. (Capability unit VIIe–1; woodland suitability group 10)

Bibb Series

The Bibb series consists of nearly level, poorly drained soils formed in recent loamy alluvium. These soils are

Figure 7.—Flood damage to a rural road constructed on Falaya and Waverly soils on a flood plain.

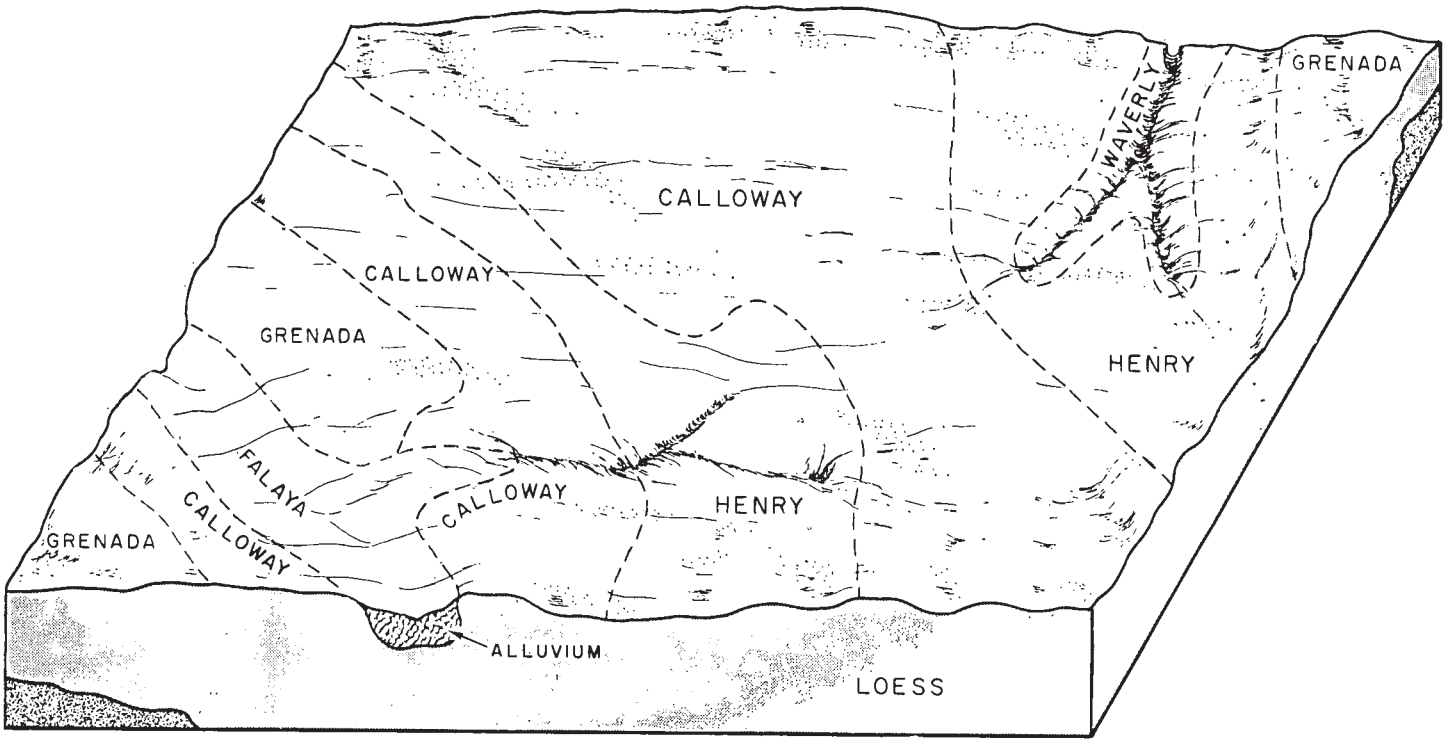

Figure 8.—Typical pattern of soils and underlying material in the Calloway-Henry association.

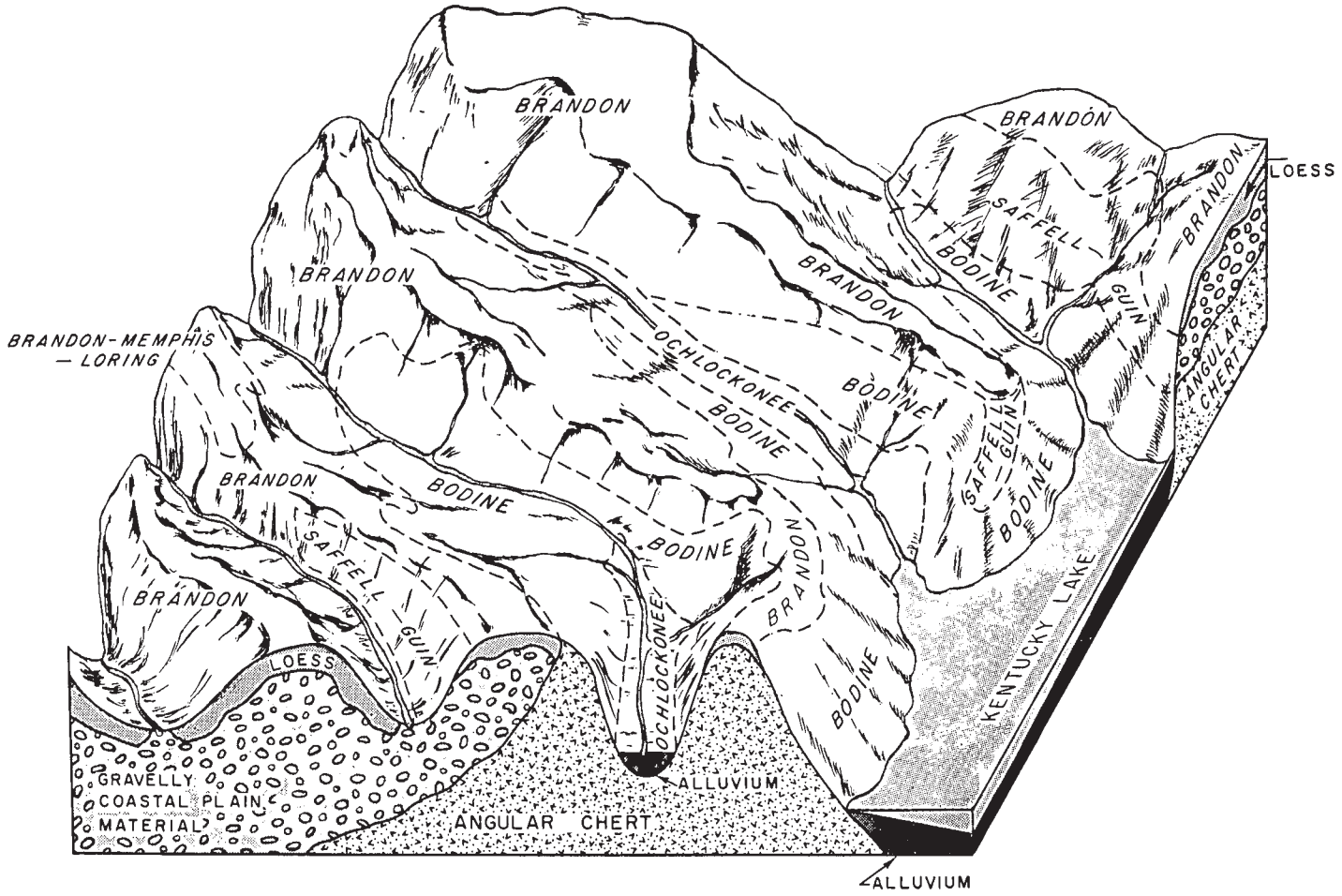

Figure 9.—**Typical pattern of soils and underlying material in the Brandon-Bodine association.**

mostly on bottoms along small creeks in the eastern part of the survey area.

In a representative profile, the surface layer is mainly grayish-brown silt loam, about 8 inches thick. It is mottled with pale brown. The next layer consists of mottled gray silt loam about 8 inches thick, over mottled light-gray loam about 20 inches thick. At a depth below 36 inches, the texture is very gravelly sandy loam. These soils are very strongly acid throughout.

The rooting zone is deep, and the available moisture capacity is high. Use of these soils is limited by flooding, and a water table that is often at or within 6 inches of the surface late in winter and in spring.

Representative profile of Bibb silt loam in Calloway County, a half mile east of Green Plains Church on Whiteoak Creek and 320 feet north of the road:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; very strongly acid; gradual, smooth boundary.

A2g—2 to 8 inches, grayish-brown (10YR 5/2) silt loam; few, fine, distinct mottles of very pale brown (10YR 7/4); moderate, fine, granular structure; very friable; few small pebbles; very strongly acid; clear, wavy boundary.

B21g—8 to 16 inches, gray (10YR 5/1) silt loam; few, fine, distinct, olive-yellow (2.5Y 6/6) mottles; weak, fine, granular structure; friable; few small pebbles; very strongly acid; gradual, wavy boundary.

B22g—16 to 30 inches, light-gray (10YR 6/1) loam; common, fine, distinct, brownish-yellow (10YR 6/6) mottles; weak, fine, granular structure; friable; few small pebbles; very strongly acid; gradual, wavy boundary.

C1g—30 to 36 inches, light-gray (10YR 6/1) loam; common, fine, distinct, brownish-yellow (10YR 6/6) mottles; single grain; friable; few small pebbles; many black concretions; very strongly acid; abrupt, wavy boundary.

IIC2—36 to 50 inches, very gravelly sandy loam; 80 percent gravel; very strongly acid.

The A1 horizon is 3 or 4 in value and 2 or 3 in chroma. The A2 horizon ranges from 10YR to 2.5Y in hue, is 4 or 5 in value, and is 1 or 2 in chroma. Texture of the A horizon ranges from silt loam to loamy sand. The B and C horizons range from 10YR to 5Y in hue, from 5 to 7 in value, and are 1 or 2 in chroma in 60 percent or more of the soil mass. The B21g horizon is silt loam or loam, and the B22g horizon ranges from silt loam to sandy loam. The C horizon ranges from loam to very gravelly sandy loam.

The depth to very gravelly material ranges from 2 to 10 feet. In some places the gravelly layer is cemented. These soils have more silt-sized particles in the upper 2 feet of the profile and more gravel at a depth below 2 feet than the range defined for the series. This does not significantly alter their usefulness and behavior.

The Bibb soils are closely associated with the Ochlockonee, Iuka, Mantachie, Falaya, and Waverly soils. The Bibb soils are more poorly drained than the Ochlockonee, Iuka, Mantachie, and Falaya soils. They have more sand than the Falaya soils and the poorly drained Waverly soils.

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

[Dashed line indicates soil does not occur in the area]

Soil	Calloway County		Marshall County		Entire survey area	
	Area	Extent	Area	Extent	Area	Extent
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Alluvial land			745	0.4	745	0.2
Bibb loamy fine sand, overwash	350	0.1	50	(1)	400	.1
Bibb silt loam	1,425	.6	280	.1	1,705	.4
Bodine cherty silt loam, 12 to 20 percent slopes	195	.1	5	(1)	200	(1)
Bodine cherty silt loam, 20 to 60 percent slopes	3,815	1.6	1,890	1.0	5,695	1.3
Brandon silt loam, 6 to 12 percent slopes	8,205	3.4	1,820	.9	10,025	2.3
Brandon silt loam, 12 to 20 percent slopes	13,510	5.5	20,810	10.8	34,320	7.8
Brandon silt loam, 20 to 30 percent slopes	7,755	3.2	3,775	1.9	11,530	2.6
Brandon silty clay loam, 6 to 12 percent slopes, severely eroded	4,385	1.8	1,905	1.0	6,290	1.4
Brandon silty clay loam, 12 to 20 percent slopes, severely eroded	9,195	3.8	16,565	8.5	25,760	5.9
Brandon-Memphis-Loring silt loams, 2 to 12 percent slopes	3,315	1.4	5,625	2.9	8,940	2.0
Calloway silt loam, 0 to 2 percent slopes	14,060	5.7	5,230	2.7	19,290	4.4
Calloway silt loam, 2 to 6 percent slopes	10,265	4.2	1,975	1.0	12,240	2.8
Calloway silt loam, 2 to 6 percent slopes, eroded	4,175	1.7	270	.1	4,445	1.0
Collins silt loam	9,970	4.0	7,790	4.0	17,760	4.0
Dumps	40	(1)	270	.1	310	.1
Egam silty clay loam			625	.3	625	.1
Falaya silt loam	12,210	5.0	12,440	6.5	24,650	5.7
Forestdale silt loam, high clay variant	40	(1)	1,490	.8	1,530	.3
Grenada silt loam, 0 to 2 percent slopes	15,720	6.4	5,410	2.8	21,130	4.8
Grenada silt loam, 2 to 6 percent slopes	27,515	11.2	20,575	10.7	48,090	10.9
Grenada silt loam, 2 to 6 percent slopes, severely eroded	22,310	9.1	10,370	5.3	32,680	7.4
Grenada silt loam, 6 to 12 percent slopes	740	.3	690	.4	1,430	.3
Grenada silt loam, 6 to 12 percent slopes, severely eroded	85	(1)	580	.3	665	.1
Guin gravelly loam, 2 to 12 percent slopes	80	(1)	450	.2	530	.1
Guin very gravelly soils, 20 to 60 percent slopes	5,475	2.2	1,780	.9	7,255	1.7
Gullied land	890	.4	1,030	.5	1,920	.4
Henry silt loam	4,255	1.7	5,100	2.6	9,355	2.1
Huntington silt loam			515	.3	515	.1
Iuka silt loam	4,665	1.9	2,660	1.4	7,325	1.7
Lax silt loam, 6 to 12 percent slopes	8,015	3.3	3,625	1.9	11,640	2.7
Lax silty clay loam, 6 to 12 percent slopes, severely eroded	8,870	3.6	13,975	7.2	22,845	5.2
Lexington silt loam, 6 to 12 percent slopes	1,045	.4	200	.1	1,245	.3
Lexington silt loam, 12 to 20 percent slopes	1,200	.5	455	.2	1,655	.4
Lexington silty clay loam, 6 to 12 percent slopes, severely eroded	1,020	.4	260	.1	1,280	.3
Lexington silty clay loam, 12 to 20 percent slopes, severely eroded	2,185	.9	695	.4	2,880	.7
Loring silt loam, 2 to 6 percent slopes	5,450	2.2	4,725	2.4	10,175	2.3
Loring silt loam, 2 to 6 percent slopes, eroded	4,565	1.9	2,235	1.2	6,800	1.6
Loring silt loam, 6 to 12 percent slopes, eroded	2,630	1.0	2,820	1.5	5,450	1.2
Mantachie silt loam	2,585	1.1	1,360	.7	3,945	.9
McGary silt loam			140	(1)	140	(1)
Melvin silt loam			450	.2	450	.1
Memphis silt loam, 2 to 6 percent slopes	820	.3	1,290	.7	2,110	.5
Memphis silt loam, 6 to 12 percent slopes, eroded	350	.1	740	.4	1,090	.2
Newark silt loam			300	.2	300	.1
Ochlockonee gravelly loam	1,565	.6	685	.4	2,250	.5
Ochlockonee silt loam	2,495	1.0	3,090	1.6	5,585	1.3
Ruston fine sandy loam, 12 to 20 percent slopes	400	.2	75	(1)	475	.1
Ruston fine sandy loam, 20 to 30 percent slopes	1,090	.4	100	(1)	1,190	.3
Ruston-Lexington complex, 18 to 30 percent slopes	1,090	.4	310	.2	1,400	.3
Saffell-Guin complex, 6 to 12 percent slopes	790	.3	160	(1)	950	.2
Saffell-Guin complex, 12 to 20 percent slopes	1,290	.5	1,630	.8	2,920	.7
Saffell-Guin complex, 20 to 50 percent slopes	5,435	2.2	4,430	2.3	9,865	2.2
Swamp	130	.1	1,190	.6	1,320	.3
Urban land	270	.1	680	.3	950	.2
Vicksburg silt loam	1,605	.7	3,440	1.9	5,045	1.2
Waverly silt loam	4,710	1.9	10,005	5.2	14,715	3.4
Wheeling silt loam, 0 to 2 percent slopes			390	.2	390	.1
Wheeling silt loam, 2 to 6 percent slopes	260	.1	565	.3	825	.2
Wheeling silt loam, 6 to 12 percent slopes	350	.1	280	.1	630	.1
Wheeling silty clay loam, 6 to 12 percent slopes, severely eroded			310	.2	310	.1
Water	900	.4	600	.3	1,500	.3
Total	245,760	100.0	193,920	100.0	439,680	100.0

[1] Less than 0.5 percent.

Bibb loamy fine sand, overwash (0 to 2 percent slopes) (Bb).—This soil is on flood plains. It has a surface layer of dark yellowish-brown, brown, or yellowish-red loamy fine sand overwash that ranges from 6 to 12 inches in thickness.

Included in mapping are some areas where the overwash ranges from 12 to 20 inches in thickness and some areas where the overwash is 20 to 40 percent gravel. Small areas of Waverly silt loam and Bibb silt loam are also included.

Natural fertility and organic-matter content are very low. Permeability is rapid in the overwash layer and moderate in the lower horizons.

This soil is suited only to plants that tolerate wetness. It needs to be drained by tile drains or open ditches. Tillage operations are often delayed in spring by wetness and flooding. (Capability unit IIIw–3; woodland suitability group 2)

Bibb silt loam (0 to 2 percent slopes) (Bc).—This soil is on flood plains. This soil has the profile described as representative for the series.

Included in mapping are small areas of Waverly, Falaya, and Mantachie soils and Bibb loamy fine sand, overwash.

Natural fertility and organic-matter content are low. Permeability is moderate. Tillage operations in spring are often delayed by wetness and overflows.

This soil is suited only to plants that tolerate wetness. Drainage by tile lines or open ditches is needed. (Capability unit IIIw–3; woodland suitability group 2)

Bodine Series

The Bodine series consists of well drained or excessively drained cherty soils developed in residuum from limestone of low purity (fig. 10). They are moderately steep to very steep, upland soils near Kentucky Lake.

In a representative profile, the surface layer is mainly brown cherty silt loam about 5 inches thick. The upper 3 inches of the next layer is light yellowish-brown cherty silt loam. Below this is brownish-yellow very cherty silt loam, about 14 inches thick, that is underlain by mottled, yellowish-red very cherty silty clay loam, which extends to a depth of more than 62 inches.

The Bodine soils are shallow to moderately deep to very cherty material that is unfavorable for root growth. Permeability is rapid, and available moisture capacity is low. The organic-matter content is low, and natural fertility is very low. Reaction is very strongly acid throughout. Slope and high chert content limit the use of these soils. Most of the acreage is forested.

Representative profile of Bodine cherty silt loam, 20 to 60 percent slopes, near the Center Ridge cabin area at the end of blacktop road on a steep slope facing Kentucky Lake:

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) cherty silt loam; moderate, fine, granular structure; very friable; angular chert fragments from 0.1 to 10 inches across; about 40 percent chert on surface; very strongly acid; abrupt, smooth boundary.

A2—1 to 5 inches, brown (10YR 5/3) cherty silt loam; weak, fine, granular structure; very friable; 25 percent chert fragments; very strongly acid; clear, wavy boundary.

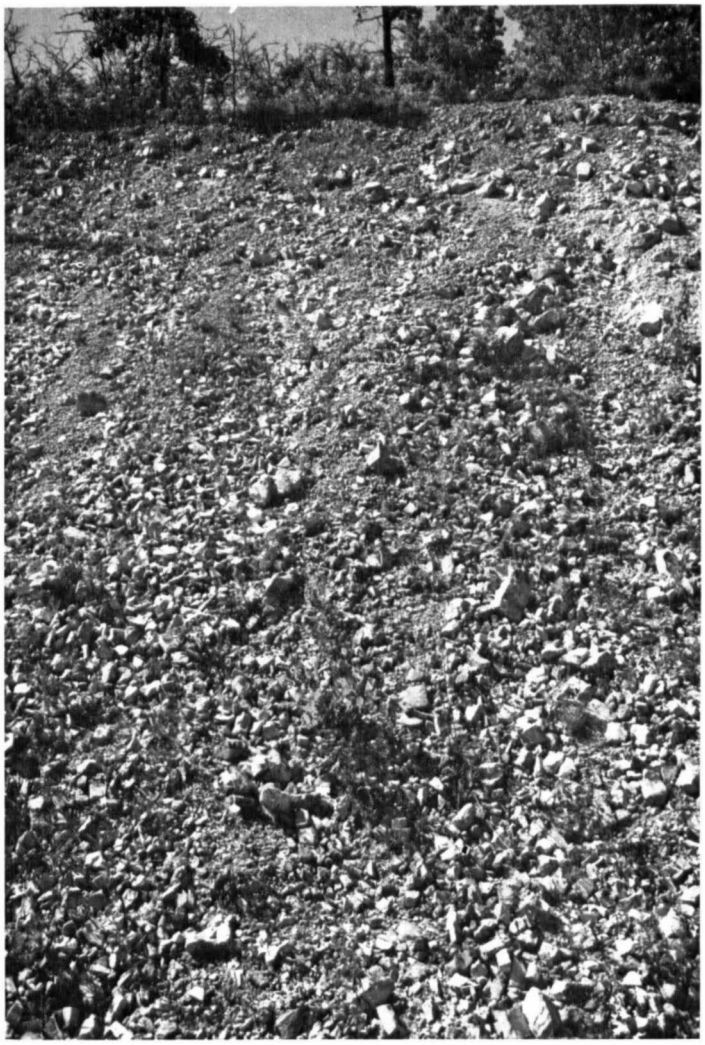

Figure 10.—**Profile of a Bodine cherty silt loam developed in limestone residuum.**

B1—5 to 8 inches, light yellowish-brown (10YR 6/4) cherty silt loam; weak, fine, subangular blocky structure; very friable; 40 percent chert fragments; very strongly acid; clear, wavy boundary.

B21t—8 to 22 inches, brownish-yellow (10YR 6/6) very cherty silt loam; weak, medium, subangular blocky structure; friable; patchy clay films; 65 percent chert fragments; very strongly acid; abrupt, broken boundary.

B22t—22 to 62 inches, yellowish-red (5YR 5/6) very cherty silty clay loam; many, fine, distinct mottles of strong brown (7.5YR 5/8) and white (10YR 8/2); weak, medium, subangular blocky structure; firm, friable; angular chert fragments are more than 75 percent of the soil mass; clay films on surfaces of chert; much of the white color is in streaks; very strongly acid.

The A1 horizon has a value of 4 or 5 and a chroma of 1 or 2. The A2 horizon has a value of 5 or 6 and a chroma of 2 to 4. The A horizon is cherty or very cherty. The B1 horizon ranges from 10YR to 7.5YR in hue, from 5 to 7 in value, and from 4 to 8 in chroma. The B horizon is cherty or very cherty. Color pattern of the B21t and B22t is sometimes so finely variegated that no color is dominant in the mass. The color is 10YR, 7.5YR or 5YR in hue, and it ranges from 5 to 8 in value and from 2 to 8 in chroma. Texture is

very cherty silt loam to very cherty silty clay, the percentage of clay generally increasing as depth increases.

The depth to bedrock is more than 20 feet. Chert content ranges from 20 to 75 percent of the upper part of the profile and 50 to 90 percent of the lower part. The high content of chert is a significant feature of the morphology of this soil and there is generally a gradual increase in clay as depth increases.

The Bodine soils are associated with Brandon and Guin soils. The Bodine soils contain angular chert fragments, but Brandon and Guin soils have rounded pebbles in their profiles. Bodine soils have more coarse fragments than Brandon soils and less sand than Guin soils.

Bodine cherty silt loam, 12 to 20 percent slopes (BoD).—This soil is on the upper part of side slopes.

Included in mapping are small, moderately eroded areas where plowing has mixed subsoil with the surface layer, giving it a more yellowish color and a slightly higher content of clay than was in the original surface layer.

Most of this soil is forested.

Use of this soil is limited mainly by the chert, which affects the depth of the rooting zone and the ease of tillage. It is suitable for use as pasture, woodland, and wildlife habitat. (Capability unit VIs–1; woodland suitability group 7)

Bodine cherty silt loam, 20 to 60 percent slopes (BoF).—This soil is on side slopes near Kentucky Lake. It has the profile described as representative for the series.

Included in mapping are small areas of Brandon soils that are generally on lower slopes and Guin soils that are generally near the tops of slopes.

Most of this soil is forested.

This cherty, steep soil is not suited to cultivated crops. It is poorly suited to pasture and can be grazed only to a limited extent. Unless cover is maintained, the hazard of erosion is very severe. Woodland and wildlife habitat are suitable uses. (Capability unit VIIs–1; woodland suitability group 7)

Brandon Series

The Brandon series consists of sloping to steep, well-drained soils. They developed in 2 to 4 feet of loess over gravelly Coastal Plain deposits.

In a representative profile, the surface layer is brown silt loam about 5 inches thick. The next layer consists of brown heavy silt loam about 4 inches thick, underlain by yellowish-red light silty clay loam about 18 inches thick. At a depth below 27 inches, the soil material is 80 to 90 percent gravel.

Unlimed, reaction is strongly acid or very strongly acid throughout the Brandon soils. The subsoil is moderately permeable. Permeability of the gravelly material is generally rapid, but ranges to slow where the Coastal Plain deposits are compacted or cemented. Available moisture capacity is moderate.

Representative profile of Brandon silt loam, 12 to 20 percent slopes, in northeastern Calloway County, one-third mile south of Liberty Church:

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; few, fine, faint, brown (7.5YR 4/4) mottles; moderate, fine, granular structure; very friable; slightly acid; clear, wavy boundary.

B1t—5 to 9 inches, brown (7.5YR 4/4) heavy silt loam; weak, fine, granular and subangular blocky structure; friable; few thin clay films; strongly acid; clear, wavy boundary.

B2t—9 to 27 inches, yellowish-red (5YR 4/6) light silty clay loam; moderate, medium, subangular blocky structure; friable; many thin clay films; 1 percent small gravel; strongly acid; clear, wavy boundary.

IIC—27 to 50 inches, gravel bed, 80 to 90 percent gravel, strong-brown (7.5YR 5/6) loam interstitial materials; very strongly acid.

The Ap horizon is brown (10YR 5/3) in some profiles. In forested areas that have never been cleared, the A horizon consists of A1 and A2 horizons. The A1 horizon which is less than 2 inches thick, is 10YR in hue, 2 to 4 in value, and 1 or 2 in chroma. The A2 horizon is 10YR in hue, 4 or 5 in value, and 2 or 3 in chroma. The B1t horizon has a hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. The texture ranges from silt loam to silty clay loam, and some profiles lack clay films. The color of the B2t horizon is 7.5YR or 5YR in hue, 4 or 5 in value, and 4 to 6 in chroma. Pale-brown or gray mottles are in the lower 4 to 8 inches in some profiles. The texture is silty clay loam, except that in some places the lower part is heavy silt loam. The thickness of the solum (loess mantle) ranges from 24 to 48 inches.

The IIC horizon ranges in color from red to yellow, and the volume of gravel ranges from 20 to 90 percent. The gravel is largely chert, but some is quartz, and there are cemented layers in some places. Loamy, sandy, or clayey stratum is at depths ranging from 4 to 10 feet.

The Brandon soils are associated with Loring, Memphis, Guin, and Bodine soils. Brandon soils are shallower to gravelly material than Loring and Memphis soils, and they lack the fragipan of the Loring soils. They contain fewer coarse fragments in the A and B horizons than the Guin and Bodine soils.

Brandon silt loam, 6 to 12 percent slopes (BrC).—This soil is on narrow ridgetops, mostly in the eastern part of the survey area. It has a profile similar to the one described as representative for the series, but in wooded areas the combined A1 and A2 horizon is generally about 4 inches thicker.

Included in mapping are small areas that have a gravelly surface layer and subsoil. Near Kentucky Lake there are included areas where very cherty residuum underlies the loess. The chert is angular, whereas rounded gravelly material commonly underlies the Brandon soils.

The moderately deep rooting zone over very gravelly material is unfavorable for root growth. Natural fertility is moderate, and organic-matter content is low.

About half of this soil is forested. Some open areas are idle and some are used for cultivated crops, permanent or rotation pasture, or for meadow.

This soil is suited to most crops common in the survey area. If cultivated crops are grown, the erosion hazard is severe. (Capability unit IIIe–1; woodland suitability group 5)

Brandon silt loam, 12 to 20 percent slopes (BrD).—This soil is on side slopes in the deeply dissected sections. It is the dominant soil in these areas and one of the most extensive soils in the survey area. This soil is the one described as representative for the series. In some forested areas the combined A1 and A2 horizon is about 4 inches thicker than the Ap horizon of the representative profile.

Included in mapping are small areas of Memphis, Loring, and Lexington silt loams, and soils of the Saffell and Guin series. Also included are small areas of Ruston fine sandy loam, and along the natural drainageways are small areas of soils formed in alluvium. Near Kentucky Lake are included areas where very cherty residuum underlies the loess.

This soil is moderately deep over very gravelly material that is unfavorable for root penetration. Natural fertility and organic-matter content are low.

About half this soil has been cleared and used for cultivated crops, but most of the rest is used for permanent pasture or is idle. Some of the formerly cleared areas have reverted to forest.

This soil is not suited to cultivated crops because of the hazard of erosion. It is better suited to pasture, woodland, or wildlife habitat. Most grasses and legumes can be grown. (Capability unit VIe–1; woodland suitability group 8)

Brandon silt loam, 20 to 30 percent slopes (BrE).—This soil is on side slopes in areas deeply dissected by many natural drainageways. It is on all slope aspects, except in the eastern part of the survey area, where most of the acreage is on slopes facing north and east. In most areas the combined A1 and A2 horizon is about four inches thicker than the Ap horizon of the representative profile.

Included in mapping are small areas of soils that are moderately eroded and soils that have 12 to 20 percent slopes. Also included are small areas of Saffell, Guin, and Ruston soils and soils formed in alluvium. Near Kentucky Lake are included areas that have very cherty residuum underlying the loess.

The moderately deep rooting zone over very gravelly material is unfavorable for root penetration. The organic-matter content and natural fertility are low.

Most of this soil has never been cleared. Improper cutting practices and poor management have resulted in a somewhat poor quality of hardwood trees on much of this soil.

Use of this soil is very severely limited by steep slopes and the hazard of further erosion. It is suitable for woodland, for wildlife habitat, and, to a limited extent, for pasture. The operation of machinery is limited by steepness. (Capability unit VIIe–1; woodland suitability group 8)

Brandon silty clay loam, 6 to 12 percent slopes, severely eroded (BsC3).—This soil is on side slopes near the heads of natural drainageways in highly dissected areas. The plow layer, consisting mostly of subsoil, is heavier in texture and redder in color than that in the profile described as representative for the series. Rills and gullies are common.

Included in mapping are small areas that have rounded pebbles in the surface layer and subsoil, small areas of Lax soils, and, along natural drainageways, small areas of soils formed in alluvium. Also included are areas near Kentucky Lake where the subsoil is underlain by a very cherty residuum.

This soil is moderately deep to shallow over very gravelly material that is unfavorable for root penetration. The natural fertility and organic-matter content are very low. The soil needs to be worked within a narrow range of soil moisture to prevent clodding. Surface crusting causes poor germination of seeds and poor survival of seedlings, especially those planted in spring.

Most of this soil was once cleared and used for cultivated crops, but it is now idle or has reverted to trees. Some areas are used for pasture or meadow.

This soil is suited to the crops commonly grown in the two counties, but cultivated crops should be grown only occasionally because the hazard of erosion is very severe. Better uses are pasture and meadow. (Capability unit IVe–1; woodland suitability group 6)

Brandon silty clay loam, 12 to 20 percent slopes, severely eroded (BsD3).—This soil is on side slopes in the highly dissected areas. It is one of the most extensive soils in the survey area. The plow layer, mostly made up of subsoil, contains more clay and is redder in color than that in the profile described as representative for the series. Rills and gullies are common.

Included in mapping are less eroded areas, severely eroded areas on 20 to 30 percent slopes, and areas of Saffell and Guin soils. Also included are small areas of Memphis, Loring, Lexington, and Ruston soils, and some soils that formed in alluvium. Near Kentucky Lake, at elevations below 480 feet, are areas where very cherty residuum underlies the loess.

This soil is moderately deep to shallow over very gravelly material that is unfavorable for root growth. The natural fertility and organic-matter content are very low. The soil needs to be worked within a narrow range of soil moisture to prevent clodding. Surface crusting causes poor germination of seeds and poor survival of seedlings, especially those planted in spring.

Most of the acreage was formerly cleared and used for cultivated crops, but it is now idle or has reverted to forest. Some areas are used for permanent pasture or meadow.

This soil is very severely limited by the hazard of erosion. It is suitable for woodland, for wildlife habitat, and, to a limited extent, for pasture. The operation of machinery is limited by slope and by gullies. (Capability unit VIIe–2; woodland suitability group 6)

Brandon-Memphis-Loring silt loams, 2 to 12 percent slopes (BtC).—This complex of three soils is on narrow ridgetops in some of the areas highly dissected by natural drainageways. These soils have a silty surface layer and subsoil. They formed in loess over very gravelly Coastal Plain materials. The three named soils each have a profile similar to that described as representative for the respective series. They are associated in the landscape in so intricate a pattern that it is not practical to separate them in mapping.

The ridgetops are 100 to 300 feet in width. The Memphis and Loring soils are in the middle third of the ridgetop where the slope ranges from 2 to 6 percent. The Brandon soils are on each side of the Memphis soils, where the slope ranges from 6 to 12 percent. The Loring soils are near the heads of small branches as well as near the center of the wider ridgetops. Brandon soils make up about 50 percent of this unit; Memphis soils, about 30 percent; and the Loring soils, about 20 percent.

This complex includes both slightly eroded and moderately eroded soils. Some areas have never been cleared of forests and have a thicker surface layer than that in the representative profile.

These soils have a moderately deep to deep rooting zone. The organic-matter content is low.

Many areas have both cleared and forested parts within the same delineation. The cleared parts are used for cultivated crops, pasture, and meadow. There are many homesteads and gardens.

The soils in this complex are suited to most of the commonly grown crops. If cultivated crops are grown,

the hazard of erosion is severe. (Capability unit IIIe–1; woodland suitability group 5)

Calloway Series

The Calloway series consists of nearly level and gently sloping, somewhat poorly drained soils that have a fragipan. They developed in more than 4 feet of loess on uplands and stream terraces.

In a representative profile, the surface layer is dark grayish-brown silt loam about 8 inches thick. Below the surface layer is mottled, brownish-yellow silt loam about 10 inches thick. At a depth of about 18 inches, is a fragipan consisting of a slightly compact, mottled, light brownish-gray silt loam layer about 8 inches thick, underlain by a compact, mottled, light-gray silty clay loam and silt loam layer that extends to a depth of more than 50 inches.

The Calloway soils are moderately permeable above the fragipan, but permeability in the fragipan is slow. The fragipan hinders the penetration of roots as well as water, and causes a seasonal perched water table that is within 6 to 18 inches of the surface late in winter and early in spring. Reaction is strongly acid or very strongly acid throughout, and the available moisture capacity is moderate.

Representative profile of Calloway silt loam, 0 to 2 percent slopes, 2 miles northwest of South Pleasant Grove Church and 200 yards east of Taylors Store, in the southern part of Calloway County:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; few, small, dark-brown concretions; strongly acid; clear, wavy boundary.

B21—8 to 13 inches, brownish-yellow (10YR 6/6) silt loam; few, fine, faint, very pale brown (10YR 7/3) mottles; weak, medium, subangular blocky structure; friable, few, fine, black and brown concretions; very strongly acid; clear, wavy boundary.

B22—13 to 18 inches, brownish-yellow (10YR 6/6) silt loam; many, medium, distinct, light brownish-gray (10YR 6/2) and very pale brown (10YR 7/3) mottles; weak, medium, subangular blocky structure; friable; few, fine, black and brown concretions; very strongly acid; clear, wavy boundary.

A'2x—18 to 26 inches, mottled, light brownish-gray (10YR 6/2) and brownish-yellow (10YR 6/6) silt loam; weak, medium, subangular blocky structure; friable; slightly compact and brittle; many, fine, black and brown concretions; very strongly acid; clear, wavy boundary.

B'x1—26 to 38 inches, light-gray (10YR 6/1) silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure that breaks to moderate, medium, subangular blocky; few thin clay films; firm, compact and brittle; common, fine, black and brown concretions; very strongly acid; diffuse, irregular boundary.

B'x2—38 to 50 inches, light-gray (10YR 6/1) heavy silt loam; many, coarse, prominent, yellowish-brown (10YR 5/8) mottles; weak, coarse, prismatic structure that breaks to weak, medium, subangular blocky; firm, compact and brittle; patchy clay films; strongly acid.

Color of the Ap horizon has a value ranging from 3 to 5 and a chroma ranging from 2 to 4. The B2 horizon ranges from 10YR to 2.5Y in hue, from 4 to 6 in value, and from 2 to 6 in chroma. The A'2x horizon ranges from 10YR to 2.5Y in hue, from 5 to 7 in value, and from 1 to 3 in chroma. The A'2x horizon is nearly continuous horizontally. The B'x horizon ranges from 10YR to 2.5Y in hue, from 5 to 7 in value, and from 1 to 6 in chroma. The dominant color has a chroma of 1 or 2 and mottles of brown and yellow. The depth to the A'2x horizon ranges from 13 to 25 inches.

The Calloway soils are very closely associated with the Grenada and Henry soils. They are more poorly drained than the moderately well drained Grenada soils and are better drained than the poorly drained Henry soils.

Calloway silt loam, 0 to 2 percent slopes (CaA).—This soil occurs on uplands and on terraces near the larger streams. Slopes are slightly concave. This soil has the profile described as representative for the series.

Included in mapping are areas where the subsoil is gray immediately below a dark grayish-brown surface layer that is 9 to 12 inches thick. Also included are small areas of Grenada and Henry soils on uplands. Areas on stream terraces that have loamy or gravelly material about 33 inches below the surface are included.

This soil is shallow to moderately deep to a fragipan which hinders root penetration. The organic-matter content and natural fertility are low. A seasonal high water table delays spring planting in some years.

This soil is suited to crops that tolerate wetness or that have a short growing season. It is unsuited to burley tobacco and alfalfa because of the limited depth of the rooting zone and the seasonal high water table.

Drainage through open ditches lengthens the time during which field operations are possible and permits a larger selection of plants. The fragipan hinders tile drainage. (Capability unit IIIw–1; woodland suitability group 3)

Calloway silt loam, 2 to 6 percent slopes (CaB).—This soil is on uplands, at the heads of natural drainageways, and on stream terraces near the larger streams. Much of it has slopes of 2 to 3 percent. The surface layer is about 2 inches thinner than that described in the representative profile for the series.

Included in mapping are small areas of Grenada soils and soils along drainageways that formed in recent alluvium. On the stream terraces, soils that have loamy or gravelly material about 33 inches below the surface are included.

This soil is shallow to moderately deep to the fragipan which hinders root penetration. Organic-matter content and natural fertility are low. A seasonal high water table delays spring planting in some years.

In addition to wetness, a moderate hazard of erosion limits the use of this soil for cultivated crops. It is better suited to crops that tolerate wetness or have a short growing season.

Drainage through open ditches lengthens the time during which field operations are possible and permits a larger selection of plants. The fragipan hinders tile drainage. (Capability unit IIIw–2; woodland suitability group 3)

Calloway silt loam, 2 to 6 percent slopes, eroded (CaB2).—This soil is on uplands near the heads of natural drainageways and near the larger streams. Much of it has slopes of 2 to 4 percent. It differs from the soil described as having the representative profile in that erosion has removed about 4 inches of the original surface layer, and the plow layer is a mixture of original surface soil and subsoil. Also, the fragipan is about 4 inches closer to the surface.

Included in mapping are small areas that are only slightly eroded, small areas of eroded Grenada soils, and, along natural drainageways, soils that formed in alluvium. Included are soils, on stream terraces, that have loamy or gravelly material about 33 inches below the surface.

This soil is shallow to a fragipan which hinders root movement. Organic-matter content and natural fertility are low. A seasonal high water table delays planting in some spring seasons.

In addition to wetness, a moderate hazard of erosion limits the use of this soil for cultivated crops. The soil is suited to crops that will tolerate wetness or have a short growing season.

Drainage through open ditches lengthens the time during which field operations are possible and permits a broader selection of plants. The fragipan hinders tile drainage. (Capability unit IIIw–2; woodland suitability group 3)

Collins Series

The Collins series consists of nearly level, moderately well drained soils on flood plains. These soils formed in alluvium washed from soils that formed in loess.

In a representative profile, the surface layer is brown silt loam about 7 inches thick. The underlying material consists of mottled, dark grayish-brown silt about 6 inches thick over mottled, dark yellowish-brown silt loam about 10 inches thick and mottled brown and light brownish-gray silt loam about 10 inches thick. At a depth below 33 inches is mottled, light-gray silt loam.

The Collins soils have a deep rooting zone, high available moisture capacity, and moderate permeability. Natural fertility is moderate, and the organic-matter content is low. Soil reaction is strongly acid or very strongly acid throughout. The water table is 18 to 24 inches below the surface in wet seasons.

Representative profile of Collins silt loam, 2.25 miles northwest of Van Cleve on the flood plain of East Fork of the Clarks River, 0.75 mile north of bridge over the river, and 220 yards west of power line:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

C1—7 to 13 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, distinct, pale-brown (10YR 6/3) mottles; weak, fine, granular structure; very friable; few, small, dark concretions; strongly acid; clear, wavy boundary.

C2—13 to 23 inches, dark yellowish-brown (10YR 4/4) silt loam; few, fine, faint, light yellowish-brown (10YR 6/4) mottles; weak, fine, granular structure; very friable; few dark-brown stains; very strongly acid; clear, wavy boundary.

C3g—23 to 33 inches, mottled, brown (10YR 4/3) and light brownish-gray (10YR 6/2) silt loam; massive; very friable; few, small, black concretions; very strongly acid; clear, wavy boundary.

C4g—33 to 50 inches, light-gray (10YR 7/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) mottles; massive; friable; very strongly acid.

The Ap horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 2 to 4. The C1 and C2 horizons are generally 10YR in hue but range to 7.5YR, and they are 3 to 5 in value and 3 or 4 in chroma. Pale-brown (10YR 6/3) mottles are lacking in the C1 horizon of many profiles, and in some places a few light brownish-gray (10YR 6/2) mottles are in the lower part of the C2 horizon. Gray mottles are in 20 to 50 percent of the C3g horizon. Sandy loam layers, 1 to 4 inches thick, occur in some profiles.

Collins soils are associated with the Falaya, Waverly, Vicksburg, Ochlockonee, Iuka, and Mantachie soils. They are better drained than the Falaya and Waverly soils and are not so well drained as the Vicksburg soils. They are less sandy and gravelly in the upper 3 feet of the profile than the Ochlockonee, Iuka, and Mantachie soils.

Collins silt loam (0 to 2 percent slopes) (Co).—This soil is on flood plains of the rivers and larger creeks. It generally is near the stream channels, but in some areas that have small and intermediate size streams, it occupies the entire flood plain.

Included in mapping are small areas of Vicksburg, Falaya, Ochlockonee, and Iuka soils. Also included are small areas where the B horizon is weakly developed and blocky in structure, and some areas that are slightly compact below a depth of 30 inches.

Some areas are subject of flooding, but seldom during the growing season. Deep rooted crops, such as alfalfa, generally benefit from artificial drainage that lowers the seasonal water table.

Most of the acreage of this soil is cleared and used for cultivated crops. Some areas are used for rotation pasture and meadow, and a small acreage is forested.

This soil is suited to most of the crops commonly grown and it is easy to till. Tile drainage is unnecessary for most crops, but it lengthens the time during which field operations are possible. (Capability unit I–1; woodland suitability group 1)

Dumps

Dumps (Du) is a miscellaneous land type that consists of areas, usually several acres in size, where raw material to be used in manufacturing or by-products or wastes from manufacturing are piled. The piles range from 1 foot to more than 20 feet in height. They are near Calvert City in the huge industrial complex near the Tennessee River.

A limestone quarry in the southeastern part of Calloway County is included in this mapping unit. It is about 40 acres in size. (Woodland suitability group 10; not placed in a capability unit)

Egam Series

The Egam series consists of moderately well drained, fine-textured soils that formed in alluvium deposited in still water. They are on nearly level flood plains.

In a representative profile, the surface layer is dark-brown silty clay loam about 27 inches thick. The next layer is very dark grayish-brown silty clay about 13 inches thick. Below this is faintly mottled, dark-brown silty clay about 32 inches thick. At a depth below 72 inches, the underlying material is dark-brown clay loam.

The Egam soils have a neutral to medium acid reaction throughout. The rooting zone is deep, natural fertility is high, and the organic-matter content is medium. Permeability is moderately slow, and the available moisture capacity is high. These soils are seldom flooded during the growing season.

Representative profile of Egam silty clay loam, 2 miles northwest of Gilbertsville near Clear Pond, and 100 yards south of the Tennessee River:

Ap—0 to 7 inches, dark-brown (10YR 3/3) heavy silty clay loam; many, medium, faint, very dark grayish-brown (10YR 3/2) mottles; weak, fine, granular structure; firm; few iron concretions; slightly acid; gradual, wavy boundary.

A1—7 to 27 inches, dark-brown (10YR 3/3) heavy silty clay loam; weak, fine, granular structure and moderate, medium, prismatic structure; some peds have glossy faces; some mica and quartz are visible; slightly acid; clear, wavy boundary.

B21—27 to 40 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate, medium, prismatic structure; very firm; some peds have glossy faces; some mica and quartz are visible; slightly acid; gradual, wavy boundary.

B22—40 to 72 inches, dark-brown (10YR 3/3) silty clay; common, fine, faint mottles of dark grayish brown (10YR 4/2); weak, fine, prismatic structure; very firm; few dark-brown concretions; mica and quartz grains visible; slightly acid; clear, wavy boundary.

IIC—72 to 110 inches, dark-brown (10YR 3/3) clay loam; massive; firm; mica and quartz grains are abundant; slightly acid.

The Ap horizon is 6 to 10 inches thick. It ranges from dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2). The B horizon has hues of 10YR and 7.5YR, values of 2 to 4, and chromas of 2 to 4. The texture is generally silty clay, but ranges from heavy silt loam to clay. The reaction ranges from neutral to medium acid throughout. The C horizon has values of 2 to 6 and chromas of 2 to 4. Gray mottles are generally at a depth of 3 to 4 feet.

Egam soils are closely associated with Huntington, Newark, and Melvin soils on the Tennessee River flood plain. They have a finer texture than the Huntington, Newark, and Melvin soils. They are less well drained than Huntington soils, but are better drained than the somewhat poorly drained Newark soils and the poorly drained Melvin soils.

Egam silty clay loam (0 to 3 percent slopes) (Eg).—This soil occupies long, somewhat narrow areas on flood plains.

Included in mapping are some areas that have a lighter colored surface layer, clay films in the subsoil, and a strongly acid to extremely acid reaction. Also included are a few small areas of Newark and Melvin soils.

This soil has a clayey surface that should be tilled within a narrow range of soil moisture to prevent formation of clods and plowpans.

Most of the acreage is cleared but part of this is idle because it is near the industrial area of Calvert City. Cultivated crops, meadow, and pasture are grown on some of these soils. (Capability unit IIs–2; woodland suitability group 1)

Falaya Series

The Falaya series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in alluvium washed from loess.

In a representative profile, the surface layer is faintly mottled, dark grayish-brown silt loam about 8 inches thick. The next layer is faintly mottled, brown silt loam about 9 inches thick. At a depth below about 17 inches, is mottled, light brownish-gray silt loam about 13 inches thick overlying mottled, light-gray silt loam that extends to a depth of more than 50 inches.

These soils have a high available moisture capacity, deep rooting zone, moderate permeability, moderate natural fertility, and low organic-matter content. Reaction is strongly acid or very strongly acid throughout. A seasonal high water table, 6 to 18 inches below the surface, often delays cultivation in spring and limits the variety of crops that are suitable.

Representative profile of Falaya silt loam, 2 miles northeast of Murray, 300 feet east of the railroad tracks, and 1 mile east of Scotts Grove Church:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint, light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

B21—8 to 17 inches, brown (10YR 5/3) silt loam; common, medium, faint, pale-brown (10YR 6/3) and light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; very friable; very strongly acid; gradual, wavy boundary.

B22g—17 to 24 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, faint, grayish-brown (2.5Y 5/2) mottles; weak, fine, granular structure; very friable; few dark-brown concretions; very strongly acid; gradual, wavy boundary.

B23g—24 to 30 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, distinct, brown (10YR 5/3) mottles; weak, fine, granular structure; very friable; few, dark-brown stains and concretions; very strongly acid; gradual, wavy boundary.

B24g—30 to 50 inches light-gray (10YR 7/1) silt loam; few, medium, prominent, brownish-yellow (10YR 6/6) mottles and common, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; friable; many small black concretions; very strongly acid.

The color of the Ap horizon is 4 or 5 in value and ranges from 2 to 4 in chroma. The B21 horizon ranges from 10YR to 2.5Y in hue, from 4 to 5 in value, and from 2 to 6 in chroma. Gray mottles are few to common. The lower part of the B horizon is gray or light brownish gray mottled with shades of brown or yellow.

Falaya soils are closely associated with Collins, Vicksburg, Iuka, Mantachie, Waverly, and Bibb soils. They are more poorly drained than the Collins, Vicksburg, and Iuka soils, but they are better drained than the Waverly and Bibb soils. The Falaya soils are similar in drainage to Mantachie soils, but they contain less sand in the layers within 36 inches of the surface.

Falaya silt loam (0 to 2 percent slopes) (Fa).—This soil occupies large areas on flood plains. Included in mapping are small areas of Collins, Waverly, Mantachie, Iuka, and Bibb soils. Also included are small areas where 1 to 3 inches of loamy, sandy, or gravelly overwash is on the surface. Some profiles have compact layers below a depth of 3 feet. Spring floods on many of the larger streams and wetness delay planting in most years.

Most of the acreage is cleared and used for continuous cultivated crops. Some areas are used for meadow and rotation pasture, and a small acreage is wooded.

This soil is suited to crops that tolerate moderate wetness, but a wider selection of crops is possible if tile lines are installed. (Capability unit IIw–2; woodland suitability group 2)

Forestdale Series, High Clay Variant

The Forestdale series, high clay variant, consists of nearly level, poorly drained soils that receive little deposition. These soils developed in 12 to 18 inches of loess and the underlying clayey alluvium. They are in an area believed to be an ancient lakebed.

In a representative profile, the surface layer is mainly dark grayish-brown silt loam about 8 inches thick. The next layer is gray light silty clay loam about 7 inches thick, overlying about 21 inches of gray silty clay that has yellowish-brown mottles. At a depth below 36 inches, the underlying material is mottled, gray silty clay.

The seasonal water table is within 6 inches of the surface in winter and spring. Permeability is slow because of the high clay content of the subsoil. The available moisture capacity is moderate because the clay holds much of the moisture in a form not available to plants. The natural fertility and organic-matter content are low. Unlimed, these soils are very strongly acid in the surface layer and subsoil.

Representative profile of Forestdale silt loam, high clay variant, one-fourth mile north of the railroad at Elva:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; medium acid; abrupt, wavy boundary.

A2g—8 to 10 inches, light-gray (10YR 6/1) silt loam; common, medium, distinct, dark grayish-brown (10YR 4/2) mottles and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, granular structure; friable; few hard concretions; very strongly acid; clear, wavy boundary.

B1g—10 to 15 inches, gray (5Y 6/1) light silty clay loam; moderate, medium, angular blocky structure; friable; few hard concretions; very strongly acid; abrupt, wavy boundary.

B2tg—15 to 36 inches, gray (5Y 6/1) silty clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, angular blocky structure; few thin clay films; few concretions; very strongly acid; gradual, wavy boundary.

Cg—36 to 75 inches, mottled, gray (5Y 6/1), yellowish-brown (10YR 5/6), and very dark grayish-brown (2.5Y 3/2) silty clay; massive; very firm; small pockets of quartz crystal; very strongly acid.

The Ap horizon color is light brownish-gray (10YR 6/2) in some profiles, and the reaction is strongly acid or very strongly acid unlimed. The dominant color of the Bt horizon ranges from 10YR to 5Y in hue, from 5 to 8 in value, and from 0 to 2 in chroma. The texture of the B1g horizon ranges from silty clay loam to silt loam. The B2tg horizon has weak, medium, prismatic structure in some profiles, and it ranges in texture from silty clay to clay. The Cg horizon ranges from very strongly acid to mildly alkaline and from silty clay to clay.

The Forestdale, high clay variant soils are closely associated with McGary, Waverly, and Henry soils. They are more poorly drained than McGary soils, and the B horizon has a finer texture than that of the Waverly and Henry soils. Forestdale, high clay variant soils also lack the fragipan of Henry soils.

Forestdale silt loam, high clay variant (0 to 2 percent slopes) (Fo).—This soil is on large areas on stream terraces.

Included in mapping are small areas of Henry silt loam and soils that have a clay or silty clay layer as much as 24 inches from the surface.

Most of this soil is forested, but some of it is used to grow corn, soybeans, meadow, and pasture.

This soil is poorly suited to any but water-tolerant crops. Bedding makes it possible to grow some other crops. Tile drains generally are not feasible, because of the high clay content of the subsoil, but open ditches can be used to remove surface water and improve drainage. (Capability unit IVw–1; woodland suitability group 4)

Grenada Series

The Grenada series consists of nearly level to sloping, moderately well drained soils that have a fragipan (fig. 11). These soils developed in more than 4 feet of loess on uplands and in alluvium washed from loess on stream terraces.

In a representative profile, the surface layer is brown silt loam about 7 inches thick. The next layer, to a depth of 22 inches, is brown and yellowish-brown silt loam that is faintly mottled with pale brown in the lower part. Below this is a fragipan consisting of a slightly compact, mottled, yellowish-brown silt loam layer about 4 inches thick. This is underlain by mottled, light yellowish-brown, compact silty clay loam to a depth of 48 inches and mottled, yellowish-brown, slightly compact silt loam to a depth of 60 inches.

The Grenada soils are moderately permeable in the layers above the fragipan and slowly permeable in the fragipan. The fragipan hinders the growth of roots and causes a seasonal high water table to form within 18 to 24 inches of the surface late in winter and early in spring. These soils are strongly acid or very strongly acid throughout, and they have a moderate available moisture capacity.

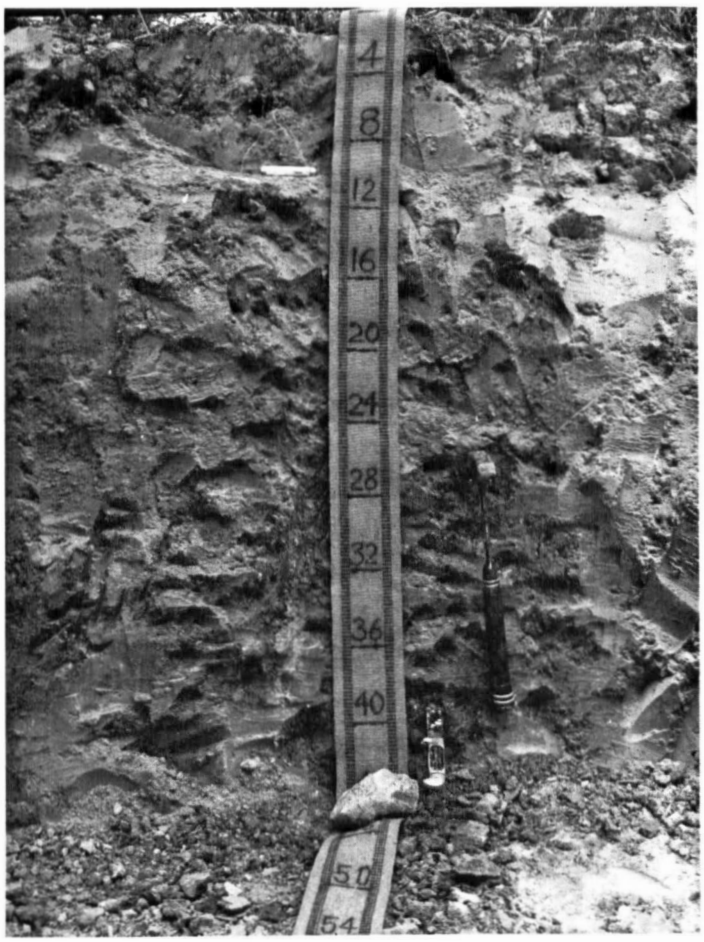

Figure 11.—**Profile of a Grenada silt loam. The surface layer is about 10 inches thick.**

Representative profile of Grenada silt loam, 2 to 6 percent slopes, one-fourth mile west of Van Cleve in Calloway County:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

B1—7 to 10 inches, brown (7.5YR 4/4) silt loam; common, medium, faint, brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B21—10 to 16 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, medium, angular blocky structure; friable; very strongly acid; clear, wavy boundary.

B22—16 to 22 inches, yellowish-brown (10YR 5/6) heavy silt loam, common, fine, faint, pale-brown (10YR 6/3) mottles; moderate, medium, angular blocky structure; friable; very strongly acid; clear, wavy boundary.

A'2x—22 to 26 inches, yellowish-brown (10YR 5/4) silt loam; many, coarse, prominent, light-gray (10YR 7/2) mottles; moderate, medium, angular blocky structure; friable, slightly compact and brittle; silt coatings of light gray (10YR 7/2) on peds; very strongly acid; clear, wavy boundary.

B'x1—26 to 48 inches, mottled, light yellowish-brown (10YR 6/4), grayish-brown (10YR 5/2), light brownish-gray (10YR 6/2), and gray (5Y 5/1) silty clay loam; moderate, coarse, prismatic structure that parts to moderate, medium, angular blocky structure; firm, compact and brittle; clay films and silt coatings on most peds; very strongly acid; diffuse, irregular boundary.

B'x2—48 to 60 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct, yellowish-brown (10YR 5/8) and light brownish-gray (10YR 6/2) mottles; weak, coarse, prismatic structure that parts to weak, moderate, subangular blocky structure; friable, slightly compact and brittle; vertical streaks of light gray in channels; few dark iron stains; strongly acid.

The A horizon is 10YR in hue, 4 or 5 in value, and ranges from 2 to 4 in chroma. Where the B1 horizon occurs, it has a color of 7.5YR 4/4 or 10YR 4/4. The B2 horizon is 10YR in hue, 4 or 5 in value, and ranges from 4 to 6 in chroma. Texture of the B2 horizon is silty clay loam in some profiles. The color of the A'2x horizon has a hue of 10YR to 2.5Y, a value of 5 to 7, and a chroma of 1 to 6. Texture of the A'2x horizon ranges from silt loam to silt. It is nearly continuous, but in some profiles it is a mixture of A'2 and B horizons. The color of the B'x1 horizon ranges from 10YR to 5Y in hue, from 4 to 6 in value, and from 2 to 6 in chroma. Texture ranges from silty clay loam to heavy silt loam. The lower boundary of the B'x1 horizon (main fragipan horizon) is gradual or diffuse and wavy or irregular. In some profiles the B'x2 horizon is lacking and a C horizon underlies the B'x1 horizon. The depth to the fragipan ranges from 20 to 26 inches in slightly eroded phases and is as shallow as 14 inches in severely eroded phases.

Grenada soils are closely associated with Loring, Calloway, and Henry soils. They are similar in drainage to the Loring soils, but the fragipan in Grenada soils is closer to the surface, and the Loring soils have a uniform texture throughout the solum. The Grenada soils are better drained than the somewhat poorly drained Calloway soils and the poorly drained Henry soils.

Grenada silt loam, 0 to 2 percent slopes (GrA).—This soil occupies broad areas on uplands and small areas on stream terraces.

The surface layer of this soil is generally about two inches thicker than that described in the representative profile for the series, and the thin brown layer in the upper part of the subsoil is lacking. Also, the fragipan horizon is about two inches closer to the surface.

Included in mapping are small areas of Calloway and Grenada soils on slopes of more than 2 percent. Also included are areas on stream terraces where loamy or gravelly alluvium is about 33 inches below the surface.

This soil is easy to till. It has a moderately deep rooting zone, moderate natural fertility, and low organic-matter content. The hazard of erosion is none to slight. The main limitation to farming is a seasonal high water table.

Most of the acreage is cleared and used for cultivated crops, rotation pasture, and meadow. A small acreage is wooded. Most of the small woodland areas are grazed and are gradually being cleared.

This soil is suited to most of the commonly grown crops. Alfalfa stands are likely to become sparse after 2 or 3 years as a result of a seasonal high water table. (Capability unit IIw–1; woodland suitability group 3)

Grenada silt loam, 2 to 6 percent slopes (GrB).—This soil is on broad ridges on uplands and on stream terraces. It has the profile described as representative for the series.

Included in mapping are small areas that are level and areas that are moderately eroded. Also included are small areas of Calloway soils at the heads of natural drainageways and small narrow areas of bottom-land soils along natural drainageways. Included are areas on stream terraces where loamy or gravelly alluvium is about 33 inches below the surface.

This soil has a moderately deep rooting zone, moderate natural fertility, and low organic-matter content. The plow layer is easily tilled. Alfalfa stands are likely to become sparse after 2 or 3 years as a result of frost heaving.

Most of the acreage is cleared and used for cultivated crops, rotation pasture, and meadow. A small acreage is wooded, but most of these tracts are grazed and they are gradually being cleared.

This soil is suited to most of the commonly grown crops, but there is excessive wetness in spring. There is a moderate hazard of erosion if cultivated crops are grown. (Capability unit IIe–2; woodland suitability group 3)

Grenada silt loam, 2 to 6 percent slopes, severely eroded (GrB3).—This soil is on side slopes on uplands and on stream terraces. It has a profile that differs from the one described as representative for the series in that the plow layer is a mixture of surface layer and subsoil and is mixed brown and yellowish brown in color. In some places the plow layer is mostly the original surface layer, while in other places it is mostly made up of subsoil. The depth to the fragipan ranges from 14 to 20 inches, and the average depth is about 17 inches.

Included in mapping are small areas where gravelly, sandy, or clayey Coastal Plain deposits are immediately below the fragipan and within 33 to 42 inches of the surface. Also included are small areas of soils on bottom land along the natural drainageways and small areas that slope more than 6 percent.

This soil is shallow to the fragipan which hinders growth of roots and the movement of water. The natural fertility is low, and the organic-matter content is very low. The soil is easy to cultivate, but it needs to be worked within a narrow range of soil moisture content to limit clodding. Surface crusting sometimes causes poor germination of seeds and sparse survival of seedlings.

Most of the acreage is used for cultivated crops, rotation pasture, and meadow. A small acreage is idle or has reverted to forest, but in recent years these small areas are gradually being recultivated.

This soil is suited to most of the commonly grown crops. If cultivated crops are grown, the hazard of erosion is severe. (Capability unit IIIe–3; woodland suitability group 9)

Grenada silt loam, 6 to 12 percent slopes (GrC).—This soil occurs in small areas on side slopes on uplands and on stream terraces. It differs from the one described as representative for the series in that the plow layer is a mixture of brown and yellowish-brown silt loam in many places and the fragipan is about 2 inches closer to the surface.

Included in mapping are small areas of Wheeling and Brandon soils. Also included are small areas of soils along natural drainageways and soils that have loamy or gravelly alluvium within 33 inches of the surface.

This soil is moderately deep to a fragipan that hinders the growth of roots and the movement of water. Natural fertility is moderate, and the organic-matter content is low.

Much of the acreage is forested or left idle. Some areas are used for cultivated crops, rotation pasture, and meadow.

This soil is suited to most of the commonly grown crops. If cultivated crops are grown, the hazard of erosion is severe. (Capability unit IIIe–3; woodland suitability group 3)

Grenada silt loam, 6 to 12 percent slopes, severely eroded (GrC3).—This soil differs from the soil described as representative for the series in that the plow layer is a mixture of the brown and yellowish-brown silt loam surface layer and the subsoil. In most areas the subsoil comprises the largest percentage of the plow layer. The depth to the fragipan ranges from 14 to 18 inches, and the average depth is about 15 inches.

Included in mapping are small areas of Wheeling and Brandon soils and small areas of bottom-land soils along natural drainageways. Also included are areas that have loamy or gravelly alluvium about 30 inches below the surface.

This soil is shallow to the fragipan which hinders root growth and slows the movement of water. The natural fertility is low, and the organic-matter content is very low. The soil needs to be worked within a narrow range of moisture content to limit clodding. Surface crusting causes poor germination of seeds and poor survival of seedlings.

This soil has been cleared and used for cultivated crops, rotation pasture, and meadow. Much of the acreage is now idle or has reverted to forests.

This soil is suited to most of the commonly grown crops. Cultivated crops should be grown only occasionally because the hazard of erosion is very severe. (Capability unit IVe–2; woodland suitability group 9)

Guin Series

The Guin series consists of gently sloping to very steep, excessively drained, very gravelly soils. These soils developed in gravelly Coastal Plain sediments on uplands (fig. 12).

Figure 12.—Profile of Guin very gravelly soils, 20 to 60 percent slopes, that formed in gravelly Coastal Plain sediments.

In a representative profile, the surface layer is dark grayish-brown very gravelly silt loam, about 3 inches thick, that overlies about 6 inches of dark yellowish-brown gravelly sandy loam. The next layer is brown very gravelly sandy loam about 15 inches thick. Yellowish-red and reddish-yellow very gravelly sandy loam is at a depth below 24 inches.

The Guin soils have rapid permeability, very low available moisture capacity, a shallow rooting zone, and low organic-matter content. Natural fertility is low. Reaction is strongly acid or very strongly acid throughout. The gravel in these soils hinders tillage and dulls implements.

Representative profile of Guin very gravelly soils, 20 to 60 percent slopes, 1.25 miles east of Dexter on edge of a gravel pit bordering State Route 1346, just east of bridge on the Clarks River:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) very gravelly silt loam; moderate, fine, granular structure; very friable; gravel averaging about 1 inch in diameter makes up about 55 percent of the volume; very strongly acid; clear, wavy boundary.

A3—3 to 9 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; weak, fine, granular structure; very friable; gravel averaging about 1 inch in diameter makes up about 35 percent of the volume; very strongly acid; clear, wavy boundary.

B—9 to 24 inches, brown (7.5YR 4/4) very gravelly sandy loam; weak, fine, granular structure; very friable; gravel averaging about 1 inch in diameter makes up about 70 percent of the volume; very strongly acid; gradual, wavy boundary.

C—24 to 50 inches, yellowish-red (5YR 5/6) and reddish-yellow (5YR 6/6) very gravelly sandy loam; single grain; very friable; gravel averaging about 1 inch in diameter makes up about 80 percent of the volume; very strongly acid.

The A1 horizon is dark gray (10YR 4/1) in some places and has a gravelly loam or gravelly sandy loam texture. In places there is an A2 horizon that ranges from brown (10YR 5/3) to pale brown (10YR 6/3), from very gravelly to gravelly, and from silt loam to loam. The A3 horizon ranges from brown to dark yellowish brown and is gravelly or very gravelly sandy loam, loam, or silt loam. The B horizon is discontinuous in some places.

The gravel makes up 30 to 90 percent of the volume throughout the profile. The gravel ranges from ⅛ inch to 4 inches in diameter and averages about 1 inch in diameter.

The Guin soils are closely associated with the Brandon, Loring, and Bodine soils on uplands. They are more gravelly in the A and B horizons than the Brandon and Loring soils. Guin soils contain rounded gravel, but the Bodine soils have angular chert fragments throughout the profile. The Guin soils are sandier than the Bodine soils. On the terraces the Guin soils are closely associated with the Calloway, McGary, Falaya, and Grenada soils. Guin soils have a much higher gravel content, are more droughty, and are better drained than these associated soils.

Guin gravelly loam, 2 to 12 percent slopes (GsC).—This excessively drained gravelly soil is on long, narrow ridges at a maximum elevation of about 355 feet. Areas of this soil are either between bottom land and terraces or between terraces and uplands.

The surface layer is dark grayish brown throughout. It generally contains less gravel but slightly more silt and clay than are in the profile described as representative for the Guin series.

Included in mapping are small areas that have less than 20 percent gravel in the layers at a depth below 20 inches. Ledges of sandstone and conglomerate rock outcrop on some slopes.

Most of the acreage is cleared and is generally used in the same way as the adjoining soils; that is, for cultivated crops, pasture, or meadow. Some areas are left idle when adjoining soils are cultivated.

This gravelly soil is droughty and poorly suited to cultivated crops. It is difficult to establish good stands of many of the commonly grown pasture and meadow plants. (Capability unit IVs–1; woodland suitability group 7)

Guin very gravelly soils, 20 to 60 percent slopes (GtE).—These soils are mostly on side slopes facing south and west. These soils have the profile described as representative of the series, but the surface layer ranges from very gravelly silt loam to gravelly sandy loam.

Included with these soils in mapping are small areas of Brandon, Ruston, and Bodine soils. The Ruston and Bodine soils are on the lower parts of slopes. The Brandon soils are on both the upper and lower parts of slopes.

Little of the acreage has been cleared of forest. Most areas are used for low-quality hardwood trees.

These gravelly, steep soils are not suited to cultivated crops. They are poorly suited to pasture and can be grazed to only a limited extent. Unless cover is maintained, the hazard of erosion is very severe. Woodland and wildlife habitat are suitable uses. (Capability unit VIIs–1; woodland suitability group 7)

Gullied Land

Gullied land (Gu) is a miscellaneous land type so dissected by recent gullies that it is not suitable for farming. Soil profiles have been destroyed except in small areas between gullies. The remaining soil material is acid. Reclamation for crop production or improved pasture is difficult, but is sometimes feasible. These areas, generally, have resulted from improper use and management of the original soil.

This land type is very severely limited by the effects of erosion, the hazard of further erosion, and the slopes. It can be used for woodland, for wildlife habitat, and, to a limited extent, for pasture. The operation of machinery on this land type is difficult. (Capability unit VIIe–3; woodland suitability group 10)

Henry Series

The Henry series consists of nearly level, poorly drained soils that have a fragipan. They developed in more than 4 feet of loess or silty alluvium on uplands and stream terraces.

In a representative profile, the surface layer is light brownish-gray silt loam about 8 inches thick. Below the surface layer is a mottled, light-gray silt loam layer about 18 inches thick. A fragipan, consisting of a compact, mottled, light brownish-gray silty clay loam layer, is at a depth of about 26 inches and extends to a depth below 50 inches.

The Henry soils are moderately permeable in the layers above the fragipan and slowly permeable in the fragipan. The fragipan hinders root penetration as well as water movement, and it causes a perched water table at or within 6 inches of the surface during the later part of winter and the early part of spring. These soils are very strongly acid throughout, unless limed. Natural fertility and organic-matter content are low. Available moisture capacity is moderate.

Representative profile of Henry silt loam in Calloway County, 2 miles west of New Providence and 1.75 miles north of the Kentucky-Tennessee State line:

Ap—0 to 8 inches, light brownish-gray (10YR 6/2) silt loam; few, fine, faint, light yellowish-brown (2.5Y 6/4) mottles; weak, fine, granular structure; friable; few, small, brown concretions; slightly acid; abrupt, smooth boundary.

A2g—8 to 26 inches, light gray (10YR 7/2) silt loam; common, fine, distinct, yellow (10YR 7/6) mottles; weak, fine, subangular and granular structure; friable; common, small, brown concretions; very strongly acid; clear, wavy boundary.

Bxg—26 to 50 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, fine, faint, white (10YR 8/1) mottles and few, medium, distinct reddish-yellow (7.5YR 6/6) mottles; weak, coarse, prismatic structure breaking to moderate, medium, angular blocky; firm, compact and brittle; common thin clay films; few black concretions; very strongly acid.

The color of the A horizon is 10YR in hue, ranges from 4 to 6 in value, and has a chroma of 1 or 2. The color of the A2g horizon ranges from 10YR to 2.5Y in hue, has a value of 6 to 8, and a chroma of 1 to 3. In some profiles the A2g horizon is a brittle and compact layer like a fragipan. The Btg horizon ranges from 10YR to 2.5Y in hue, from 4 to 6 in value, and has a chroma of 1 or 2. The B horizon has few to many mottles of shades of yellow and brown. Depth to the fragipan ranges from 15 to 39 inches. In wooded areas there is an A1 horizon.

The Henry soils are closely associated with the Calloway, Grenada, Waverly, and Forestdale, high clay variant soils. They are more poorly drained than the Calloway and Grenada soils. Their drainage compares with the Waverly and Forestdale, high clay variant soils, but they have a fragipan

which is lacking in the Waverly and the Forestdale, high clay variant soils. They have more silt and less clay than the Forestdale, high clay variant soils.

Henry silt loam (0 to 2 percent slopes) (Hn).—This soil is on uplands and stream terraces. It has a concave or slightly concave surface.

Included in mapping are areas on stream terraces that have loamy or gravelly loam alluvium about 36 inches below the surface.

Much of the acreage has never been cleared of forests, but machinery and improvements in technology and cultivation practices are increasing the usefulness of this soil for farming.

This soil is poorly suited to any but water-tolerant crops. Tile drains are not feasible, because of the slowly permeable fragipan, but open ditches can be used to remove surface water and improve drainage. (Capability unit IVw–1; woodland suitability group 4)

Huntington Series

The Huntington series consists of nearly level to gently sloping, well-drained soils on flood plains. These soils formed in mixed alluvium deposited by the Tennessee River.

In a representative profile, the surface layer is dark-brown silt loam about 24 inches thick. The next layer is brown silt loam that extends to a depth below 50 inches.

Huntington soils have a deep rooting zone, high available moisture capacity, moderate permeability, high natural fertility, and medium organic-matter content. The surface layer is easy to till, and it can be worked over a wide range of soil moisture content without clodding or crusting. These soils are medium acid to neutral. They often are flooded during winter, but seldom during the growing season.

Representative profile of Huntington silt loam, 1 mile north of Gilbertsville, 1.9 miles downstream from Kentucky Dam, and 400 feet south of the river bank:

Ap—0 to 11 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; very friable; roots plentiful; slightly acid; clear, smooth boundary.

A1—11 to 24 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; common roots; common mica flakes; slightly acid; clear, wavy boundary.

B—24 to 50 inches, brown (10YR 4/3) silt loam; common, medium, distinct, brown (7.5YR 4/4) mottles; weak, fine, granular structure; friable; medium acid.

Color of the A horizon is 10YR in hue, ranges from 1 to 3 in value, and from 2 to 4 in chroma. The A1 horizon is lacking in some profiles. The color of the B horizon ranges from 10YR to 7.5YR in hue, is 3 or 4 in value, and ranges from 2 to 4 in chroma. This color generally extends to a depth of 42 inches or more, but there are gray mottles at a depth below 24 inches in some profiles. The reaction is generally slightly acid in all horizons, but ranges from medium acid to neutral in some places. Solum thickness is more than 40 inches.

The annual temperature of these soils is a few degrees warmer than the defined range for the series, but this difference does not alter their usefulness and behavior.

The Huntington soils are closely associated on the Tennessee River flood plain with Egam, Newark, and Melvin soils. They have less clay than the Egam soils. They are better drained than the moderately well drained Egam soils, the somewhat poorly drained Newark soils, and the poorly drained Melvin soils.

Huntington silt loam (0 to 4 percent slopes) (Hu).—This is a well-drained soil on the flood plain of the Tennessee River.

Included in mapping are areas where the surface layer is lighter in color than in the profile described as representative for the series. Also included are small areas where the surface soil is a sandy loam and the subsoil is a sandy loam or loamy sand and small areas of soils that have slopes of 4 to 20 percent.

Most of the acreage is cleared and used for cultivated crops. This soil is suited to all the crops commonly grown in the area. (Capability unit I–1; woodland suitability group 1)

Iuka Series

The Iuka series consists of nearly level, moderately well drained soils on flood plains. These soils formed in recent loamy and sandy alluvium. They are mostly along the smaller branches, but extend into some of the bottoms where the branches flow into larger streams.

In a representative profile, the surface layer is brown silt loam about 10 inches thick. The next layer is brown silt loam about 12 inches thick. At a depth below 22 inches is mottled, dark grayish-brown fine sandy loam about 8 inches thick over mottled, grayish-brown sandy loam that extends to a depth of 50 inches.

The Iuka soils have a deep rooting zone, high available moisture capacity, moderate permeability, and moderate natural fertility. Organic-matter content is low, and reaction is strongly acid throughout. These soils have a seasonal water table that ranges from 18 to 24 inches below the surface during wet seasons.

Representative profile of Iuka silt loam, three-eighths mile south of Hamlet Church; and 200 yards east of gravel road on the south side of York Creek in Marshall County:

Ap—0 to 10 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C1—10 to 22 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C2—22 to 30 inches, dark grayish-brown (10YR 4/2) fine sandy loam; common, medium, distinct, gray (10YR 5/1) and brown (7.5YR 5/4) mottles; massive; very friable; few soft concretions; few pebbles; strongly acid; clear, wavy boundary.

C3g—30 to 50 inches, grayish-brown (10YR 5/2) sandy loam; many, medium, distinct, gray (5Y 6/1) mottles and few, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; very friable; 15 percent gravel; many black concretions; strongly acid; clear, wavy boundary.

The Ap horizon has a chroma of 2 to 4. The C1 horizon has a chroma of 3 or 4, and it has a few pale-brown (10YR 6/3) and light brownish-gray (10YR 6/2) mottles in some profiles. Dominant color of the C2 horizon is 10YR 4/3. The C2 horizon has common to many mottles that are 10YR, 2.5Y or 5Y in hue, range from 5 to 8 in value, and from 1 to 6 in chroma. The C3g horizon in some profiles is dominantly gray or light gray, and has common to many mottles of brown and yellow. The texture ranges from loam to sandy loam, and there is a gravelly or very gravelly stratum in some places.

These soils have more silt-size particles in the upper 2 feet of the profile and more gravel below 2 feet than the defined range for the series, but this does not greatly alter their usefulness and behavior.

The Iuka soils are closely associated with the Ochlockonee, Mantachie, Collins, and Vicksburg soils in the branch and creek flood plains. They are not so well drained as the well-drained Ochlockonee soils, but are better drained than the somewhat poorly drained Mantachie soils. They are sandier and more gravelly than the Collins and Vicksburg soils.

Iuka silt loam (0 to 2 percent slopes) (Iu).—This soil is on flood plains. It makes up the entire flood plain of some small streams and occupies small areas adjacent to uplands on large flood plains.

Included in mapping are small areas of Ochlockonee, Mantachie, Falaya, Collins, and Vicksburg soils. Also included are small areas that have recent overwash of sandy or gravelly material on the surface.

Erosion is not a hazard. This soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content without clodding or crusting. A seasonal high water table remains long enough to be injurious to some deep-rooted crops. Occasionally, flooding late in spring delays plowing and planting or damages growing crops in some lower lying areas.

Most of the acreage of this soil is cleared and used for cultivated crops, hay, or pasture. Some small areas are in woodland.

This soil is suited to most of the crops commonly grown. Tile drainage is unnecessary for most crops, but it lengthens the time during which field operations are possible. (Capability unit I–1; woodland suitability group 1)

Lax Series

The Lax series consists of sloping, moderately well drained soils that have a fragipan. These soils developed in 2 to 4 feet of loess and underlying gravelly Coastal Plain deposits.

In a representative profile, the surface layer is brown silt loam about 6 inches thick. Below the surface layer is a layer of strong-brown heavy silt loam about 9 inches thick and a layer of strong-brown heavy silt loam 7 inches thick that is mottled with yellowish brown and pale brown. At a depth of about 22 inches there is a fragipan consisting of compact, mottled, yellowish-brown and light-gray heavy silt loam about 11 inches thick. At a depth below 33 inches, the underlying material is mostly gravel.

Lax soils are moderately permeable in the layers above the fragipan and slowly permeable in the fragipan. The fragipan restricts the movement of water and penetration of roots. It also causes a seasonal water table to form 18 to 24 inches below the surface during the wetter seasons. These soils are strongly acid throughout. Available moisture capacity is moderate.

Representative profile of Lax silt loam, 6 to 12 percent slopes, on the north side of State Route 444, 4 miles northeast of New Concord:

Ap—0 to 6 inches, brown (10YR 5/3) silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

B1—6 to 8 inches, strong-brown (7.5YR 5/6) heavy silt loam; common, fine, distinct, pale-brown (10YR 6/3) mottles; moderate, fine, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

B21t—8 to 15 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate, medium, angular blocky structure; friable; common thin clay films; strongly acid; clear, wavy boundary.

B22t—15 to 22 inches, strong-brown (7.5YR 5/6) heavy silt loam; common, fine, faint, yellowish-brown (10YR 5/6) and few, fine, distinct, pale-brown (10YR 6/3) mottles; moderate, medium, angular blocky structure; friable; many, thin, discontinuous, brown (7.5YR 4/4) clay films; about 1 percent pebbles; very strongly acid; clear, wavy boundary.

Bx—22 to 33 inches, mottled yellowish-brown (10YR 5/6) and light-gray (10YR 7/2) heavy silt loam; moderate, medium, angular blocky structure; firm, compact and brittle; many, thin, yellowish-red clay films on ped surfaces; about 2 percent pebbles; very strongly acid; gradual, diffuse boundary.

IIC—33 to 50 inches, yellowish-brown (10YR 5/6) and gray (10YR 5/1) gravel averaging less than one inch in diameter, mottled yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) loam interstitial material; very strongly acid.

The Ap horizon has a value ranging from 4 to 6 and a chroma from 2 to 4. The B2t horizon ranges from 7.5YR to 10YR in hue and from 4 to 6 in value and chroma. The texture is heavy silt loam or light silty clay loam. Mottles in the Bx horizon range from 10YR to 5YR in hue, from 4 to 7 in value, and from 2 to 6 in chroma. Gray colors are in approximately 20 to 60 percent of the mass. Texture is silt loam, silty clay loam, or fine sandy clay loam. In some places the lower part of the fragipan layer is 1 to 20 percent gravel.

The thickness of loess deposits over gravelly material ranges from about 25 to 45 inches. In places small pebbles make up less than 10 percent of the B horizon. Depth to the fragipan ranges from 18 to 30 inches.

The Lax soils are closely associated with Brandon, Grenada, and Loring soils. They are more poorly drained than the Brandon soils. Lax soils have gravel immediately below the fragipan layers, unlike Grenada and Loring soils.

Lax silt loam, 6 to 12 percent slopes (LaC).—This soil is on side slopes on uplands. This soil has the profile described as representative for the series.

Included in mapping are small areas of soils that have slopes of 4 to 6 percent and soils that have cherty material, fine sandy loam, or sandy clay underlying the fragipan. Also included are small areas of Grenada, Loring, and Brandon soils and small areas of alluvial soils along drainageways.

This soil has a moderately deep rooting zone. The organic-matter content is low, and natural fertility is moderate. The surface layer is easy to work.

Most of the acreage has been cleared and is used for cultivated crops, rotation pasture, and meadow, but some is now idle.

This soil is suited to most of the crops commonly grown in the area; but if these soils are cultivated, the hazard of erosion is severe. (Capability unit IIIe–2; woodland suitability group 3)

Lax silty clay loam, 6 to 12 percent slopes, severely eroded (LcC3).—This soil is on side slopes on uplands. It occupies small to medium-sized areas near the heads of natural drainageways. This soil has a profile similar to the one described as representative for the series, except that most of the original surface layer has been removed by erosion, and the present surface layer is yellowish-brown silty clay loam. Also, the fragipan is about 4 inches closer to the surface.

This soil has a shallow rooting zone. The organic-matter content and natural fertility are very low. The surface layer is somewhat difficult to work, and surface

crusting interferes with the germination of seeds and the survival of seedlings.

Nearly all of the acreage has been cleared and used for cultivated crops, rotation pasture, and meadow, but a large part of it is now idle or has reverted to trees.

This soil is suited to shallow-rooted crops. Cultivated crops should be grown only occasionally because the hazard of erosion is very severe. (Capability unit IVe–2; woodland suitability group 9)

Lexington Series

The Lexington series consists of sloping to moderately steep, well-drained soils, developed in 2 to 3 feet of loess and the underlying sandy Coastal Plain material. They are on narrow ridgetops and side slopes in the more deeply dissected part of the survey area.

In a representative profile, the surface layer is brown silt loam about 5 inches thick. The next layer consists of brown silt loam about 3 inches thick underlain by yellowish-red silty clay loam about 20 inches thick. At a depth below 28 inches, there is yellowish-red clay loam that extends to a depth of more than 60 inches.

The Lexington soils have a deep rooting zone, high available moisture capacity, and moderate permeability. They are strongly acid throughout.

Representative profile of Lexington silt loam, 6 to 12 percent slopes, 1.5 miles northwest of New Concord and 1.5 miles north of junction of State Routes 121 and 614:

Ap—0 to 5 inches, brown (10YR 5/3) silt loam; few, medium, distinct, brown (7.5YR 5/4) mottles; weak, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

B1—5 to 8 inches, brown (7.5YR 5/4) heavy silt loam; weak, fine, angular and subangular blocky structure; friable; strongly acid; gradual, wavy boundary.

B2t—8 to 28 inches, yellowish-red (5YR 5/6) silty clay loam; moderate, medium, angular blocky structure; friable; many thick yellowish-red (5YR 4/6) clay films; strongly acid; gradual, wavy boundary.

IIB3—28 to 60 inches, yellowish-red (5YR 4/6) clay loam; few, fine, distinct, white (10YR 8/2) mottles; weak, coarse, subangular blocky structure; firm; light brownish-gray (10YR 6/2) silt coatings; few pebbles; strongly acid.

Colors of the Ap horizon are brown (10YR 4/3) and dark yellowish brown (10YR 4/4) in slightly or moderately eroded soils and brown (7.5YR 4/4) or yellowish red (5YR 5/6) in severely eroded soils. The color of the B2t horizon in some profiles is reddish brown (5YR 4/4). The IIB horizon is very gravelly in places. The texture of the IIB3 horizon ranges from loamy sand to sandy clay; color is reddish and has variegations of gray, white, brown, and yellow. The loess averages about 30 inches in thickness but ranges from 20 to 42 inches.

Kentucky test data indicates these soils have a higher base saturation and the IIB3 horizon is finer textured than the defined range for the series, but this does not greatly alter their usefulness and behavior.

The Lexington soils are associated with the Brandon, Memphis, Loring, and Ruston soils. They have a thicker solum, and the underlying material contains more sand and less gravel than Brandon soils. They are shallower to gravelly material than Memphis and Loring soils, and they are not so sandy as the Ruston soils.

Lexington silt loam, 6 to 12 percent slopes (LeC).—This soil is on narrow, convex ridgetops in the deeply dissected part of the survey area. This soil has the profile described as representative for the series.

Included in mapping are small areas of soils that have a thicker surface layer than that of the representative profile, soils that are severely eroded, and soils that have slopes of 4 to 6 percent. In some places, small areas of Brandon, Memphis, and Loring soils are included.

This soil has moderate natural fertility and low organic-matter content. The soil is easy to work, but tends to form a surface crust in the more eroded spots.

Most of the acreage has been cleared and is used for cultivated crops rotated with pasture and meadow. Some of the land has reverted to woodland or is idle. Improved and unimproved permanent pasture or meadow are also common uses.

This soil is suited to most of the crops commonly grown in the survey area. If cultivated crops are grown, the hazard of erosion is severe. (Capability unit IIIe–1; woodland suitability group 5)

Lexington silt loam, 12 to 20 percent slopes (LeD).—This soil is on side slopes. The part of the profile that developed in loess is 4 to 8 inches thinner than in the representative profile.

Included in mapping are small areas that are severely eroded and small areas of Brandon, Ruston, or Memphis soils.

Much of the acreage has been cleared and was formerly used for cultivated crops but has now reverted to woods or is idle. In recent years some areas have been cleared of trees and bushes and seeded to improved pasture.

This soil has moderate natural fertility and low organic-matter content.

This soil is unsuited to cultivated crops because of the hazard of erosion. Pasture, woodland, or wildlife habitat are better uses. Most grasses and legumes can be grown. (Capability unit VIe–1; woodland suitability group 5)

Lexington silty clay loam, 6 to 12 percent slopes, severely eroded (LgC3).—This soil is on narrow, convex ridgetops and side slopes. It has a profile similar to the one described as representative for the series, except that the surface layer is mostly yellowish-red silty clay loam.

Included in mapping are small moderately eroded areas or soils that have slopes of 4 to 6 percent. Also included are small areas of Memphis, Brandon, and Loring soils. In a few places, gullies expose the underlying sandy material.

The soil has a low natural fertility and very low organic-matter content. The higher clay content of the surface layer causes surface crusting, poor seed germination, and poor seedling survival, especially for spring-seeded crops.

This soil is suited to the commonly grown crops, but cultivated crops should be grown only occasionally because the hazard of erosion is very severe. Pasture and hay are better uses. (Capability unit IVe–1; woodland suitability group 6)

Lexington silty clay loam, 12 to 20 percent slopes, severely eroded (LgD3).—This soil is on side slopes in the deeply disected part of the survey area. The profile of this soil differs from the representative profile in that the surface layer is mostly yellowish-red silty clay loam.

Included in mapping are small areas of moderately eroded or slightly eroded soils and small areas of Mem-

phis, Brandon, and Ruston soils. In a few places, gullies expose the underlying sandy material.

The soil has low natural fertility and very low organic-matter content. The very low organic-matter content and higher clay content cause crusting of the surface layer. This hinders seed germination and seedling survival.

Most of the acreage has been cleared and used for cultivated crops, but now much of it has reverted to woods or is idle. In recent years some areas have been cleared of trees and bushes and seeded to pasture.

This soil is very severely limited because of the effects of past erosion and the hazard of further erosion. It is suitable for woodland, wildlife habitat, and to a limited extent, for pasture. The operation of machinery on this soil is difficult. (Capability unit VIIe–2; woodland suitability group 6)

Loring Series

The Loring series consists of gently sloping and sloping, moderately well drained soils that have a fragipan. They developed in more than 4 feet of loess on ridgetops and upper side slopes.

In a representative profile, the surface layer is brown silt loam about 8 inches thick. Below the surface layer is strong-brown heavy silt loam about 21 inches thick. Below this a fragipan consisting of compact, mottled silt loam that extends to a depth below 50 inches.

The Loring soils have a moderately deep rooting zone and are moderately permeable above the fragipan. Moderately slow permeability in the fragipan causes a seasonal water table to form immediately above it, within 2 to 3 feet of the surface. This water table occurs for short periods in wet seasons. These soils have a moderate available moisture capacity, moderate natural fertility, and low organic-matter content. They are strongly acid throughout.

Representative profile of Loring silt loam, 6 to 12 percent slopes, eroded, in a road cut near Curd Cemetery, approximately 450 feet south of the Marshall County line and one-half mile west of Jonathan Creek:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; fine, medium, granular structure; very friable; strongly acid; gradual, wavy boundary.

B1—8 to 13 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate, medium, granular structure and weak, medium, angular blocky structure; friable; strongly acid; gradual, wavy boundary.

B2t—13 to 29 inches, strong-brown (7.5YR 5/6) heavy silt loam; few, pale-brown (10YR 6/3) mottles in the lower part; moderate, medium, angular blocky structure; friable; few, thin, discontinuous brown (7.5YR 4/4) clay films; strongly acid; gradual, wavy boundary.

Bx—29 to 50 inches, mottled, yellowish-brown (10YR 5/6), strong-brown (7.5YR 5/6), and light-gray (10YR 7/1) silt loam; weak, coarse, prismatic structure breaking to weak, medium, angular blocky; firm, brittle and compact; black staining is common; strongly acid.

The A horizon color has a value of 4 or 5 and a chroma ranging from 2 to 4. The Bt horizon above the fragipan has a value of 4 or 5 and a chroma ranging from 4 to 6. In many profiles, strong brown (7.5YR 5/6) is the dominant color of the Bx horizon. Depth to the fragipan ranges from 24 to 35 inches. Sand content throughout the solum is less than 10 percent.

Loring soils are closely associated with Memphis, Grenada, and Calloway soils. They are more poorly drained than the Memphis soils and do not have the slight decrease in clay content immediately above the fragipan that is characteristic of the Grenada and Calloway soils.

Loring silt loam, 2 to 6 percent slopes (LoB).—This soil is on ridgetops that have convex slopes. The profile of this soil differs from the one described as representative for the series in that the surface layer is darker and the fragipan is slightly deeper in many places. This soil is easily tilled.

Included in mapping are small areas of Grenada, Brandon, and Memphis soils.

Most of this soil is cleared and used for cultivated crops, rotation pasture, or meadow. This soil is suited to the commonly grown crops, but there is some wetness in spring. There is a moderate hazard of erosion if cultivated crops are grown. (Capability unit IIe–3; woodland suitability group 5)

Loring silt loam, 2 to 6 percent slopes, eroded (LoB2).—This soil is on ridgetops near the heads of drainageways in deeply dissected areas where the topography is strongly sloping to steep. It is also on the narrow ends of ridgetops. Included with this soil in mapping are small areas of Lax, Brandon, and Memphis soils and small areas that are severely eroded.

This soil is subject to surface crusting which hinders seedling emergence.

Most of the acreage is cleared and used for cultivated crops, rotation pasture, and meadow. This soil is suited to most of the commonly grown crops, but there is some wetness in spring. There is a moderate hazard of erosion if cultivated crops are grown. (Capability unit IIe–3; woodland suitability group 5)

Loring silt loam, 6 to 12 percent slopes, eroded (LoC2).—This soil is on side slopes near the heads of drainageways and on ridgetops in deeply dissected areas. It is also on bench positions near Kentucky Lake at about the same elevation as the stream terraces. This soil has the profile described as representative for the series.

Included in mapping are small areas of severely eroded Loring soil in which the surface layer is mostly subsoil and some less eroded areas that have a surface layer which is darker. Also included are small areas of Grenada, Lax, Brandon, and Memphis soils.

This soil has a moderate available moisture capacity, low natural fertility, and low organic-matter content. It is subject to surface crusting which hinders seedling emergence.

Most of the acreage is cleared and used for rotation pasture, meadow, and cultivated crops. A part is idle, and some narrow ridgetops have never been cleared of trees.

This soil is suited to most of the commonly grown crops. If cultivated crops are grown, the hazard of erosion is severe. (Capability unit IIIe–1; woodland suitability group 5)

Mantachie Series

The Mantachie series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in recent loamy, gravelly, and sandy alluvium. They are mostly on small branch bottoms, but extend

into the larger bottoms at the junction of smaller streams with larger streams.

In a representative profile, the surface layer is grayish-brown silt loam about 8 inches thick. The next layer is mottled, brown silt loam about 10 inches thick. At a depth below about 18 inches mottled, light-gray loam about 8 inches thick, overlies mottled, light-gray fine sandy loam about 11 inches thick. At a depth below about 37 inches, the underlying material is mottled, light-gray gravelly sandy loam.

These soils have a deep rooting zone, high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content. They are strongly acid or very strongly acid throughout. They have a seasonal water table 6 to 18 inches below the surface. This delays cultivation in the spring months and limits the crops that are suitable.

Representative profile of Mantachie silt loam, on Whiteoak Creek, five-eights mile northeast of the Green Plains Church in Calloway County:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam; common, fine, faint, light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

B21—8 to 18 inches, brown (10YR 5/3) silt loam; common, fine, distinct, light-gray (10YR 7/2) mottles; weak, fine, granular structure; very friable; very strongly acid; gradual, irregular boundary.

B22g—18 to 26 inches, light-gray (2.5Y 7/2) loam; many, medium, faint, very pale brown (10YR 7/3) mottles; weak, fine, granular structure; very friable; few small pebbles; very strongly acid; gradual, irregular boundary.

B23g—26 to 37 inches, light-gray (5Y 6/1) fine sandy loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) and brownish-yellow (10YR 6/6) mottles; weak, fine, granular structure; very friable; common, soft, black concretions; few pebbles; very strongly acid; abrupt, wavy boundary

Cg—37 to 50 inches, light-gray (5Y 6/1) gravelly sandy loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) and brownish-yellow (10YR 6/6) mottles; single grain; very friable; common black concretions; about 50 percent gravel; very strongly acid.

The color of the Ap horizon has a value of 4 or 5 and a chroma ranging from 2 to 4. Textures are silt loam, loam, and fine sandy loam. The uppermost part of the B horizon has very pale brown mottles. The lower part of the B horizon ranges from 10YR to 5Y in hue, from 4 to 7 in value and from 1 to 6 in chroma. Stratification of sediments is visible in many profiles. Very gravelly strata occur at a depth of 2 to 3 feet in many places. These soils have more silt-size particles in the upper 2 feet of the profile and more gravel at a depth below 2 feet than the defined range for the series, but this does not greatly alter their usefulness and behavior.

The Mantachie soils occur in close association with Iuka, Ochlockonee, Collins, Vicksburg, Waverly, Bibb, and Falaya soils. They are not so well drained as the Iuka, Ochlockonee, Collins, and Vicksburg soils, but they are better drained than the Waverly and Bibb soils. They have the same drainage as the Falaya soils, but are coarser textured in the lower horizons.

Mantachie silt loam (0 to 2 percent slopes) (Ma).—This somewhat poorly drained soil is on flood plains. Included in mapping are small areas of Falaya, Waverly, Iuka, and Bibb soils. Also included are small areas of similar soils that have a recent overwash of sandy and gravelly material.

Overflow and wetness during the spring months sometimes delays cultivation of this soil. Crop damage by flooding occurs infrequently during the growing season.

Most of the acreage is cleared and used for cultivated crops, hay, and pasture. Some small areas are wooded or have been abandoned and are reverting to woodland.

This soil is suited to crops that tolerate moderate wetness. Tile drainage allows a wider selection of crops. (Capability unit IIw–2; woodland suitability group 2)

McGary Series

The McGary series consists of nearly level, somewhat poorly drained soils on stream terraces. These soils developed in about 12 inches of silty alluvium and the underlying clayey alluvium. They occupy somewhat small stream terraces along the Tennessee River.

In a representative profile, the surface layer is pale-brown silt loam, mottled with yellowish brown, about 6 inches thick. Below the surface layer is mottled, light-gray, pale-brown, and yellowish-brown silty clay loam about 6 inches thick; mottled, light brownish-gray and yellowish-brown silty clay about 6 inches thick; mottled, light brownish-gray silty clay and clay about 12 inches thick; and mottled, strong-brown, pale-brown, and light brownish-gray clay about 10 inches thick. At a depth below 34 inches, the underlying material is mottled, grayish-brown and strong-brown clay.

The McGary soils are slowly permeable at a depth below about 12 inches because of the high clay content. This limits the depth to which roots penetrate and causes a perched seasonal water table to form 6 to 18 inches below the surface that delays cultivation in spring. Available moisture capacity is moderate. Natural fertility and organic-matter content are low, but the surface layer is easy to work. Unlimed, these soils are very strongly acid to strongly acid in the upper horizons, but the reaction becomes medium acid to mildly alkaline at a depth below 18 inches.

Representative profile of McGary silt loam, 300 feet north of U.S. Highway 62 at Possum Trot, in Marshall County:

Ap—0 to 6 inches, pale-brown (10YR 6/3) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1t—6 to 12 inches, mottled, light-gray (10YR 6/1), pale-brown (10YR 6/3), and yellowish-brown (10YR 5/6) light silty clay loam; weak, fine, angular blocky structure; friable to firm; patchy clay films; strongly acid; clear, smooth boundary.

B21tg—12 to 18 inches, mottled, light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/6) silty clay; moderate, medium, angular blocky structure; firm; continuous clay films; strongly acid; clear, smooth boundary.

B22tg—18 to 24 inches, light brownish-gray (2.5Y 6/2) clay; many, fine, distinct, strong-brown (7.5YR 5/8) mottles; weak, medium, subangular blocky structure; very firm; continuous clay films; medium acid; clear, wavy boundary.

B3t—24 to 34 inches, mottled, strong-brown (7.5YR 5/6), pale-brown (10YR 6/3), and light brownish-gray (2.5Y 6/2) clay; weak, medium, subangular blocky structure; very firm; few clay films; neutral; abrupt, smooth boundary.

C—34 to 50 inches, mottled, grayish-brown (2.5Y 5/2), gray (N 6/0), and strong-brown (7.5YR 5/8) clay; pre-

dominantly massive, and some weak, fine, subangular blocky peds; few, dark-brown, soft concretions; neutral.

The Ap horizon colors are gray (10YR 5/1) and brown (10YR 5/3). The B1 horizon also has a dominant color of light yellowish brown (10YR 6/4) and many mottles of gray, pale brown, and yellowish brown. The B21t, B22t, and B3 horizons have mottled colors that range from 10YR, 2.5Y, and 7.5YR in hue, from 5 to 7 in value, and from 2 to 8 in chroma. The dominant color of the B horizon is grayish brown or gray, but in some places it is difficult to select a dominant color from the mottled mixture. The texture of the B horizon ranges from silty clay to clay. The C horizon is dominantly gray (N 6/0), (10YR 6/1) or grayish brown (10YR 5/2) and it has common or many yellowish-brown and strong-brown mottles. The depth to the C horizon ranges from 24 to 35 inches.

The annual temperature of these soils is a few degrees warmer than the defined range for the series, but this difference does not alter their usefulness and behavior.

The McGary soils are closely associated with the Calloway, Henry, and Guin soils. They have similar drainage to the somewhat poorly drained Calloway soils, are better drained than the Henry soils, and are more poorly drained than the gravelly Guin soils. They have a much higher clay content than any of these soils and they do not have a fragipan, as do the Calloway and Henry soils.

McGary silt loam (0 to 3 percent slopes) (Mc).—This soil is on stream terraces. Included in mapping are small areas of moderately well drained clayey soils on slopes of 2 to 12 percent. These small areas are generally severely eroded.

Most of the acreage of this soil is idle or is used for pasture and meadow. It is near the Calvert City industrial area, and many of the people who own farms in this area are employed in industry.

This soil is suited to crops that tolerate excessive wetness. It is unsuited to burley tobacco and alfalfa because of the seasonal high water table.

Drainage through open ditches lengthens the time during which field operations are possible and allows a wide selection of plants. The clay in the subsoil hinders tile drainage. (Capability unit IIIw–1; woodland suitability group 4)

Melvin Series

The Melvin series consists of nearly level, poorly drained soils on flood plains. These soils formed in mixed alluvium deposited by the Tennessee River.

In a representative profile, the surface layer is mottled, grayish-brown silt loam about 7 inches thick. Below this a layer of mottled, light brownish-gray and light-gray silt loam extends to a depth below 50 inches.

The Melvin soils have water table that is at or within six inches of the surface for long periods during the latter part of winter and the early part of spring. These soils have moderate permeability, a deep rooting zone, high available moisture capacity, moderate natural fertility, and low organic-matter content. The reaction generally ranges from medium acid to neutral throughout the profile. Wetness is a hazard on these soils even after a drainage system is installed. Most areas are subject to frequent flooding.

Representative profile of Melvin silt loam, on the south side of State Route 1523 where it crosses Cypress Creek in Marshall County:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) silt loam; many fine, faint, light-gray (5Y 6/1) and pale-brown (10YR 6/3) mottles; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B21g—7 to 20 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct, light-gray (5Y 6/1), brown (10YR 5/3), and very dark gray (10YR 3/1) mottles; weak, fine, granular structure; friable; common dark concretions and stains; medium acid; clear, wavy boundary.

B22g—20 to 29 inches, light-gray (5Y 6/1) heavy silt loam; common, medium, distinct, pale-brown (10YR 6/3) and yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; friable; many, small, dark-brown concretions; medium acid; clear, wavy boundary.

B23g—29 to 50 inches, light-gray (10YR 6/1) heavy silt loam; many coarse, prominent, light yellowish-brown (10YR 6/4) mottles and common, coarse, faint, very dark gray (10YR 3/1) mottles; weak, fine, granular structure; friable; few, large, dark-brown concretions; slightly acid.

The colors of the Ap horizon range from light brownish gray (10YR 6/2) to dark gray (N/4). The dominant colors of the B horizons range from 10YR to 5Y in hue, are 6 or 7 in value, and 2 or less in chroma. The reaction ranges from neutral to medium acid in all horizons.

Stratification is visible in many profiles, but silt loam or silty clay loam is between depths of 6 and 36 inches.

The annual temperature of these soils is a few degrees higher than the defined range for the series, but this difference does not alter their usefulness and behavior.

Melvin soils are closely associated with Henry, Calloway, Newark, and Waverly soils. Melvin soils do not have a fragipan, as do the Henry and Calloway soils. They are more poorly drained than the Calloway and Newark soils. Melvin soils have similar drainage to the Waverly soils, but they are less acid and have a somewhat finer texture.

Melvin silt loam (0 to 2 percent slopes) (Me).—This soil is on flood plains. Included in mapping are areas where the plow layer is silty clay loam and small areas of Newark soils. Also included are a few areas of a soil that is strongly acid throughout.

This soil has moderate permeability, but artificial drainage is hindered in many areas by the lack of adequate outlets.

Most of the acreage is along Cypress Creek, which is slightly entrenched and fairly frequently flooded. The major present use of this soil is for woodland.

This soil is suited only to plants that tolerate wetness. Drainage by tiles or open ditches allows a wider selection of crops. (Capability unit IIIw–3; woodland suitability group 2)

Memphis Series

The Memphis series consists of well-drained, gently sloping to sloping soils. They developed in more than 4 feet of loess on narrow ridgetops and on side slopes near the heads of drainageways.

In a representative profile, the surface layer is mixed brown and strong-brown silt loam about 6 inches thick. The next layer consists of dark-brown silty clay loam about 23 inches thick overlying strong-brown silt loam about 11 inches thick. At a depth below about 40 inches, the underlying material is mottled, strong-brown to yellowish-brown silt loam.

The Memphis soils have a deep rooting zone and moderate permeability. They have a high available mois-

ture capacity, moderate natural fertility, and low organic-matter content. They are strongly acid throughout the solum.

Representative profile of Memphis silt loam, 6 to 12 percent slopes, eroded, one-tenth mile south of Mt. Pleasant Church in the southwestern part of Calloway County:

Ap—0 to 6 inches, brown (10YR 4/3) mixed with strong-brown (7.5YR 5/6) silt loam; moderate, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

B1t—6 to 11 inches, dark-brown (7.5YR 4/4) silty clay loam; weak, fine, angular blocky structure and moderate, fine, granular structure; friable; few thin clay films; strongly acid; clear, wavy boundary.

B2t—11 to 29 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, angular and subangular blocky structure; friable; common, thin, reddish-brown (5YR 4/4) clay films; strongly acid; gradual, wavy boundary.

B3t—29 to 40 inches, strong-brown (7.5YR 5/6) silt loam; few very pale brown mottles in the lower part; weak, medium, angular blocky structure; friable; few discontinuous clay films; strongly acid; gradual, wavy boundary.

C—40 to 50 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/4) silt loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable to firm; few dark stains; medium acid.

The A horizon color has a value of 3 or 4 and a chroma of 2 to 4. The B horizon ranges from 7.5YR to 5YR in hue, is 4 or 5 in value, and ranges from 4 to 6 in chroma. The B3t horizon is not always mottled in the lower part. The C horizon has a hue of 7.5YR to 10YR, with a value of 4 or 5, and a chroma of 4 to 6. Mottles are light brownish gray (10YR 6/2) or pale brown (10YR 6/3). The solum thickness ranges from 36 to 50 inches.

Kentucky data indicates that these soils have a lower base saturation than the defined range for the series, but this does not greatly alter their usefulness and behavior.

Memphis soils are closely associated with the Loring and Grenada soils. They are better drained than these soils and do not have a fragipan.

Memphis silt loam, 2 to 6 percent slopes (MmB).—This soil is on narrow ridgetops in highly dissected areas. In many places some subsoil is mixed with the original surface layer, but in other, less eroded areas the surface layer is darker brown and about 3 inches thicker than in the profile described as representative for the series.

Included are small areas of severely eroded Memphis soils where the surface layer is mostly subsoil. Also included are small areas of Loring soils and Brandon-Memphis-Loring silt loams, 2 to 12 percent slopes.

Most of the acreage of this soil has been cleared and is used for cultivated crops, rotation pasture, or meadow, uses to which it is well suited.

This soil is suited to all of the commonly grown crops. There is a moderate hazard of erosion if cultivated crops are grown. (Capability unit IIe–1; woodland suitability group 5)

Memphis silt loam, 6 to 12 percent slopes, eroded (MmC2).—This soil is on narrow ridgetops and upper parts of side slopes near the heads of drainageways in deeply dissected areas where the topography is rough. This soil has the profile described as representative for the series.

Included in mapping are small areas of Loring, Lexington, and Brandon soils, and also slightly eroded areas where the surface layer is darker colored and thicker than that of the representative profile. Surface crusting hinders emergence of seedlings in some areas.

Much of the acreage has been cleared and is used for rotation pasture, meadow, and cultivated crops. A small acreage is forested or idle, and some of the idle land is reverting to woodland.

This soil is suited to most of the commonly grown crops. If cultivated crops are grown, the erosion hazard is severe. (Capability unit IIIe–1; woodland suitability group 5)

Newark Series

The Newark series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in mixed alluvium deposited by the Tennessee River.

In a representative profile, the surface layer is faintly mottled, brown silt loam about 6 inches thick. Below the surface layer mottled, dark grayish-brown silt loam about 10 inches thick, overlies mottled, gray silt loam that extends to a depth below 50 inches.

A seasonal water table stands 6 to 18 inches below the surface for long periods during the latter part of winter and early part of spring. These soils have a deep rooting zone, moderate permeability, and high available moisture capacity. They are medium acid to neutral throughout. The natural fertility is moderate, and the organic-matter content is low. These soils are subject to flooding, but the hazard is only slight during the growing season.

Representative profile of Newark silt loam, one-fifth mile south of the Tennessee River, 4 miles west of Calvert City:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; common, medium, faint, dark grayish-brown (10YR 4/2) mottles; moderate, fine, granular structure; friable; slightly acid; few, small, soft, black concretions; clear, wavy boundary.

B21—6 to 16 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, faint, yellowish-brown (10YR 5/4) and gray (10YR 5/1) mottles; weak, medium, subangular blocky and weak, fine, granular structure; friable; few, small, soft concretions; medium acid; clear, wavy boundary.

B22g—16 to 23 inches, gray (5Y 5/1) heavy silt loam; few, fine, prominent, strong-brown (7.5YR 5/6); mottles; weak, medium, subangular blocky structure; firm; few brown concretion stains; medium acid; clear, wavy boundary.

Cg—23 to 50 inches +, gray (N 5/0) heavy silt loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; few black concretion stains; medium acid.

The A horizon is 10YR in hue, 4 in value, and ranges from 2 to 4 in chroma. The B21 horizon is 10YR in hue, 4 or 5 in value, and ranges from 2 to 4 in chroma. Gray mottles are common to many. The B22g and Cg horizons are 10YR in hue, range from 4 to 6 in value, and are 1 or 2 in chroma. Brownish mottles are few to many. Stratification of sediments is visible in some places. The layers at depths between 6 and 36 inches are dominantly silt loam, but the texture ranges from silt loam to silty clay loam. The B22g horizon has a weak, fine, granular structure in places.

The annual temperature of these soils is a few degrees higher than the defined range for the series, but this difference does not alter their usefulness and behavior.

The Newark soils are closely associated with the Melvin, Egam, Calloway, and Falaya soils. They are better drained than the Melvin soils, more poorly drained than the Egam soils, and do not have a fragipan like the similarly drained

Calloway soils. The Newark soils have drainage similar to the Falaya soils, but they are less acid and somewhat finer textured.

Newark silt loam (0 to 2 percent slopes) (Ne).—This soil is on flood plains. Included in mapping are soils that have a silty clay loam surface layer and generally have a silty clay loam subsoil. Also included are small areas of Melvin silt loam and areas where the soil reaction is strongly acid in all parts of the profile.

This soil is easy to cultivate, but wetness sometimes delays cultivation. Outlets for drainage are not easily available in some places.

About one-half the acreage of this soil is in forest. Many of the cleared areas are in grasses and legumes. This soil is suited to crops that tolerate moderate wetness. Artificial drainage allows a wider selection of crops. (Capability unit IIw–2; woodland suitability group 2)

Ochlockonee Series

The Ochlockonee series consists of nearly level and gently sloping, well-drained bottom soils on flood plains. These soils formed in recent loamy alluvium. Most of the acreage is in small bottoms, but extends into the larger bottoms where branches flow into the larger streams.

In a representative profile, the surface layer is brown silt loam about 7 inches thick. The underlying material, to a depth of 50 inches, consists of brown loam about 14 inches thick, brown fine sandy loam about 14 inches thick, and gravelly sandy loam about 15 inches thick. These soils have a deep rooting zone and are strongly or very strongly acid throughout. Crops are seldom damaged by flooding during the growing season.

Representative profile of Ochlockonee silt loam, 3 miles north of Hamlet Church and one-fourth mile northwest of the cemetery on the Elizabeth Creek flood plain in Marshall County:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C1—7 to 21 inches, brown (7.5YR 4/4) loam that contains pockets of fine sandy loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C2—21 to 35 inches, brown (7.5YR 4/4) fine sandy loam; weak, fine, granular structure; very friable; very strongly acid; gradual, diffuse boundary.

C3—35 to 50 inches, brown (10YR 4/3) gravelly sandy loam; single grain; very friable; strongly acid; gravel is mostly less than 1 inch in diameter, ranging in amount from 20 percent in the uppermost part to 50 percent in the lower part.

The color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4), and the texture is silt loam, loam, or fine sandy loam. In gravelly phases 20 to 50 percent of the uppermost 35 inches of the profile is gravel. Color of the C horizon has a hue of 10YR to 7.5YR, a value of 4 or 5, and a chroma ranging from 3 to 6. Some profiles have gray mottles beginning at a depth of 30 to 40 inches. The texture of the C1 and C2 horizons is silt loam in some profiles. Gravel content of the C1 and C2 horizons ranges from 0 to 50 percent. The texture of the C3 horizon ranges from sandy loam to loam, and the content of gravel is 20 to 90 percent. These soils have more silt-size particles in the uppermost 2 feet of the profile and more gravel at a depth below 2 feet than the defined range for the series, but this does not greatly alter their usefulness and behavior.

The Ochlockonee soils are associated with the Iuka, Mantachie, Falaya, Collins, and Vicksburg soils. They are better drained than all of these except the Vicksburg soils. They contain more sand and gravel than the Collins, Vicksburg, and Falaya soils.

Ochlockonee gravelly loam (0 to 4 percent slopes) (Oc).—This gravelly soil is generally near the heads of small branches, but small areas of it are also in the larger bottoms.

This soil has a profile that contains more sand and gravel in the upper 2 feet than is in the profile described as representative for the series. The amount of gravel in the surface layer and within the profile is variable within short distances. Gravel content ranges from about 20 to 50 percent, and averages about 30 percent. The surface layer is generally gravelly loam, but in some areas it is gravelly sandy loam. Included in mapping are small areas of Ochlockonee and Iuka silt loams.

This soil is rapidly permeable and somewhat droughty, and the available moisture capacity is low. The natural fertility and organic-matter content are low. This soil is difficult to till, and the gravelly surface dulls tillage implements.

Most of the acreage has been cleared and is used for cultivated crops or rotation meadow and pasture, to which this soil is suited. Many small areas are left in woodland where stream channels are crooked. This soil is better suited to drought-resistant plants. (Capability unit IIs–1; woodland suitability group 1)

Ochlockonee silt loam (0 to 2 percent slopes) (Oh).—This soil is on flood plains. It has the profile described as representative for the series. Included in mapping are small areas that are silt loam to a depth of 42 inches and a few areas that have a fine sandy loam surface layer.

This soil has moderate natural fertility, low organic-matter content, and high available moisture capacity. It is strongly acid or very strongly acid. Roots and moisture easily penetrate the soil to a depth of 3 feet or more. Tilth is easily maintained, and the soil can be worked over a wide range of moisture content without clodding or crusting. There is no erosion hazard, and this soil is suitable for continuous cultivated crops. Permeability is moderate in the upper part of the soil and rapid in the lower, gravelly part.

Most of the acreage is cleared and used for cultivated crops or rotation pasture and meadows. Some areas are wooded. This soil is suited to all of the crops commonly grown in the survey area. It is flooded only infrequently. (Capability unit I–1; woodland suitability group 1)

Ruston Series

The Ruston series consists of moderately steep and steep, well-drained soils that developed in loamy Coastal Plain sediments. These soils are on side slopes on highly dissected uplands.

In a representative profile, the surface layer is mainly brown fine sandy loam about 9 inches thick. The next layer extends to a depth of 52 inches. It consists of strong-brown fine sandy loam about 4 inches thick

overlying yellowish-red sandy clay about 12 inches thick, yellowish-red sandy loam about 18 inches thick, and reddish-yellow sandy clay loam about 9 inches thick. The underlying material is yellowish-red sandy loam.

The Ruston soils have a deep rooting zone, moderate permeability and high available moisture capacity. They are strongly acid or very strongly acid throughout. They are moderate in natural fertility and low in organic-matter content.

Representative profile of Ruston fine sandy loam, 20 to 30 percent slopes, a mile west of New Concord on a gravel road, one-fourth mile east of State Route 614:

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; few pebbles; strongly acid; abrupt, wavy boundary.

A2—1 to 6 inches, brown (7.5YR 5/2) fine sandy loam; weak, fine, granular structure; very friable; few pebbles; strongly acid; clear, smooth boundary.

A3—6 to 9 inches, brown (7.5YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; few pebbles; very strongly acid; clear, smooth boundary.

B1—9 to 13 inches, strong-brown (7.5YR 5/6) fine sandy loam; weak, fine, subangular blocky structure; friable; few pebbles; very strongly acid; clear, smooth boundary.

B2t—13 to 25 inches, yellowish-red (5YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; common clay films on ped surfaces; very strongly acid; gradual, wavy boundary.

B31—25 to 43 inches, yellowish-red (5YR 4/6) sandy loam; weak, medium, subangular blocky structure; friable; few pebbles; few patchy clay films; very strongly acid; gradual, wavy boundary.

B32—43 to 52 inches, reddish-yellow (5YR 6/6) sandy clay loam; few, medium, faint, light-brown (7.5YR 6/4) mottles; moderate, medium, subangular blocky structure; few thin clay films; very strongly acid; gradual, wavy boundary.

C—52 to 72 inches, yellowish-red (5YR 4/6) sandy loam; many, fine, faint, red (2.5YR 4/6) and light-brown (7.5YR 6/4) mottles; single-grained; friable; very strongly acid.

The color of the A1 horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 1 or 2. The A2 horizon ranges from 7.5YR to 10YR in hue, from 5 to 7 in value, and from 2 to 4 in chroma. The A3 and B1 horizons are discontinuous, and one or both are lacking in some profiles. They have a hue of 7.5YR, a value of 5 or 6, and a chroma ranging from 4 to 6. The B2t horizon ranges from 7.5YR to 10R in hue, is 4 or 5 in value, and ranges from 6 to 8 in chroma. The B3 horizon has faint mottles of brownish yellow and red in some profiles. These soils have a thinner solum than the defined range for the series, but this does not greatly alter their usefulness and behavior.

Ruston soils are closely associated with Lexington, Brandon, and Guin soils. They are sandier in the upper horizons than Lexington and Brandon soils and less gravelly than Guin soils.

Ruston fine sandy loam, 12 to 20 percent slopes (RuD).—This soil is deep and well-drained.

Included in mapping are small areas that have a surface layer of silt loam and a subsoil that is silty clay loam to a depth of 20 inches or less. Also included are small areas that have a sandy clay, loamy sand, or very gravelly stratum within depths of 10 to 50 inches, as well as small areas of moderately and severely eroded soil in which a part or most of the surface layer has been removed by erosion.

Most of the acreage of this soil is in forest. It produces good growth of many of the native and introduced trees. This soil is unsuited to cultivated crops because of the hazard of erosion. It is better used for pasture, woodland, or wildlife habitat. Most grasses and legumes can be grown. (Capability unit VIe–1; woodland suitability group 8)

Ruston fine sandy loam, 20 to 30 percent slopes (RuE).—This deep, well-drained soil has the profile described as representative for the series. Included in mapping are some small, moderately and severely eroded areas where a part or most of the original surface layer has been removed by erosion. There are small areas that have a sandy clay, loamy sand, or very gravelly stratum within depths of 10 to 50 inches. Also included are some areas that have slopes of 30 to 60 percent.

Most of the acreage of this soil is in forest. This soil is severely limited in use because of the slope and the hazard of erosion. It is suitable for woodland, wildlife habitat, and, to a limited extent, for pasture. The operation of machinery is difficult. (Capability unit VIIe–1; woodland suitability group 8)

Ruston-Lexington complex, 18 to 30 percent slopes (RxE).—This complex consists of well-drained soils that have a reddish subsoil. The named soils have profiles similar to the profile described as representative for each series. They occur together in so intricate a pattern that it is not practical to separate them. The Lexington soils are on the upper one-third of the slopes where the slope is mostly between 18 and 23 percent, and they make up about 35 percent of this unit. The Ruston soils are on the lower two-thirds of the slopes where the slope is mostly 23 to 30 percent, and they make up about 65 percent of this unit. Included in mapping are small moderately and severely eroded areas.

The soils in this complex have moderate natural fertility and low organic-matter content.

Most of the acreage is in woodland. The soils in this complex are very severely limited by the hazard of erosion and by the slope. They are suitable for woodland, wildlife habitat, and, to a limited extent, for pasture. The operation of machinery is difficult because of slope. (Capability unit VIIe–1; woodland suitability group 8)

Saffell Series

The Saffell series consists of sloping to very steep, well-drained, gravelly soils developed in Coastal Plain deposits. These soils are mapped only in complex with Guin soils.

In a representative profile, the surface layer is mainly yellowish-brown and dark yellowish-brown gravelly loam about 10 inches thick. The next layer consists of yellowish-red gravelly loam about 8 inches thick, underlain by yellowish-red gravelly sandy clay loam about 17 inches thick. The underlying material to a depth of 70 inches consists of mottled, yellowish-red very gravelly sandy loam about 25 inches thick and yellowish-red sandy loam about 10 inches thick.

The Saffell soils are moderately deep to very gravelly material that is unfavorable for root growth. The permeability is moderate to rapid; organic-matter content, natural fertility, and available moisture capacity are low. The soils are strongly acid to very strongly acid throughout.

Representative profile of Saffell gravelly loam, from an area of Saffell-Guin complex, 20 to 50 percent slopes, one-third mile east of Almo, Kentucky, on a gravel road one-fourth mile north of State Route 464:

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) gravelly loam; moderate, fine granular structure; very friable; 20 percent gravel; very strongly acid; abrupt, smooth boundary.

A2—2 to 6 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, fine, granular structure; very friable; 25 percent gravel; strongly acid; clear, wavy boundary.

A3—6 to 10 inches, dark yellowish-brown (10YR 4/4); gravelly loam; weak, medium, angular blocky structure and weak, fine, granular structure; friable; 20 percent gravel; very strongly acid; abrupt, wavy boundary.

B21t—10 to 18 inches, yellowish-red (5YR 4/8) gravelly loam; moderate, medium, angular blocky structure; friable; 20 percent gravel; few clay films; very strongly acid; clear, wavy boundary.

B22t—18 to 35 inches, yellowish-red (5YR 5/8) gravelly sandy clay loam; moderate, medium, angular blocky structure; friable; 35 percent gravel; common clay films; strongly acid; clear, wavy boundary.

C1—35 to 60 inches, yellowish-red (5YR 4/6) very gravelly sandy loam; common, medium, distinct, light-gray (10YR 7/2) mottles; weak, medium, platy structure; friable; 75 percent gravel; strong acid; clear, wavy boundary.

C2—60 to 70 inches, yellowish-red (5YR 4/8) sandy loam; common, medium, distinct, light-gray (10YR 7/2) mottles; weak, medium, platy structure; friable; strongly acid.

In places loess is a component of the parent material of the A and B21t horizons, and the percentage of gravel in these horizons ranges from 15 to 50 percent. The gravel content in the B22t horizon ranges from 25 to 70 percent. It is partly cemented in some places. The C2 horizon is lacking or it is more than 10 feet below the surface in many places. The texture of the A horizon ranges from silt loam to sandy loam. The color of the B21t and B22t horizons is brown (7.5YR 4/4) in some profiles, and the texture is gravelly silt loam, gravelly silty clay loam, or gravelly sandy clay loam. The thickness of the solum ranges from 35 to 50 inches.

These soils have more silt particles and less gravel in the uppermost 18 inches of the profile than the defined range for the series, but this does not greatly alter their usefulness and behavior.

The Saffell soils are closely associated with the Brandon, Guin, and Ruston soils. They have more gravel in the A and B horizons than the Brandon and Ruston soils and less gravel than the Guin soils. They have a thicker solum than Guin soils and more clay accumulation in the B horizon.

Saffell-Guin complex, 6 to 12 percent slopes (SgC).—This unit is on narrow ridgetops in the sections deeply dissected by natural drainageways. The soils in this unit occur in so intricate a pattern that it is not practical to separate them in mapping. The two named soils have profiles similar to the profile described as representative for each series. This unit is about 70 percent Saffell soil and about 30 percent Guin soil.

Included with this soil on the narrow ridgetops are a few areas of Bodine cherty silt loam and Brandon silt loam.

The soils in this unit are shallow or moderately deep to very gravelly material that is unfavorable for root penetration. These soils are strongly acid to very strongly acid. The gravelly surface makes the soil difficult to work and dulls tillage implements. In addition to the limitations of droughtiness and poor workability, the hazard of erosion is severe if this complex is used for cultivated crops.

Most of the acreage has never been cleared of forest. The areas that are cleared are in pasture or meadow and a few acres are used occasionally for cultivated crops. The soils in this complex are droughty and poorly suited to cultivated crops. It is difficult to establish good stands of many of the commonly grown pasture and meadow plants. (Capability unit IVs–1; woodland suitability group 7)

Saffell-Guin complex, 12 to 20 percent slopes (SgD).—The soils in this complex are on side slopes in areas deeply dissected by natural drainageways. These gravelly soils occur in so intricate a pattern that it is not practical to separate them in mapping. The two named soils have profiles similar to the profile described for each series. The Saffell soil is generally in the middle part of slopes and makes up about 50 percent of most areas. The Guin soil is generally on the upper one-third of slopes and makes up about 30 percent of most areas. Brandon, Lexington, Loring, Memphis, and Ruston soils are usually on the lower part of the slopes, and, in combination or singly, they make up about 20 percent of most areas.

Included in mapping are small areas of soils on flood plains along natural drainageways and moderately or severely eroded soils. In the west-central part of Marshall County on the side slopes south of the flood plain of East Fork of the Clarks River, clayey soils are included in this complex. The clay is at the surface in some places, but in other places is overlain by a thin gravelly layer or a thin loess and gravelly layer.

The soils in this unit are shallow or moderately deep to very gravelly material that is unfavorable for root growth. They have low to very low natural fertility and low organic-matter content, and they are strongly acid to very strongly acid. In addition to droughtiness and poor workability, the hazard of erosion is very severe if these soils are used for cultivated crops.

Most of these soils have been cleared of trees and are used for pasture or meadow, but a few acres are used for cultivated crops. Use of the soils in this complex are limited mainly by gravel, which causes droughtiness and makes the soil difficult to work. These soils are suited to pasture, woodland, and wildlife habitat. (Capability unit VIs–1; woodland suitability group 7)

Saffell-Guin complex, 20 to 50 percent slopes (SgE).—This soil complex is on side slopes in areas deeply dissected by natural drainageways. These gravelly soils occur together in so intricate a pattern that it is not practical to separate them in mapping. The Saffell soil has the profile described as representative for the series. The Guin soil has a profile similar to the one described as representative for the series. The Saffell soil is generally in the middle part of slopes and makes up about 45 percent of most areas. The Guin soil is generally on the upper one-third of slopes and makes up about 35 percent of most areas. Included are Brandon, Lexington, Memphis, Loring, and Ruston soils on the lower parts of the slopes. They make up about 20 percent of most areas.

Also included in mapping are small areas of soils in bottoms along natural drainageways and small areas of moderately or severely eroded soils. In the west

central part of Marshall County on the side slopes south of the flood plain of East Fork of the Clarks River, areas of clayey soils are included in mapping. The clay comes to the surface in places but is overlain by a thin gravelly layer or a thin silty and gravelly layer.

These soils are shallow or moderately deep to very gravelly material that limits root penetration. They are low to very low in natural fertility, low in organic-matter content, and strongly acid to very strongly acid.

Most of these soils have never been cleared of trees. The soils in this complex are not suited to cultivated crops because of the gravel content and slope. They are poorly suited to pasture and can be grazed only to a very limited extent. Unless cover is maintained, the hazard of erosion is very severe. Woodland and wildlife habitat are suitable uses. (Capability unit VIIs–1; woodland suitability group 7)

Swamp

Swamp (Sw) is a miscellaneous land type consisting of low-lying areas that are under water most of the year and are usually in woodland. All trees except cypress show damage from ponded water. The soil material is gray and bluish gray. Because of the standing water no soil identification is made. These areas are important to some forms of wildlife. Around the Calvert City industrial complex, waste materials are pumped into these swampy areas. (Capability unit VIIw–1; woodland suitability group 10)

Urban Land

Urban land (Ur) is a miscellaneous land type consisting of areas graded off or filled with earth, gravel, or both, and then smoothed. Urban land generally lies in and around cities, towns, industrial sites, and housing developments. It has been so altered or obscured by urban works and structures that identification of soils is no longer feasible. Some areas north of Murray and southwest of Benton are used as city dumps, and the trash is covered by a mixture of earth and gravel from nearby sources. (Woodland suitability group 10; not placed in a capability unit)

Vicksburg Series

The Vicksburg series consists of nearly level to gently sloping, well-drained soils on flood plains. They formed in material washed from loess.

In a representative profile, the surface layer is brown silt loam about 8 inches thick. The underlying material extends to a depth of 50 inches. It is dark grayish-brown silt loam in the upper 6 inches and dark-brown silt loam below.

The rooting zone is deep, available moisture capacity is high, and permeability is moderate. Natural fertility is high. Organic-matter content is low. These soils are strongly acid throughout. They are easy to cultivate. Some areas are subject to flooding, but seldom during the growing season.

Representative profile of Vicksburg silt loam on Clayton Creek bottom lands, 1.25 miles east of Murray:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C1—8 to 14 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C2—14 to 23 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, wavy boundary.

C3—23 to 50 inches, dark-brown (10YR 3/3) silt loam; common, medium, faint, yellowish-brown (10YR 5/4) mottles; massive, but has bedding planes; very friable; strongly acid.

The Ap horizon has a value of 3 or 4 and a chroma ranging from 2 to 4. The C horizon is generally 10YR in hue, but it ranges from 10YR to 7.5YR in hue, from 3 to 5 in value, and from 3 to 4 in chroma. The C3 horizon is mottled yellowish brown or pale brown. In some profiles gray mottles are in the C3 horizon at a depth below 30 inches.

The Vicksburg soils are closely associated with the Collins, Falaya, Waverly, Ochlockonee, Iuka, and Mantachie soils. They have textures similar to the Collins, Falaya, and Waverly soils, but are better drained. They contain less sand and gravel in the upper 3 feet of the profile than the Ochlockonee, Iuka, and Mantachie soils.

Vicksburg silt loam (0 to 4 percent slopes) (Vb).—This deep, well-drained soil is on level flood plains. Included in mapping are small areas of Collins, Falaya, Ochlockonee, and Iuka soils. Also included are small areas, mostly near the adjoining uplands or at slightly higher elevations near streams, in which the underlying layers are lighter colored and slightly higher in clay content than those of Vicksburg silt loam. These layers have a subangular blocky structure.

Most of the acreage of this soil is cleared and used for cultivated crops. Some areas are used for rotation pasture and meadow, and a small acreage is in trees.

This soil is suited to all of the crops commonly grown in these counties. (Capability unit I-1; woodland suitability group 1)

Waverly Series

The Waverly series consists of nearly level, poorly drained soils on flood plains. They formed in material washed from loess.

In a representative profile, the surface layer is mottled, light-gray silt loam about 9 inches thick. The subsoil is silt loam to a depth of 50 inches. It is light gray with yellowish-brown mottles to a depth of 35 inches, and light brownish gray mottled with reddish yellow in the lower part.

These soils have a deep rooting zone, high available moisture capacity, moderate permeability, low natural fertility, and low organic-matter content. They are strongly acid or very strongly acid throughout. Spring floods and a seasonal water table at or within 6 inches of the surface generally delay cultivation in spring and limit the kinds of crops that are suited to these soils. These soils are subject to flooding.

Representative profile of Waverly silt loam, one-eighth mile east of the railroad tracks and one-fourth mile southwest of Murray sewage disposal plant:

Ap—0 to 9 inches, light-gray (10YR 6/1) silt loam; common, fine, distinct, brownish-yellow (10YR 6/6) mottles; weak, fine, granular structure; friable; strongly acid; few dark-brown concretion stains; gradual, wavy boundary.

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B21g—9 to 24 inches, light-gray (5Y 6/1) silt loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; friable; very strongly acid; few dark-brown and black concretions; gradual, wavy boundary.

B22g—24 to 35 inches, light-gray (5Y 7/1) silt loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, angular blocky and granular structure; friable; few, hard, dark-brown and black concretions; very strongly acid; gradual, wavy boundary.

B3g—35 to 50 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct, reddish-yellow (7.5YR 6/6) mottles; weak, fine, angular blocky structure and moderate, fine, granular structure; friable; few, hard, black concretions; strongly acid.

The Ap horizon ranges from 4 to 6 in value and from 1 to 3 in chroma. The B horizon ranges from 10YR to 5Y in hue, from 5 to 8 in value, and from 0 to 3 in chroma. Compact layers are at a depth below 3 feet in some places.

Waverly soils are closely associated with Falaya, Collins, Vicksburg, Iuka, Mantachie, and Bibb soils. They are more poorly drained than all these soils except the Bibb soils. They are less sandy than the Bibb, Iuka, and Mantachie soils.

Waverly silt loam (0 to 2 percent slopes) (Wa).—This deep, poorly drained soil is on flood plains. Included in mapping are small areas of Falaya, Mantachie, and Bibb soils.

Much of the acreage is cleared and used for continuous cultivated crops. Some areas are used for meadow and rotation pasture, and a fairly large part is in woodland. This soil is suited only to plants that tolerate wetness. Drainage by tile and open ditches allows a wide selection of crops. (Capability unit IIIw–3; woodland suitability group 2)

Wheeling Series

The Wheeling series consists of well-drained, nearly level to sloping soils on stream terraces. They developed in mixed alluvium dominantly from loess and Coastal Plain sediments. In northern Marshall County, some of the alluvium is from sediments in a prehistoric lake.

In a representative profile, the surface layer is dark yellowish-brown silt loam about 6 inches thick. The next layer extends to a depth of 50 inches. In sequence from the top, it consists of yellowish-brown silt loam about 8 inches thick, brown silt loam about 5 inches thick, dark yellowish-brown silty clay loam about 18 inches thick, and brown heavy silt loam about 13 inches thick.

These soils have a deep rooting zone, moderate permeability, and high available moisture capacity. They are moderate in natural fertility, and they are strongly acid or very strongly acid throughout.

Representative profile of Wheeling silt loam, 0 to 2 percent slopes, one-half mile west of General Analine and Film Company on the south side of State Route 1523, northeast of railroad spur lines into industrial plants:

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

A2—6 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure and weak, very fine, subangular blocky structure; very friable; strongly acid; abrupt, smooth boundary.

B1—14 to 19 inches, brown (7.5YR 4/4) heavy silt loam; moderate, fine, angular blocky structure; friable; strongly acid to very strongly acid; clear, wavy boundary.

B2t—19 to 37 inches, dark yellowish-brown (10YR 4/4) silty clay loam; strong, medium and fine, subangular blocky structure; friable; common thin clay films; common dark organic stains; very strongly acid; gradual, wavy boundary.

B3t—37 to 50 inches, brown (7.5YR 4/4) heavy silt loam; common, fine, faint, light yellowish-brown (10YR 6/4) mottles; weak, medium, subangular blocky structure; few thin clay films; very strongly acid.

The Ap horizon ranges in color from dark yellowish brown (10YR 4/4) to brown (10YR 4/3 or 10YR 5/3). Some profiles have an A2 horizon that is brown (10YR 5/3). The texture of the B1 horizon is silt loam or silty clay loam, and it is lacking in some profiles. The color of the B2t horizon is strong brown (7.5YR 5/6) in some profiles, and the texture is heavy silt loam, clay loam, or sandy clay loam.

The annual temperature of these soils is a few degrees warmer than the range defined for the series, but this difference does not alter their usefulness and behavior.

Wheeling soils are closely associated with Grenada and Calloway soils. They have a slightly higher content of sand and are better drained than the moderately well drained Grenada soils and somewhat poorly drained Calloway soils.

Wheeling silt loam, 0 to 2 percent slopes (WhA).—This deep, well-drained soil has the profile described as representative for the series.

Included in mapping are small areas of loam and fine sandy loam surface soils and small areas of Grenada silt loam.

Much of the acreage soil is used for industrial developments. It is well suited to this use as well as to all farming uses. This soil is suited to all of the commonly grown crops. (Capability unit I–1; woodland suitability group 5)

Wheeling silt loam, 2 to 6 percent slopes (WhB).—This deep, well-drained soil has a profile similar to the one described as representative for the series, except the surface layer is generally thinner and lighter in color.

Included in mapping are small areas of soils that have a loam or fine sandy loam surface layer and a sandy loam subsoil. Also included are moderately eroded areas where the Ap horizon is a mixture of original surface layer and subsoil and is generally 4 to 6 inches thick. The plow layer in these eroded areas has a slightly heavier texture and contains less organic matter. Much of the acreage of this soil is used for cultivated crops, meadow, and rotation pasture, but part near the Tennessee River is used for industrial development. It is well suited to these uses. This soil is suited to all of the commonly grown crops. There is a moderate hazard of erosion if cultivated crops are grown. (Capability unit IIe–1; woodland suitability group 5)

Wheeling silt loam, 6 to 12 percent slopes (WhC).—The profile of this deep, well-drained soil has a thinner and lighter colored surface layer than the one described as representative for the series.

Included in mapping are small areas where the surface layer is loam or fine sandy loam. In some of these areas, the subsoil is sandy loam. Also included are moderately eroded areas where the plow layer has a slightly heavier texture and contains less organic matter than is in the representative profile of the series.

Most of the acreage is used for cultivated crops, meadow, and rotation pasture. This soil is suited to most

of the commonly grown crops. If cultivated crops are grown, the hazard of erosion is severe. (Capability unit IIIe–1; woodland suitability group 5)

Wheeling silty clay loam, 6 to 12 percent slopes, severely eroded (WnC3).—The profile of this deep, well-drained soil differs from the one described as representative for the series in that the surface layer is mostly dark yellowish-brown silty clay loam subsoil.

Included in mapping are small areas where the surface layer is silt loam, loam, or fine sandy loam. Also included are some soils that have a sandy loam subsoil.

This soil has a very low organic-matter content. It needs to be worked within a narrow range of soil moisture content to prevent clodding. Surface crusting often causes poor germination of seeds and poor survival of seedlings, especially those planted in the spring months.

This soil is used for cultivated crops, meadow, and pasture, but some of the acreage is idle or in second-growth woodland. This soil is suited to the commonly grown crops, but cultivated crops should be grown only occasionally because the hazard of erosion is very severe. Pasture and hay are better suited. (Capability unit IVe–1; woodland suitability group 6)

Use and Management of the Soils

This section contains information about the use and management of the soils of Calloway and Marshall Counties for crops and pasture, for woodland, for wildlife habitat, for engineering purposes, and for town and country planning. It explains the system of capability classification used by the Soil Conservation Service and gives predicted yields of the principal crops grown in the area under two levels of management.

This section also groups the soils according to their suitability for woodland and wildlife habitat. It has tables that rate the soils for farm and nonfarm uses and for recreation, and it has a section that gives information about soils significant in engineering.

Use of the Soils for Crops and Pasture [2]

Some principles of management are general enough to apply to the soils on all the farms in the survey area, though the individual soils or groups of soils require different kinds and degrees of management.

On many soils in the survey area, 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.

Most of the soils of Calloway and Marshall Counties 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 rooting 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. Practices helpful in preventing a breakdown of structure are the addition of organic matter and the growing of sod crops, cover crops, and green-manure crops.

All of the sloping, cultivated soils in the survey area are subject 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 of the other practices of erosion control. These practices are contour farming, terracing, stripcropping, construction of diversions, grassing of waterways, using minimum tillage, (fig. 13), using crop residue effectively, seeding cover crops, and applying fertilizer and lime if needed.

On most wet soils in the survey area, 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. Drainage by either tile or open ditches requires suitable outlets.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when

Figure 13.—With minimum tillage, this field of Falaya silt loam and Calloway silt loam, 0 to 2 percent slopes, produced 75 bushels of corn per acre.

[2] WALTER J. GUERNSEY, conservation agronomist, Soil Conservation Service, helped prepare this section.

used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering uses.

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

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. There are no class V soils in Calloway and Marshall Counties.

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

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

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. There are no class VIII soils in Calloway and Marshall Counties.

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

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

CAPABILITY UNITS are soils 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–3 or IIIe–3. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Calloway and Marshall Counties are described and suggestions for the use and management of the soils are given.

CAPABILITY UNIT I–1

This unit consists of soils of the Collins, Huntington, Iuka, Ochlockonee, Vicksburg, and Wheeling series. These are nearly level to gently sloping, well drained and moderately well drained soils on flood plains and stream terraces.

Soils in this unit have a deep rooting zone, high available moisture capacity, and low to medium organic-matter content. They are strongly acid or very strongly acid, except for Huntington silt loam, which ranges from medium acid to neutral. The soils can be cultivated throughout a wide range of moisture content without clodding or crusting. Some areas are subject to flooding, and the Iuka and Collins soils have a seasonal water table ranging from 18 to 24 inches below the surface. There is no hazard of erosion on these soils.

These soils have a good response to the use of fertilizer, and lime is needed for all the soils of this unit except the Huntington soils. The soils in this unit are well suited to the row crops and hay and pasture plants commonly grown in the area. Tobacco and corn can be grown continuously.

The general principles of management that apply to liming, using fertilizer, maintaining soil structure, and applying organic matter are adequate for conserving the soils in this unit.

CAPABILITY UNIT IIe–1

This unit consists of Memphis and Wheeling soils that are gently sloping and well drained. These soils have a deep rooting zone, high available moisture capacity, and low organic-matter content, and they are strongly acid to very strongly acid. Tilth is easily maintained.

If lime and fertilizer are added, these soils are well suited to the crops and pasture and meadow plants commonly grown in the survey area. These include tobacco, small grains, and grasses and legumes such as Kentucky

31 tall fescue, orchardgrass, timothy, red clover, sericea lespedeza, Korean lespedeza, alfalfa, smooth bromegrass, and ladino clover. The erosion hazard is moderate if these soils are cultivated; therefore, a cropping system and conservation practices that control soil loss are needed.

CAPABILITY UNIT IIe–2

This unit consists of Grenada silt loam, 2 to 6 percent slopes. It is a moderately well drained soil. A compact fragipan restricts root growth and water movement and causes a water table to form at a depth of 18 to 24 inches in wet seasons. Available moisture capacity is moderate, organic-matter content is low, and reaction is strongly acid to very strongly acid. This soil is easily tilled and can be worked under a wide range of moisture content without clodding or crusting.

This soil is suited to most crops commonly grown in the survey area, such as corn, small grain, and tobacco. Some of the suitable pasture and meadow plants are smooth bromegrass, Kentucky 31 fescue, orchardgrass, timothy, red clover, ladino clover, white clover, and Korean lespedeza.

Crops respond well to the use of lime and fertilizer. Alfalfa stands tend to die out after 2 to 3 years because of the restricted rooting depth and wetness. The hazard of erosion is moderate if this soil is cultivated; therefore, a cropping system and erosion control practices are needed that will reduce soil loss.

CAPABILITY UNIT IIe–3

This unit consists of gently sloping, slightly eroded and moderately eroded Loring soils. They are moderately well drained. A fragipan at a depth of 24 to 35 inches restricts root growth and water movement. The soils have a moderately deep rooting zone, moderately slow permeability in the fragipan layer, and a moderate available moisture capacity. Organic-matter content is low, and reaction is strongly acid. The eroded soil has a somewhat narrow range of soil moisture content at which it can be worked without clodding and crusting.

These soils are suitable for most crops commonly grown in the survey area, such as tobacco, corn, and small grain. Some of the suitable pasture and meadow plants are smooth bromegrass, Kentucky 31 tall fescue, orchardgrass, timothy, alfalfa, red clover, white clover, and Korean lespedeza.

Crops respond well to the use of lime and fertilizer. The erosion hazard is moderate to severe if these soils are cultivated; therefore, a cropping system and erosion control practices are needed that will reduce soil loss.

CAPABILITY UNIT IIw–1

The unit consists of Grenada silt loam, 0 to 2 percent slopes, a moderately well drained soil. It has a fragipan which restricts root growth and water movement and causes a water table to form at a depth of 18 to 24 inches in wet seasons. This soil has moderate available moisture capacity, is low in organic-matter content, and is strongly acid to very strongly acid. This soil can be worked throughout a wide range of soil moisture content without clodding or crusting. There is little or no hazard of erosion on this soil.

The soil in this unit is suited to most of the crops and pasture and meadow plants common in the area. Tobacco and corn may be grown continuously without damaging the soil. Pasture and meadow plants that withstand slight wetness are well suited to this soil. Some of these are Kentucky 31 tall fescue, redtop, red clover, alsike clover, ladino clover, Korean lespedeza, Kobe lespedeza, and reed canarygrass. Alfalfa and orchardgrass stands tend to thin out after two to three years.

Using practices that benefit soil structure and supply organic matter and providing surface drainage are important in managing this soil. Crops respond well to the use of lime and fertilizer.

CAPABILITY UNIT IIw–2

This unit consists of Falaya, Mantachie, and Newark soils. They are nearly level, somewhat poorly drained, silty soils on flood plains. The soils in this unit have a deep rooting zone and high available moisture capacity. They are low in organic-matter content and are slightly acid to strongly acid. They have a water table at a depth of 6 to 18 inches in wet seasons.

If adequate drainage is provided, these soils are suited to most of the crops and pasture and meadow plants commonly grown in the area. Tobacco and corn may be grown continuously without damaging the soil. If the soils are artificially drained, crops respond well to the use of fertilizer. There is some hazard of damage to crops from flooding.

Plants that withstand slight wetness are well suited to these soils. Some of these are Kentucky 31 tall fescue, redtop, red clover, alsike clover, ladino clover, Korean lespedeza, Kobe lespedeza, and reed canarygrass. Alfalfa, orchardgrass, and small grain crops are not well suited to the soils of this unit because of seasonal wetness and flooding late in winter and early in spring.

Practices that aid soil structure and supply organic matter and provide adequate drainage are important in managing these soils.

CAPABILITY UNIT IIs–1

This unit consists of Ochlockonee gravelly loam, a somewhat droughty soil on flood plains. This soil has a deep rooting zone, low available moisture capacity, and low organic-matter content. It is strongly acid. Gravel makes up 20 to 50 percent of the volume throughout. The high gravel content makes tillage somewhat difficult, dulls tillage implements, and reduces the moisture-supplying capacity of the soil.

This soil is suited to all the row crops and pasture and hay plants commonly grown in the survey area. Tobacco or corn may be produced under continuous cultivation without damage to the soil.

Crops respond fairly well to additions of lime and fertilizer. In some years flooding during the growing season damages crops. There is no erosion hazard on this soil. Practices that benefit soil structure and the content of organic matter are important in managing these soils.

CAPABILITY UNIT IIs–2

This unit consists of Egam silty clay loam, a nearly level, moderately well drained, fine-textured soil on flood plains. This soil has a deep rooting zone and is medium in organic-matter content. The reaction ranges from medium acid to neutral. Permeability is moderately slow, and the available moisture capacity is high.

This soil is suited to all the row crops and pasture and hay plants commonly grown in the survey area. Tobacco and corn can be produced under continuous cultivation without damage to the soil.

Crops respond well to the use of lime and fertilizer. Flooding during the growing season damages crops in some years. There is no erosion hazard. Timely tillage, practices that supply organic matter, and the arrangement of crop rows for best surface drainage are important in managing this soil. The heavy silty clay loam plow layer should be worked within a somewhat narrow range of soil moisture content to prevent clodding.

CAPABILITY UNIT IIIe-1

This unit consists of Brandon, Lexington, Loring, Memphis, and Wheeling soils. These soils have slopes, and all except Loring soils are well drained. Loring soil is moderately well drained. These soils have a deep to moderately deep rooting zone. Permeability of the subsoil is moderate to a depth of about 30 inches, but ranges from moderately slow to rapid below this depth. The Loring soils in this unit have a fragipan at a depth of about 29 inches. These soils are low in organic-matter content and are strongly acid to very strongly acid. Tilth is easily maintained, but crusting is a slight problem on the moderately eroded soils.

The soils in this unit are suited to most of the crops grown in the survey area, such as tobacco, corn, and small grain. They are suited to pasture and meadow plants, such as smooth bromegrass, Kentucky 31 tall fescue, orchardgrass, timothy, alfalfa, red clover, ladino clover, white clover, and Korean lespedeza.

If these soils are cultivated, the erosion hazard is severe; therefore, a cropping system and erosion control practices are needed that will reduce soil loss. Crops on these soils respond well to additions of lime and fertilizer.

CAPABILITY UNIT IIIe-2

This unit contains sloping soils of the Grenada and Lax series. These soils are moderately well drained. A fragipan at a depth of about 2 feet restricts root growth and water movement. These soils have a moderately deep rooting zone and are moderately permeable above the fragipan. Permeability in the fragipan is slow. The soils are low in organic-matter content and are strongly acid to very strongly acid.

The soils in this unit are suited to most crops grown in these two counties. These include tobacco, corn, small grain, and pasture and meadow plants, such as orchardgrass, timothy, ladino clover, red clover, Kentucky 31 tall fescue, sericea lespedeza, Kobe lespedeza, and Korean lespedeza. Alfalfa stands tend to thin out after 2 or 3 years.

There is a severe erosion hazard if these soils are cultivated. A cropping system and erosion control practices are needed that will reduce soil loss. Crops respond well to additions of lime and fertilizer.

CAPABILITY UNIT IIIe-3

This unit consists of Grenada silt loam, 2 to 6 percent slopes, severely eroded, a moderately well drained soil. A compact fragipan hinders root growth and water movement and causes a perched water table 14 to 20 inches below the surface. Natural fertility is low, and organic-matter content is very low. The soil is easy to cultivate. It is strongly acid to very strongly acid.

This soil is suitable for most crops and for pasture and meadow plants produced in the county. These include tobacco, corn, small grains, and pasture and meadow plants such as orchardgrass, Kentucky 31 tall fescue, timothy, ladino clover, red clover, Kobe lespedeza, Korean lespedeza, and sericea lespedeza.

The soil should be worked within a narrow range of soil moisture content to prevent clodding or crusting. Surface crusting often prevents the emergence and survival of seedlings. The erosion hazard is severe if these soils are cultivated; therefore, a cropping system and proper erosion control practices are needed to reduce soil loss. Crops respond fairly well to well if lime and fertilizer are added.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level Calloway and McGary soils. These soils are somewhat poorly drained. A compact fragipan in the Calloway soil and the high clay content of the McGary soil hinder root growth and water movement and cause a perched water table to form in wet seasons at a depth of 6 to 18 inches. Permeability is slow. These soils are low in organic-matter content. The Calloway soil is very strongly acid throughout; the McGary soil is strongly acid or very strongly acid in the upper horizons and medium acid to mildly alkaline at a depth below 18 inches. These soils are difficult to drain because of slow permeability in the subsoil.

These soils are suited to crops that will tolerate some wetness or that have a short growing season. Corn, soybeans, and small grains can be grown on these soils. Suitable pasture and meadow plants include Kentucky 31 tall fescue, redtop, red clover, alsike clover, ladino clover, Korean and Kobe lespedeza, and reed canarygrass.

There is no hazard of erosion, and these soils can be used for continuous cultivation. Using practices that benefit soil structure and supply organic matter and providing adequate surface drainage are important in managing these soils. Many of the commonly grown row crops respond well to additions of lime and fertilizer.

CAPABILITY UNIT IIIw-2

This unit consists of gently sloping Calloway soils that are both uneroded and eroded. These soils are somewhat poorly drained. Most slopes are 2 to 3 percent. A dense, compact fragipan hinders root growth and causes a perched water table to form within the rooting zone in wet seasons. Permeability is moderate above the fragipan, but slow within it. These soils are low in organic-matter content.

The soils are suited to crops that will tolerate some wetness or have a short growing season. Such crops are soybeans, corn, and small grain. Suitable pasture and meadow plants include tall fescue, redtop, red clover, alsike clover, ladino clover, Korean and Kobe lespedeza, and reed canarygrass.

There is a moderate erosion hazard if these soils are cultivated. An artificial drainage system can be used to control soil loss. Most crops respond well to additions of lime and fertilizer.

CAPABILITY UNIT IIIw–3

This unit consists of nearly level, poorly drained soils on flood plains. These soils are of the Bibb, Melvin, and Waverly series. The soils in this unit have a silt loam surface layer, except for Bibb loamy fine sand, overwash, which has a sandy surface layer ranging in thickness from 6 to 12 inches. These soils are high in available moisture capacity, moderately permeable, and low to very low in organic-matter content. They are strongly acid, except for Melvin soil, which is medium acid to neutral.

Without artificial drainage, these soils are poorly suited to most row crops. Artificial drainage generally will not alleviate the wetness hazard enough for growing tobacco and small grain. Corn or soybeans can be grown on these soils continuously without damage to the soil. Grasses and legumes suited to these soils include timothy, Korean and Kobe lespedeza, Kentucky 31 tall fescue, redtop, reed canarygrass, alsike clover, and ladino clover.

Proper use of lime and fertilizer and practices that benefit soil structure and supply organic matter are important in managing these soils. The main limitations to use of these soils are a water table at or near the surface in winter and spring months and the risk of crop damage by flooding. It is feasible to partly drain these soils artificially, but suitable sites for drainage outlets are often not available and a suitable drainage system is costly. There is no erosion hazard.

CAPABILITY UNIT IVe–1

This unit consists of severely eroded, sloping soils of the Brandon, Lexington, and Wheeling series. These soils are well drained. They have a silty clay loam plow layer which is mostly subsoil. Gullies have formed in some areas. The soils in this unit are very low in organic-matter content and have low available moisture capacity and poor tillage qualities. Surface crusting often prevents the emergence of seedlings, especially those planted in spring. The soils are strongly acid to very strongly acid.

These soils are suited to most crops and pasture plants common in the survey area. Suitable crops include tobacco, corn, and small grain. Orchardgrass, timothy, red clover, alfalfa, Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza are suitable grasses and legumes.

The erosion hazard is very severe if these soils are cultivated. They are, therefore, suited to only occasional cultivation. If these soils are cultivated, a cropping system and management practices that help control erosion are needed. Growing grasses and legumes that add organic matter to the plow layer reduces surface crusting and improves tilth. Additions of lime and fertilizer are needed to ensure survival and growth of plants.

CAPABILITY UNIT IVe–2

This unit consists of sloping, moderately well drained, severely eroded soils of the Grenada and Lax series. They have a brittle, compact fragipan at a depth of 12 to 20 inches, and the plow layer is mostly subsoil. Gullies have formed in some areas. The soils in this unit are very low in organic-matter content, have a low available moisture capacity, and are slowly permeable in the fragipan. Surface crusting often prevents emergence of seedlings, especially if they are planted in spring. These soils are strongly acid to very strongly acid.

These soils are suited to most crop and pasture plants grown in the county. These include tobacco, corn, small grains and such grasses and legumes as orchardgrass, timothy, red clover, Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza.

These soils are suited to only occasional cultivation because of a very severe erosion hazard; therefore a suitable cropping system and erosion control practices are needed. Growing grasses and legumes that add organic matter to the plow layer reduces crusting. Additions of lime and fertilizer are needed to ensure survival and growth of plants.

CAPABILITY UNIT IVw–1

This unit consists of nearly level, poorly drained soils. These soils are of the Forestdale, high clay variant, and Henry series. They have a fragipan of clayey subsoil that keeps a perched water table at or near the surface during the winter and spring months. These soils are low in organic-matter content and are very strongly acid to extremely acid.

These soils are poorly suited to most row crops. Pasture and meadow plants suitable for growing on these soils include Kentucky 31 tall fescue, reed canarygrass, redtop, alsike clover, ladino clover, and Korean and Kobe lespedeza. If these soils are adequately drained, corn or soybeans can be grown year after year without damage to the soil because there is no erosion hazard.

Management practices that benefit soil structure and supply organic matter are needed. The main limitation to use of these soils is wetness. This is difficult to correct because of slow water movement through the subsoil and the lack of suitable outlets for an artificial drainage system.

CAPABILITY UNIT IVs–1

This unit is made up of gently sloping or sloping, excessively drained to well-drained, gravelly soils on uplands and stream terraces. These are Guin soils and Saffell-Guin complexes. They are low in natural fertility, low in organic-matter content, and strongly acid to very strongly acid throughout. Permeability is rapid to moderate, and the available moisture capacity is low to very low, because of the large amount of gravel in the subsoil. The gravelly surface layer makes tillage somewhat difficult and dulls tillage implements.

These soils are poorly suited to crops, such as corn, wheat, and tobacco. They are better suited to pasture and hay plants, such as Kentucky 31 tall fescue, sericea lespedeza, red clover, Korean lespedeza, and redtop.

Seeding of pasture and hay is generally more successful in spring than in fall because of the more favorable moisture conditions. There is a moderate to severe erosion hazard if these soils are cultivated. A suitable cropping system and erosion control practices help control soil loss.

CAPABILITY UNIT VIe–1

This unit consists of moderately steep, well-drained Brandon, Lexington, and Ruston soils. All soils in this unit are low in organic-matter content, moderate to low in natural fertility, and strongly acid to very strongly acid. They are very erodible.

The soils in this unit are not suited to row crops because of the hazard of excessive erosion. They are suited to pasture and hay plants. Orchardgrass, timothy, red clover, sweet clover, and Korean lespedeza are suited to these soils, but Kentucky 31 tall fescue and sericea lespedeza are better suited because they provide better vegetative cover for the soil.

Because of the erosion hazard, management of vegetation for ground cover is important. Pasture mixtures that produce satisfactory forage and require the least renovation are needed. Grazing should be managed to maintain a 3-inch minimum of vegetative cover. Rest should be provided after each grazing period to allow regrowth of the plants.

CAPABILITY UNIT VIs–1

This unit consists of excessively drained to well-drained, gravelly and cherty soils on uplands. These soils are of the Bodine, Guin, and Saffell series. They are low in organic-matter content, very low to low in natural fertility, and very low to low in available moisture capacity. They are strongly acid to very strongly acid. Plants give only fair response to the use of lime and fertilizer because of droughtiness. These soils are difficult to till because of the coarse fragments in the surface layer.

These soils are too cherty or gravelly and erodible to use for cultivated crops. The chert or gravel interferes with tillage and makes preparation of the seedbed for hay crops difficult. These soils are more suitable for pasture, woodland, or wildlife habitat. Orchardgrass, red clover, and Korean lespedeza can be grown, but the stands are not vigorous. They are short lived and the pasture needs to be renovated frequently. Kentucky 31 tall fescue and sericea lespedeza grow better than the other plants and provide better vegetative cover.

Because of the erosion hazard, management of vegetation for ground cover is important. Pasture mixtures should be selected that will produce satisfactory forage and ground cover and require the least renovation. Grazing should be managed to maintain a 3-inch minimum of vegetative cover. Rest should be provided after each grazing period to allow regrowth of the plants.

CAPABILITY UNIT VIIe–1

This unit consists of steep, well-drained soils of the Brandon, Lexington, and Ruston series and Alluvial land. The Brandon, Lexington, and Ruston soils are on uplands. Alluvial land consists mostly of strongly sloping to steep soils on terrace breaks to the flood plains along the larger streams. The soils in this unit, including Alluvial land, have a deep to moderately deep rooting zone, a high to moderate available moisture capacity, and moderate to moderately rapid permeability. They have excessive runoff and are severely eroded unless good ground cover is maintained.

The soils in this unit are not suitable for cultivated crops because of steepness and the risk of damage to the soil by erosion. They are suitable for pasture, but are better suited to woodland or wildlife habitat. Of the pasture plants commonly grown in the area, Kentucky 31 tall fescue and sericea lespedeza are suitable for use on these soils.

Because of steep slopes and risk of erosion, management of vegetation for ground cover is important. If these soils are used for pasture, mixtures should be selected that will produce satisfactory forage and ground cover and require the least frequent renovation of the pasture. The steep slope makes it extremely difficult to operate farm machinery in the pastures. Consequently, mowing for weed control and the spreading of fertilizer and lime are difficult, costly, and in places, hazardous.

If these soils are used for pasture, grazing should be managed to maintain a 3-inch minimum of vegetative cover. Rest should be provided after each grazing period to allow regrowth of the plants.

CAPABILITY UNIT VIIe–2

This unit consists of severely eroded, moderately steep, well-drained soils of the Brandon and Lexington series. These soils have a very low organic-matter content and are strongly acid to very strongly acid. As a result of erosion, the plow layer is mostly silty clay loam subsoil. Surface crusting often prevents emergence of seedlings; therefore, vegetative cover is frequently sparse.

The soils in this unit are not suited to cultivated crops, because of steepness and the severe hazard of erosion. These soils have limited suitability for pasture. Of the pasture plants commonly grown in the two counties, Kentucky 31 tall fescue and sericea lespedeza are suitable.

Because of steep slopes and the risk of erosion, management of the vegetation is very important. Pasture plant mixtures should be selected that produce satisfactory forage and ground cover and require the least frequent renovation of the pasture. The steepness of slopes and the gullies in some areas make it extremely difficult to operate farm machinery in the pastures. As a result, mowing for weed control and the spreading of fertilizer and lime are difficult, costly, and in places, hazardous.

If the soils are used for pasture, grazing should be managed to maintain a 3-inch minimum of vegetative cover. Rest should be provided after each grazing period to allow regrowth of the plants.

CAPABILITY UNIT VIIe–3

This unit consists of Gullied land, or areas having an intricate pattern of moderately deep to deep gullies. Included are a few areas that are relatively free of gullies but have extremely severe sheet erosion damage. Some narrow strips between the gullies are only moderately eroded, and some have narrow strips of alluvial soils. In most places the lower part of the subsoil or the underlying gravelly or sandy material is exposed.

Some areas have been planted to pine trees (fig. 14), but most are left idle or have reverted to woodland. These areas seldom can be reclaimed economically for pasture use. They are mostly suitable for woodland or wildlife habitat.

CAPABILITY UNIT VIIw–1

This unit is made up of Swamp, a miscellaneous land type. It consists of low-lying areas that are covered by standing water much of the year, and they are commonly forested. All trees, except Cypress, are damaged by the

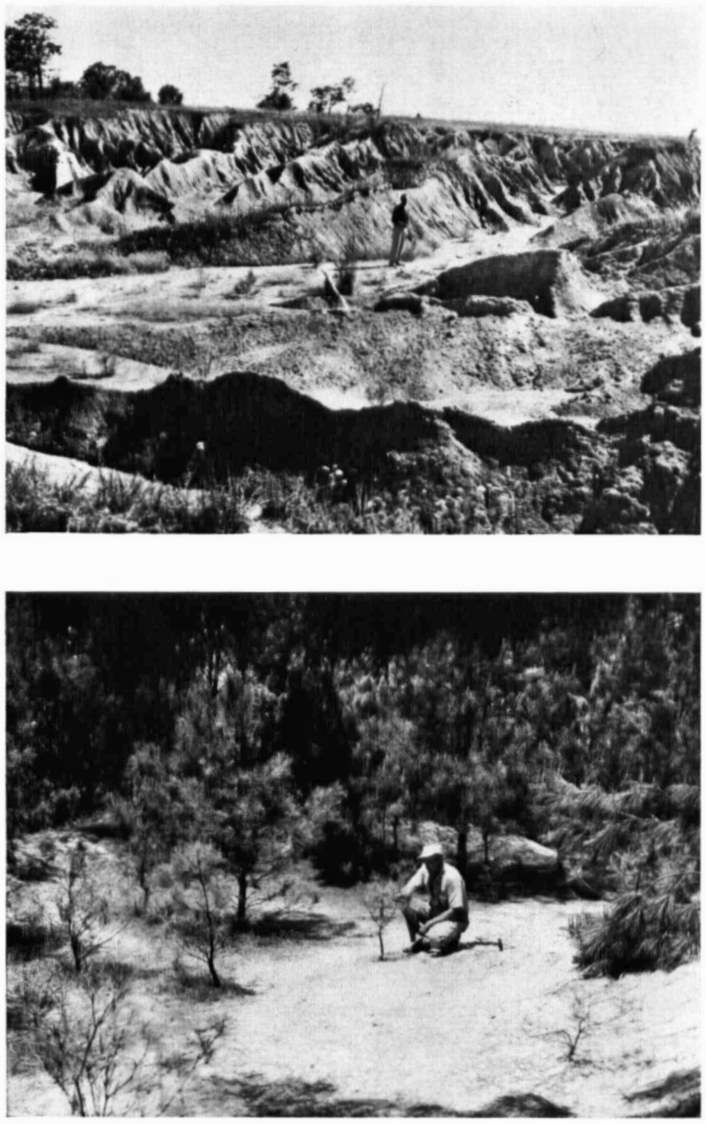

Figure 14.—Gullied land. *Top,* view of land in 1957; *bottom,* the same farm 8 years later shows gullies almost completely stabilized by planted pines.

excess water. The soil materials are continuously saturated, except during extended dry periods. These areas are not suited to cultivated crops, pasture, or hay. Cypress trees grow well, and they are important to some kinds of wildlife.

CAPABILITY UNIT VIIs-1

This unit consists of steep to very steep, excessively drained and well drained, gravelly and cherty soils of the Bodine, Guin, and Saffell series. They are very low in natural fertility, are low in organic-matter content, have very low to low available moisture capacity, and are droughty. They are strongly acid to very strongly acid.

These soils are not suited to cultivated crops or meadow and are poorly suited to pasture. They are better suited to woodland and wildlife habitat. Most areas are in woodland. Kentucky 31 tall fescue and sericea lespedeza are the pasture plants most suitable for use on these soils; however, the amount of forage produced is usually low.

Steep slopes and the high content of coarse fragments are the chief limitations to the use of these soils. The maintenance of ground cover is needed to prevent erosion. If soils are used for pasture, grazing should be managed to maintain a 3-inch minimum cover of vegetation. Rest should be provided after each grazing period to allow regrowth of the plants.

Estimated yields

The estimated average yields for the crops most commonly grown in Calloway and Marshall Counties under two levels of management are given in table 2. Yields for medium level of management are shown in columns A and for high level of management in columns B.

Yields given are the average that may be expected over several years. Yields for one year may be affected adversely by extremes of weather, insects, disease or some other disaster, or they may be extremely high because of a combination of good factors.

Comparison of yields in columns A with yields in columns B shows the differences that may be expected by improving management.

A high level of management includes (1) use of suitable recommended varieties; (2) proper seeding rates, inoculation of legumes, proper dates of planting, and efficient harvesting methods; (3) control of weeds, insects, and plant diseases; (4) application of fertilizer in amounts equal to or greater than current recommendations of the University of Kentucky Agricultural Experiment Station, or equal to or greater than the need shown by properly interpreted soil tests; (5) adequate applications of lime; (6) drainage of naturally wet soils if drainage is feasible; (7) cropping systems that control erosion and maintain soil structure, tilth, and organic-matter content; (8) control of erosion by means of minimum tillage, interseeding winter crops with row crops, contour tillage, terracing, contour stripcropping, and keeping grass in waterways; (9) use of cover crops and crop residue to increase supplies of organic matter and to control erosion; (10) use of all the applicable pasture management practices; and (11) use of other practices that may be suggested by representatives of the Agricultural Extension Service and the Soil Conservation Service in these counties.

The high level of management is one which will result in the highest sustained production that is economically feasible. It is not considered the maximum but is one that many farmers will find practical to reach if they choose to apply the proper practices.

The medium level of management is the management generally considered as the minimum that will keep the soil from deteriorating and producing sufficient crops for some profit.

The failure to adequately apply one or more of the listed items for high level of management may cause production level to drop and not return a profit and result in some permanent damage to the soil. Inadequate drainage or only partial application of runoff and erosion control practices are examples of deficiencies that relate to medium level of management.

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TABLE 2.—*Estimated average acre yields of principal*

[Yields in columns A can be expected under a medium level of management; yields in columns B can be expected under a high level of specified level of management. No estimates are given for Dumps, Guin

Soils	Corn		Popcorn		Wheat	
	A	B	A	B	A	B
	Bu.	*Bu.*	*Lb.*	*Lb.*	*Bu.*	*Bu.*
Alluvial land						
Bibb loamy fine sand, overwash	10	55				
Bibb silt loam	60	80	2,400	3,100		
Bodine cherty silt loam, 12 to 20 percent slopes						
Bodine cherty silt loam, 20 to 60 percent slopes						
Brandon silt loam, 6 to 12 percent slopes	60	80	2,300	2,900	25	35
Brandon silt loam, 12 to 20 percent slopes						
Brandon silt loam, 20 to 30 percent slopes						
Brandon silty clay loam, 6 to 12 percent slopes, severely eroded	40	55	1,500	2,200	15	25
Brandon silty clay loam, 12 to 20 percent slopes, severely eroded						
Brandon-Memphis-Loring silt loams, 2 to 12 percent slopes	60	90	2,400	3,600	25	35
Calloway silt loam, 0 to 2 percent slopes	60	90	2,400	3,600	20	35
Calloway silt loam, 2 to 6 percent slopes	65	85	2,300	3,400	22	37
Calloway silt loam, 2 to 6 percent slopes, eroded	50	70	2,000	2,800	22	37
Collins silt loam	85	110	3,400	4,000	35	40
Egam silty clay loam	95	105	3,800	4,000	30	40
Falaya silt loam	85	100	3,400	3,800	25	40
Forestdale silt loam, high clay variant	35	50	1,300	1,670		
Grenada silt loam, 0 to 2 percent slopes	80	100	3,200	4,000	25	40
Grenada silt loam, 2 to 6 percent slopes	80	100	3,200	4,000	35	40
Grenada silt loam, 2 to 6 percent slopes, severely eroded	60	80	2,600	3,000	20	30
Grenada silt loam, 6 to 12 percent slopes	65	85	2,700	3,200	25	30
Grenada silt loam, 6 to 12 percent slopes, severely eroded	40	60	1,600	2,200	15	25
Guin gravelly loam, 2 to 12 percent slopes	35	55	1,500	2,000	20	25
Henry silt loam	40	60	1,600	2,200		
Huntington silt loam	90	115	3,600	4,000	30	40
Iuka silt loam	75	100	3,000	4,000	30	40
Lax silt loam, 6 to 12 percent slopes	50	70	1,800	2,600	20	30
Lax silty clay loam, 6 to 12 percent slopes, severely eroded	35	50	1,100	1,800	15	20
Lexington silt loam, 6 to 12 percent slopes	65	80	2,600	3,300	25	30
Lexington silt loam, 12 to 20 percent slopes						
Lexington silty clay loam, 6 to 12 percent slopes, severely eroded	45	55	1,800	2,200	15	20
Lexington silty clay loam, 12 to 20 percent slopes, severely eroded						
Loring silt loam, 2 to 6 percent slopes	85	105	3,300	4,000	30	40
Loring silt loam, 2 to 6 percent slopes, eroded	80	100	3,200	4,000	25	40
Loring silt loam, 6 to 12 percent slopes, eroded	75	85	3,000	3,300	25	35
Mantachie silt loam	70	95	2,800	3,700	25	35
McGary silt loam	50	75	1,900	2,400	20	25
Melvin silt loam	65	85	2,600	3,400		
Memphis silt loam, 2 to 6 percent slopes	85	110	3,400	4,000	35	40
Memphis silt loam, 6 to 12 percent slopes, eroded	80	95	3,200	3,800	30	35
Newark silt loam	90	110	3,200	3,900		
Ochlockonee gravelly loam	55	80	2,300	3,100	25	30
Ochlockonee silt loam	85	105	3,400	4,000	35	40
Ruston fine sandy loam, 12 to 20 percent slopes						
Ruston fine sandy loam, 20 to 30 percent slopes						
Ruston-Lexington complex, 18 to 30 percent slopes						
Saffell-Guin complex, 6 to 12 percent slopes	35	55	1,000	1,800	15	25
Saffell-Guin complex, 12 to 20 percent slopes						
Saffell-Guin complex, 20 to 50 percent slopes						
Vicksburg silt loam	95	120	3,800	4,000	35	40
Waverly silt loam	65	85	2,600	3,400		
Wheeling silt loam, 0 to 2 percent slopes	90	110	3,000	3,700	35	40
Wheeling silt loam, 2 to 6 percent slopes	90	110	3,000	3,700	35	40
Wheeling silt loam, 6 to 12 percent slopes	75	90	2,800	3,000	30	35
Wheeling silty clay loam, 6 to 12 percent slopes, severly eroded	55	75	1,800	2,800	20	25

[1] Yield figures are for dark tobacco, some burley is grown.
[2] Yields are those obtainable in the second year.
[3] A term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number

crops under two levels of management

management. Average rainfall over a long period and no irrigation are assumed. Dashes indicate soil is not suitable for the crop at the very gravelly soils, 20 to 60 percent slopes, Gullied land, Swamp, or Urban land]

Soybeans		Tobacco [1]		Hay						Pasture	
				Alfalfa and grass		Red clover and grass [2]		Lespedeza			
A	B	A	B	A	B	A	B	A	B	A	B
Bu.	*Bu.*	*Lb.*	*Lb.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Animal-unit-days* [3]	*Animal-unit-days* [3]
											160
	25					0.5	1.6		1.4	150	180
25	30					.6	1.7		1.6	170	215
										110	150
										95	130
20	30	1,500	1,800	2.5	3.3	2.1	2.6	1.6	1.8	150	180
				1.7	2.6	1.0	2.2			120	160
										110	160
15	25	1,100	1,400	.5	2.0	.8	1.4		1.1	100	140
										75	115
25	35	1,700	2,200	3.0	4.0	2.3	3.0	1.7	2.0	165	190
22	32	1,600	2,000			.4	1.0	1.9	1.6	150	200
22	32	1,600	2,000			.8	2.0	1.4	1.7	150	200
20	30	1,500	1,800			.4	1.0		1.5	150	200
30	35	1,800	2,200	3.0	4.0	2.8	3.4	1.9	2.3	185	240
25	35	1,700	2,000	4.0	5.0	2.2	3.0	1.8	2.3	190	250
25	35	1,700	2,000			2.5	3.0	1.3	2.0	175	225
15	25							1.0	1.9	155	200
25	35	1,700	2,300	2.2	3.0	2.7	3.0	2.0	2.3	170	210
25	35	1,800	2,400	2.7	3.5	2.7	3.1	1.8	2.3	170	210
20	30	1,500	1,800	1.5	2.2	1.3	2.5	.8	1.6	140	180
20	30	1,600	2,000	3.0	3.8	2.5	3.0	1.4	2.0	160	190
15	25	1,100	1,400							130	180
	20	1,000	1,250	2.5	3.3	2.1	2.5	.8	1.4	130	170
20	30	1,400	1,600					.8	1.5	150	190
25	35	1,900	2,400	4.0	5.0	2.4	3.0	1.2	2.2	200	250
25	35	1,800	2,000	3.0	4.0	2.6	3.2	1.9	2.3	185	240
20	25	1,500	1,800	2.5	3.4	1.7	2.3	1.2	1.8	150	180
15	20	1,000	1,250			.5	1.8	.8	1.4	120	150
20	30	1,550	1,850	3.0	4.0	2.8	3.3	1.5	1.8	160	195
				2.2	3.0	1.5	2.0			145	185
15	25	1,355	1,550	2.0	2.4	1.2	2.3	.4	1.3	130	170
										100	140
25	40	1,800	2,400	3.0	4.0	2.9	3.5	1.9	2.3	175	230
20	35	1,700	2,300	3.0	3.8	2.3	3.0	1.4	2.0	170	210
25	30	1,650	1,950	2.8	3.8	2.3	2.8	1.5	1.9	160	195
25	30	1,700	2,000			1.9	2.9	1.0	1.7	170	220
20	30	1,500	1,800			.6	1.9	1.2	1.9	150	190
30	35							.7	1.6	165	210
30	35	1,800	2,400	4.0	5.0	2.9	3.5	1.9	2.3	200	250
30	35	1,850	2,200	3.6	4.0	2.5	2.9	1.6	2.0	190	235
25	35	1,700	2,000			2.2	2.8	1.2	2.0	190	225
25	30	1,450	1,750	3.0	3.5	2.4	3.2	1.0	2.0	160	200
30	35	1,800	2,100	4.0	5.0	2.9	3.2	1.6	2.0	200	250
				2.4	3.0	1.0	2.9			140	190
										130	180
										130	180
		1,000	1,250	1.8	2.5			.5	1.3	90	145
				1.5	2.2					85	140
										85	135
30	35	1,800	2,200	3.5	4.5	3.0	3.6	2.0	2.4	190	250
25	30							.6	1.6	165	210
30	35	1,900	2,400	4.2	5.0	2.8	3.6	2.0	2.4	190	250
30	35	1,900	2,400	4.2	5.0	2.1	3.0	1.7	2.0	185	240
25	30	1,750	1,950	3.7	4.5	2.0	3.0	1.6	1.9	170	220
20	25	1,300	1,600	2.5	3.0	1.9	2.6	1.4	1.9	145	180

of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 animal-unit-days.

Use of the Soils for Woodland [3]

This section describes the woods in the survey area, explains woodland suitability grouping of soils, describes potential of the soil groups for producing wood crops, and discusses limitations to the use of soils for woodland. In table 3 soils of the survey area are placed in 10 woodland suitability groups.

Originally Calloway and Marshall Counties were covered by hardwood forest. The Indians burned over large, nearly level areas, which became known as "Barrens," although they later reverted to woodland. Early settlers progressively cleared and farmed the land. By 1966 only approximately 29 percent of the total acreage of Calloway County and about 34 percent of Marshall County remained in woodland. This remaining woodland is largely privately owned, but a small acreage near Kentucky Lake is owned and managed by the Tennessee Valley Authority and Kentucky State Department of Natural Resources.

The upland forests are made up of many kinds of trees, including red and white oaks, hickory, yellow-poplar, and hard maple. Along the streams and in the bottoms are pin oak, sweetgum, cottonwood, red gum, hickory, red maple, and sycamore. Indiscriminate logging, forest fires, and overgrazing have reduced the proportion of desirable trees. The remaining trees are largely of medium to poor quality.

Local markets provide outlets for barrel staves and rough lumber. Top quality walnut, sweetgum, yellow-poplar, and oak logs for the most part are purchased for processing plants in Tennessee and converted into veneer, flooring, furniture, and crossties. There are no large, permanent, processing mills in the area.

The soils of Calloway and Marshall Counties have been placed in 10 woodland suitability groups. Each group is made up of soils that are suitable for similar kinds of woodcrops, need similar management, and are about equal in productivity.

The factors considered in placing each soil in a woodland group include: (1) potential productivity for several kinds of trees, (2) species preferred in existing stands, (3) species suitable for planting, and (4) critical soil-related hazards and limitations to be considered in woodland management with respect to erosion, use of equipment, plant competition, and seedling mortality.

The potential productivity is expressed as site index, or the expected height in feet that a tree species or forest type will attain on a specified kind of soil or group of soils at a specified age, which is 50 years for most species. The site index ratings shown for each woodland suitability group are expressed as a range in height; for example, the site index for lowland oaks on soils in woodland group 1 is 95 to 105 feet.

Many trees in these counties and in adjacent areas were measured and the soils described at each site in the process of gathering data from which to determine the site indexes. As nearly as possible, the studies were confined to well-stocked, naturally-occurring, even-aged, essentially unmanaged stands that had not been adversely affected by fire, insects, or disease and had not been grazed to a damaging extent.

The average height and age measurements for most species were converted to site index by using site index curves in published research (*3*, *4*, *5*, *6*). Unpublished field studies by the Tennessee Valley Authority of 271 plots were used to determine the site indexes for eastern redcedar.

Site index can be converted to a volumetric prediction of growth and yield which can be shown in wood measurements such as board feet per acre.

Predictions of average yearly growth per acre are given in board feet, according to the International ¼-inch rule, and are based on published data (*9*, *10*, *12*, *13*, *14*) and on evaluations made by the Soil Conservation Service. Estimates were made for the average height of oak and yellow-poplar at 60 years of age and for other species at age 50.

Erosion hazard is the degree of potential soil erosion that occurs following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and landing areas. It is assumed that the woodland is well managed and is protected from fire and grazing. Soil characteristics or properties considered in rating erosion hazard include slope, rate of infiltration, permeability of the subsoil, water storage capacity, and resistance to detachment of soil particles by forces of rainfall and runoff. The following relative ratings are used to indicate the degree of erosion hazard. *Slight* indicates that no special measures of control are needed. *Moderate* indicates that some attention needs to be given to the prevention of soil erosion. *Severe* indicates that intensive erosion control measures are needed. Erosion can be held to a minimum by taking care in locating, constructing, and maintaining roads, trails, fire lanes, and landings.

Equipment limitation is influenced by topographic features and soil characteristics, such as slope, drainage, soil texture, stoniness, and rockiness, that restrict the use of conventional wheel or track-type equipment for harvesting and planting wood crops, for constructing roads, for controlling fire, and for controlling unwanted vegetation. Topographic conditions or differences in soils may necessitate the use of different kinds of equipment and methods of operation, or varying the season when equipment is used. Generally, the limitation is *slight* if the slope is 12 percent or less and farm machinery can be operated efficiently without construction and maintenance of permanent roads and truck trails. The rating is *moderate* if the slope is 12 to 30 percent, if the use of ordinary wheeled or crawler type equipment is limited, if track-type equipment is necessary for efficient harvesting, or if soil wetness prevents the use of logging vehicles for 2 to 6 months. The rating is *severe* if the slope is more than 30 percent, if track-type equipment is not adequate for harvesting and power winches and other special equipment are needed, or if wetness prevents the use of vehicles for 6 months or more.

Plant competition hinders the establishment and normal development of desirable seedlings, whether they occur naturally or are planted. Unwanted trees, vines, shrubs, and other plants invade a site when openings

[3] By WILLIAM M. MORRILL, woodland conservationist, in collaboration with E. V. HUFFMAN, assistant State soil scientist, both of the Soil Conservation Service.

are made in the canopy. Plant competition is *slight* if unwanted plants do not prevent adequate natural regeneration, interfere with early growth, or restrict the normal development of planted stock. Competition is *moderate* if unwanted plants delay establishment and hinder the growth of either planted stock or naturally regenerated seedlings, or if they retard the eventual development of a fully stocked stand. Plant competition is *severe* if unwanted plants prevent adequate restocking, either by natural regeneration or by planting, without intensive site preparation or special maintenance practices.

Some loss of seedlings is expected if soil characteristics or topographic features are unfavorable, even though plant competition is not a factor. Seedling mortality is *slight* if the expected loss is not more than 25 percent of the number needed to provide optimum stocking. Mortality is *moderate* if the expected loss is between 25 and 50 percent; it is *severe* if the expected loss is more than 50 percent. If the rating is *moderate* or *severe*, replanting is likely to be needed to insure a fully stocked stand, and special preparation of the seedbed and special planting techniques are often necessary.

Each woodland suitability group in table 3 contains a brief description of the soils in that group and evaluations for wood crop production based on factors given above. Detailed descriptions of the soils are contained in the section, "Descriptions of the Soils."

Wildlife

The principal kinds of wildlife in Calloway and Marshall Counties are cottontail rabbits, gray and fox squirrels, raccoons, opossums, muskrats, skunks, red and gray foxes, whitetailed deer, bobwhite quail, mourning doves, ducks, and geese. There are also many species of nongame birds and mammals.

The streams of the county contain the usual variety of warm-water game fish, pan fish, and rough fish that are commonly found throughout the state. Examples of these are largemouth bass, bluegill, and bullheads, respectively. Most of the farm ponds have been stocked with largemouth bass and bluegill.

Wildlife populations vary from year to year, but in the period 1962 to 1966, rabbits, gray squirrels, raccoons, opossums, muskrats, red and gray foxes, quail, doves, ducks, and geese were abundant; fox squirrels, deer, and skunks were common; and only mink were scarce.

Rough fish are abundant in lakes and streams and common in farm ponds. Game fish are abundant in the lakes and common in streams and farm ponds.

Both hunting and fishing are popular forms of recreation throughout the two-county area.

Successful management of wildlife on any tract of land requires, among other things, that food, cover, and water be available in a suitable combination. Lack of any one of these necessities, unfavorable balance between them, or inadequate distribution of them may severely limit or eliminate desired wildlife species. Soil information provides a valuable tool in establishing, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is managed by planting suitable vegetation; by manipulating existing vegetation to bring about natural establishment, increase, or improvement of desired plants; or by combinations of such measures. The influence of a soil on the growth of many kinds of plants is known or can be inferred from the characteristics and behavior of the soil. In addition, water areas can be formed or natural areas improved for wildlife habitat. Soil information is useful for these purposes.

Soil interpretations for wildlife habitat serve a variety of purposes. They are an aid in selecting the more suitable sites for various kinds of wildlife habitat. They serve as indicators of the level of management needed to achieve satisfactory results. They also show why it may not be feasible generally to manage a particular area for a given kind of wildlife.

These interpretations also may serve in broad-scale planning of wildlife management areas, parks, and nature areas, or for acquiring wildlife lands. With the aid of a map overlay, habitat groupings may be made for various areas. The soil areas shown on the soil survey maps are rated without regard to positional relationships with adjoining delineated areas. The size, shape or location of the outlined areas do not affect the rating. Certain characteristics that influence habitat, such as elevation and aspect, must be appraised onsite.

In table 4, the soils of Calloway and Marshall Counties are rated for their relative suitability for the establishment, improvement, or maintenance of eight wildlife habitat elements and for three main classes of wildlife; namely, openland, woodland, and wetland. These ratings are based upon limitations imposed by the characteristics or behavior of the soil. Three levels of suitability are recognized. It also is recognized that certain conditions render a site unsuited to a particular habitat element. Numerical ratings of 1 to 4 indicate the degree of soil suitability for a given habitat element. They also indicate the relative extent of soil limitations.

For specific detail on characteristics of the soils, the section headed "Descriptions of the Soils" should be consulted.

Special attention is directed to the ratings for Coniferous woody plants. There is a considerable body of evidence indicating that, under situations of slow growth and delayed canopy closure, coniferous habitat harbors larger numbers and varieties of wildlife than under the reverse growth conditions. Soil properties, therefore, which tend to promote rapid growth rates and canopy closure are classed as limitations to the use and management of a soil for wildlife.

In general, soils favorable to quick establishment and rapid growth of conifers require more intensive management to achieve satisfactory results for long-term usage by wildlife. Soils rated as poorly suited to coniferous woody plants provide easily established habitat for temporary or short-term use.

The following definitions are given for suitability ratings:

A rating of 1 means *well suited.* Soil limitations are negligible in the management of the designated habitat element. Generally, the intensity of management required for the establishment, improvement, or maintenance of the habitat element is low.

TABLE 3.—*Management data for*

[Dashed lines indicate

Woodland suitability group and mapping symbol	Potential productivity		
	Important forest types	Site index	Average yearly growth per acre
			Bd. ft.
Group 1: Deep, well drained to moderately well drained, nearly level, loamy soils on flood plains. (Co, Eg, Hu, Iu, Oc, Oh, and Vb).	Upland oak [1]	80–85	320
	Loblolly pine [1]	75–85	----------
	Yellow-poplar [1]	105–115	----------
	Cottonwood	100–110	----------
	Lowland oak	95–105	500
	Sweetgum	90–100	----------
Group 2: Somewhat poorly drained and poorly drained, nearly level, loamy soils on flood plains. (Bb, Bc, Fa, Ma, Me, Ne, and Wa).	Pin oak	100–110	560
	Cottonwood	100–110	----------
	Sweetgum	95–105	----------
	Yellow-poplar [1]	95–105	550
Group 3: Moderately deep to a fragipan, moderately well drained and somewhat poorly drained, nearly level to sloping soils on uplands and stream terraces. (CaA, CaB, CaB2, GrA, GrB, GrC, and LaC).	Upland oak	75–85	300
	Pin oak	95–105	500
	Yellow-poplar	95–105	550
	Sweetgum	90–100	----------
Group 4: Shallow to fragipan or clay subsoil, poorly drained to somewhat poorly drained, level to gently sloping, acid soils on uplands and terraces. (Fo, Hn, and Mc).	Upland oak	65–75	200
Group 5: Deep, well drained and moderately well drained, gently sloping to sloping, loamy soils on uplands and terraces. (BrC, BtC, LeC, LeD, LoB, LoB2, LoC2, MmB, MmC2, WhA, WhB, and WhC).	Upland oak	75–85	300
	Yellow-poplar	95–105	550
	Virginia pine	----------	----------
Group 6: Deep, well-drained, severely eroded, sloping to moderately steep, silty clay loam soils on uplands. (BsC3, BsD3, LgC3, LgD3, and WnC3).	Upland oak	55–65	120
	Virginia pine	60–70	----------
Group 7: Very gravelly or very cherty, droughty, sloping to very steep soils on uplands and terraces. (BoD, BoF, GsC, GtE, SgC, SgD, and SgE).	Upland oaks	55–65	125
Group 8: Deep, well-drained, moderately steep to steep soils with very gravelly or sandy substrata on uplands. (BrD, BrE, RuD, RuE, and RxE).	Upland oaks	65–75	200
Group 9: Shallow to a fragipan, moderately well drained, severely eroded soils on uplands and terraces. (GrB3, GrC3, and LcC3).	Upland oaks	45–55	70
Group 10: Variable, onsite investigation needed. (Ad, Du, Gu, Sw, and Ur).			

[1] Trees that grow well if not subject to frequent or long periods of flooding.
[2] A seasonal high water table is a moderate limitation on level areas of Calloway soils.

woodland suitability groups

data is not available]

Hazards and limitations				Tree species—	
Erosion hazard	Equipment limitation	Plant competition	Seedling mortality	Preferred in existing stands	Suitable for planting
Slight	Slight	Severe	Slight	Lowland oaks, sweetgum, cottonwood, yellow-poplar, and upland oak.	Pin oak, sweetgum, cottonwood, yellow-poplar, loblolly pine, and black walnut.
Slight	Moderate to severe.	Severe	Slight	Pin oak, sweetgum, cottonwood, and yellow-poplar.	Pin oak, sweetgum, and cottonwood.
Slight	Slight [2]	Moderate to severe.	Slight	Pin oak, white oak, northern red oak, yellow-poplar, sugar maple, black oak, white ash, hickory, and sweetgum.	Yellow-poplar, red oak, and loblolly pine.
Slight	Moderate	Moderate	Moderate	Shumard oak, black oak, and southern red oak.	Red oak and Virginia pine.
Slight to moderate.	Slight to moderate.	Moderate to severe.	Slight	Yellow-poplar, white oak, white ash, red oak, black oak, black walnut, and black cherry.	Red oak, white oak, white pine, loblolly pine, shortleaf pine, black walnut, white ash, and black locust.
Severe	Moderate	Slight	Moderate to severe.[3]	Black oak, southern red oak, scarlet oak, Virginia pine, and hickory.	Loblolly pine, Virginia pine, and scotch pine.
Moderate to severe.	Moderate to severe.	Slight	Slight to moderate.[3]	Black oak, southern red oak, white oak, scarlet oak, hickory, and Virginia pine.	Loblolly pine, shortleaf pine, and white pine.
Moderate to severe.	Moderate to severe.	Slight to moderate.	Slight	Black oak, white oak, southern red oak, scarlet oak, Virginia pine, and hickory.	Loblolly pine, shortleaf pine, white pine, red oak, and scotch pine.
Severe	Moderate	Slight	Severe	Black oak, southern red oak, and post oak.	None.

[3] Dry periods of 2 to 3 weeks duration increase hazard to young seedlings.

A rating of 2 means *suited*. Soil limitations moderately affect the management of the designated habitat element. Fairly frequent attention and a moderate intensity of effort is required to achieve satisfactory results.

A rating of 3 means *poorly suited*. Soil limitations are severe. The establishment, improvement, or maintenance of the designated habitat element is difficult, may be expensive, and requires intensive effort.

A rating of 4, *unsuited*, is given if the soil limitations are so extreme that it is highly impractical, if not impossible, to manage the designated habitat element.

The eight wildlife habitat elements rated in table 4 are defined as follows:

Grain and seed crops are grains or seed-producing annuals planted to produce food for wildlife. Examples are corn, sorghums, wheat, oats, millet, buckwheat, soybeans, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted to furnish wildlife food and cover. 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 provide food and cover principally to upland forms of wildlife. They are established mainly through natural processes. Examples are bluestem, indiangrass, wheatgrass, wild ryegrass, oatgrass, pokeweed, strawberries, lespedeza, beggarweed, wild beans, nightshade, goldenrod, and dandelions.

Hardwoods are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife. They are commonly established through natural processes, 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.

Conifers are cone-bearing trees and shrubs, important to wildlife mainly as cover, but also to furnish food in the form of browse, seeds, or fruitlike cones. These plants commonly are established through natural processes, but they also may be planted. As explained in the introductory paragraphs, soils that are well suited to coniferous wildlife habitat are those in which plants grow slowly and closure of the canopy is delayed. Examples of plant species are pine, hemlock, and redcedar.

Wetland food and cover plants are annual and perennial wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover that is extensively and dominantly used by wetland forms of wildlife. Examples are smartweed, wild millet, bulrush, spike sedge, rushes, sedges, burreeds, wild rice, rice cutgrass, mannagrass, and cattails.

TABLE 4.—*Suitability of soils for elements of wildlife habitats and kinds of wildlife*

[Suitability ratings are as follows: 1, well suited or above average; 2, suited or average; 3, poorly suited or below average; and 4, not suited. Absence of figures indicates that the mapping unit is variable in characteristics and that onsite investigation is required to determine suitability]

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwoods	Conifers	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Alluvial land: Ad	4	3	2	2	2	4	4	4	4	2	4
Bibb: Bb, Bc	3	2	2	1	2	2	2	4	2	1	2
Bodine:											
BoD	3	3	2	2	2	4	4	4	3	2	4
BoF	4	4	2	2	2	4	4	4	3	3	4
Brandon:											
BrC, BtC	2	1	1	1	3	4	4	4	1	1	4
BrD	3	2	1	1	3	4	4	4	2	2	4
BrE, BsD3	4	2	2	2	2	4	4	4	3	2	4
BsC3	3	2	2	2	2	4	4	4	2	2	4
Calloway:											
CaA	3	2	2	2	2	2	2	2	2	2	2
CaB, CaB2	3	2	2	2	2	3	4	4	2	2	4
Collins: Co	2	1	1	1	3	4	4	4	1	1	4
Dumps: Du. Too variable to rate.											
Egam: Eg	2	2	1	1	3	3	3	3	1	1	3
Falaya: Fa	2	2	2	1	3	2	2	2	2	2	2

TABLE 4.- *Suitability of soils for elements of wildlife habitats and kinds of wildlife* – Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwoods	Conifers	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Forestdale: Fo	3	2	2	1	2	3	1	2	2	1	2
Grenada:											
GrA	2	1	1	1	3	3	3	3	1	1	3
GrB, GrB3, GrC	2	1	1	1	3	4	4	4	1	1	4
GrC3	3	2	2	2	2	4	4	4	2	2	4
Guin:											
GsC	3	2	2	2	2	4	4	4	2	2	4
GtE	4	3	3	3	1	4	4	4	4	3	4
Gullied land: Gu	4	4	4	4	1	4	4	4	4	4	4
Henry: Hn	3	3	2	1	2	3	1	1	2	2	2
Huntington: Hu	2	1	1	1	3	4	4	4	1	1	4
Iuka: Iu	2	1	1	1	3	3	3	3	1	1	3
Lax:											
LaC	2	1	1	1	3	4	4	4	1	1	4
LcC3	3	2	1	1	2	4	4	4	2	1	4
Lexington:											
LeC	2	1	1	1	3	4	4	4	1	1	4
LeD, LgC3	3	2	1	1	3	4	4	4	2	2	4
LgD3	4	3	1	1	3	4	4	4	3	2	4
Loring: LoB, LoB2, LoC2	2	1	1	1	3	4	4	4	1	1	4
Mantachie: Ma	2	2	2	1	3	2	2	3	2	2	2
McGary: Mc	2	2	2	1	3	3	2	2	2	2	2
Melvin: Me	3	2	2	1	2	2	2	4	2	1	2
Memphis: MmB, MmC2	2	1	1	1	3	4	4	4	1	1	4
Newark: Ne	2	2	2	1	3	2	2	3	2	2	2
Ochlockonee:											
Oc	2	2	2	1	3	4	4	4	2	2	4
Oh	2	1	1	1	3	4	4	4	1	1	4
Ruston: RuD, RuE, RxE For Lexington part of RxE, see Lexington series.	3	3	1	1	3	4	4	4	2	2	4
Saffell:											
SgC, SgD	3	2	2	2	2	4	4	4	2	2	4
SgE	4	3	3	3	1	4	4	4	4	3	4
Swamp: Sw	4	4	4	4	4	1	2	4	4	4	2
Urban land: Ur Too variable to rate.											
Vicksburg: Vb	2	1	1	1	3	4	4	4	1	1	4
Waverly: Wa	3	2	2	1	2	2	2	4	2	1	2
Wheeling:											
WhA, WhB, WhC	2	1	1	1	3	4	4	4	1	1	4
WnC3	3	2	1	1	3	4	4	4	2	2	4

Shallow water developments are impoundments or excavations or the control of water, generally not exceeding six feet in depth. Examples are low dikes and levees; shallow dugouts; level ditches; and devices for water level control in marshy drainageways or channels.

Excavated ponds are dug-out water areas or combinations of dug-out areas and low dikes (dammed areas) that have water of suitable quality, of suitable depth, and in ample supply for production of fish or wildlife. Examples are ponds built on nearly level land, that are at least one-fourth acre in surface area, have an average depth of six feet over at least one-fourth of their area, and have a dependably high water table or other source of water.

The ratings in table 4 for the main classes of wildlife are based upon weighted values of selected habitat elements that show the relative value of a soil for each class. These classes are defined in the following paragraphs.

Openland wildlife is birds and mammals that normally make their homes on croplands, pastures, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, meadowlarks, field sparrows, doves, cottontail rabbits, red foxes, and woodchucks.

Woodland wildlife is birds and mammals that normally make their homes in wooded areas that have hardwood trees and shrubs, coniferous trees and shrubs, or mixtures of such plants. Examples are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, gray squirrels, gray fox, white-tailed deer, raccoon, and wild turkey.

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

Use of the Soils in Engineering [4]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as a structural material or as a foundation material upon which structures are built. This section lists those properties of the soils that affect construction and maintenance of roads and airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, available moisture capacity, drainage, grain-size distribution, plasticity, and reaction.

Information concerning these and related soil properties is furnished in tables 5, 6, and 7. The estimates and interpretations of soil properties in these tables can be used in:

1. Planning and designing agricultural drainage systems, diversion terraces, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand, gravel, or rock suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where excavations are deeper than depths of layers here reported. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

Some terms used by soil scientists may be unfamiliar to engineers, and some words, such as sand, silt, and clay, have different meanings in soil science than they have in engineering. These and other terms are defined in the Glossary.

Engineering classification of the soils

The two systems most commonly used in classifying samples of soil horizons for engineering are the AASHO system (*1*) adopted by the American Association of State Highway Officials and the Unified System (*19*) used by the SCS engineers, Department of Defense, and others. Additional information is given in the PCA Soil Primer (*11*).

The AASHO system is used to classify soil materials according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils, which have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. If soil material is near a classification boundary, it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. Group index numbers are given in the test data in table 7, but they are not given in the estimated properties in table 5.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are 8 classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; 6 classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and 1 class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CH or MH.

[4] J. R. DAVIS, State conservation engineer, helped with this section.

The AASHO and Unified classifications for tested soils are shown in table 7. The estimated classifications for both systems for all the soils in the survey area are shown in table 5.

Engineering properties of the soils

Table 5 gives the estimated engineering classification and properties of the soil materials at various depths for the soils in this survey area. The properties given for a soil are those of a single typical profile divided into horizons. A description of each soil is given in the section "Descriptions of the Soils."

Depth to seasonal high water table, shown in table 5, refers to the upper limit of soil or underlying material that is saturated during the seasons of highest rainfall, either as perched water that is separated from the ground water by a layer of nearly impervious soil or as a part of the ground water.

Classification of soils according to the textural classes of the U.S. Department of Agriculture is based on the percentage of sand, silt, and clay in the soils. Table 5 shows the classification of each important layer of the soils according to this system and according to the AASHO and Unified systems.

The percentages of soil material that pass through sieves of various sizes make up the estimated relative amounts of coarse-grained material. The percentage passing through the No. 200 sieve is the fine-grained part of the material. The estimates of size distribution given in table 5 are based on data obtained from tests made in this area and on similar soils in other areas.

Permeability, as used in table 5, relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soils are not considered.

Available moisture capacity is a term used to designate the amount of water in the soil available for plant growth after all free water has drained away. It is expressed in table 5 as inches per inch of soil.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and relative terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is an indication of the volume change to be expected of the soil material with changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials.

Corrosivity indicates the potential danger to uncoated steel or concrete structures through chemical action that dissolves or weakens the structural material. Structural materials may corrode when buried in soil, and any given material corrodes in some kinds of soil more rapidly than in others. Extensive installations that intersect soil boundaries or soil horizons are more likely to be damaged by corrosion than are installations entirely in one kind of soil or soil horizon.

Depth to bedrock is not given in table 5, because all the soils are more than 20 feet deep to bedrock.

Interpretations of engineering properties

Table 6 contains selected information useful to engineers and others who plan to use soil material in construction of highways, farm ponds, and other engineering practices. Detrimental or undesirable features are emphasized. The ratings and other interpretations in this table are based on estimated engineering properties of the soils in table 5; on available test data; and on field experience. The information applies only to soil depths indicated in table 5, but it is reasonably reliable to depths of about 6 feet for most soils and several feet more for some soils.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily one rich in organic matter, used as a topdressing for lawns, gardens, roadbanks, and the like. The ratings indicate suitability for such use.

Sand and gravel ratings are based on the probability that delineated areas of the soil contain deposits of sand and gravel. The ratings do not indicate quality or extent of the deposits.

Road fill is material used to build road embankments. The ratings indicate performance of soil material moved from borrow areas for these purposes.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features given are the principal ones that affect geographic location of highways.

Farm pond reservoir areas are affected mainly by loss of water through seepage, and the soil features named are those that influence seepage.

Farm pond embankments serve as dams. The features of disturbed soil from both subsoil and substratum are important in constructing embankments.

Agricultural drainage is influenced by features of the undisturbed soil that affect the installation and performance of surface and subsurface drainage installations.

Irrigation is affected by features of undisturbed soil that influence soil-moisture relationships and the potential of a soil to produce specific crops. A feasibility study should be made by a qualified consultant before an irrigation project is planned.

Terraces and diversions are affected by soil features that influence their stability or hinder layout and construction. Hazards of sedimentation in channels and difficulty of establishing and maintaining cover are important considerations for diversions.

Grassed waterways are affected by soil features that are important to establishment, growth, and maintenance of plants or that affect layout and construction.

Engineering test data

Table 7 contains the results of engineering tests performed by the Kentucky Department of Highways, Highway Research Laboratory, on several important soils in Calloway and Marshall Counties. The table shows where samples were taken, the depth of sampling, and the results of tests to determine particle-size distribution and other properties significant in soil engineering.

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. Because that appear in the first column. The symbol

Soil series and map symbols	Depth to seasonal high water table	Depth from surface (typical profile)	Classification		
			USDA texture	Unified	AASHO
Alluvial land: Ad No estimates; all properties variable.					
Bibb: [1]	*Feet*	*Inches*			
Bb	0–½	0–12	Loamy fine sand	SM	A1 or A–2
		12–24	Silt loam	ML	A–4
		24–50	Loam	ML	A–4
Bc	0–½	0–16	Silt loam	ML	A–4
		16–36	Loam	ML	A–4
		36–50	Very gravelly sandy loam	GW or GM	A–1
Bodine: BoD, BoF	6+	0–22	Cherty and very cherty silt loam.	ML or GM	A–4 or A–2
		22–62	Very cherty silty clay loam	GM or GC	A–1 or A–2
*Brandon: BrC, BrD, BrE, BsC3, BsD3, BtC. For Loring and Memphis parts of unit BtC, see Loring and Memphis series.	6+	0–9	Silt loam	ML or ML–CL	A–4
		9–27	Silty clay loam	ML or CL	A–6 or A–4
		27–50	Very gravelly loam	GP, GP–GM, or GC.	A–1 or A–2
Calloway: [2] CaA, CaB, CaB2	½–1½	0–18	Silt loam	ML	A–4
		18–26	Silt loam (fragipan)	ML or ML–CL	A–4
		26–38	Silty clay loam (fragipan)	CL or ML	A–6 or A–4
		38–50	Silt loam (fragipan)	ML or ML–CL	A–6 or A–4
Collins: [1] Co	1½–2	0–50	Silt loam	ML or ML–CL	A–4
Dumps: Du. No estimates; all properties variable.					
Egam: [1] Eg	4+	0–27	Silty clay loam	ML or ML–CL	A–6
		27–72	Silty clay	CL or ML–CL	A–6
		72–110	Clay loam	ML or ML–CL	A–4 or A–6
Falaya: [1] Fa	½–1½	0–50	Silt loam	ML	A–4
Forestdale: [1] Fo	0–½	0–10	Silt loam	ML or ML–CL	A–4
		10–15	Silty clay loam	CL	A–6
		15–36	Silty clay	CH	A–7
		36–75	Silty clay	CL or CH	A–6 or A–7
Grenada: [2] GrA, GrB, GrB3, GrC, GrC3.	1½–2	0–10	Silt loam	ML	A–4
		10–22	Silt loam	ML or ML–CL	A–4 or A–6
		22–60	Silty clay loam to silt loam (fragipan).	ML or ML–CL	A–4 or A–6
Guin:					
GsC	6+	0–10	Gravelly loam	GM or ML	A–4
		10–50	Very gravelly loam	GC or GC–GW	A–1 or A–2
GtE	6+	0–9	Very gravelly silt loam or sandy loam.	GM	A–4 or A–2
		9–50	Very gravelly sandy loam	GW	A–1
Gullied land: Gu. No estimates; all properties variable.					

See footnotes at end of table.

significant in engineering

these soils may have different properties and limitations, it is necessary to follow carefully the instructions for referring to other series <means less than; the symbol > means more than]

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH value*			
90–100	80–95	50–75	15–30	>6. 3	0. 06–0. 08	4. 5–5. 0	Low	High	High.
95–100	95–100	85–95	70–90	0. 63–2. 0	0. 19–0. 23	4. 5–5. 0	Low	High to moderate.	High.
95–100	95–100	80–90	60–75	0. 63–2. 0	0. 15–0. 18	4. 5–5. 0	Low	High	High.
95–100	95–100	85–95	70–90	0. 63–2. 0	0. 18–0. 23	4. 5–5. 0	Low	High	High.
95–100	95–100	80–90	60–75	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	Low	High	High.
20–50	15–35	10–25	3–15	>6. 3	0. 03–0. 07	4. 5–5. 0	Low	High	High.
30–75	25–70	25–65	20–60	2. 0–10. 0	0. 07–0. 13	4. 5–5. 0	Low	Low	High.
15–55	10–50	10–40	5–35	>6. 3	0. 04–0. 10	4. 5–5. 0	Low	Low	High.
100	100	95–100	90–100	0. 63–2. 0	0. 18–0. 23	5. 1–6. 1	Low	Low	Moderate.
95–100	95–100	95–100	85–100	0. 63–2. 0	0. 19–0. 21	4. 5–5. 5	Low	Moderate	High.
5–50	5–40	5–35	5–30	6. 3–20. 0	0. 07–0. 13	4. 5–5. 5	Low	Low	Moderate to high.
100	100	95–100	90–100	0. 63–2. 0	0. 18–0. 23	4. 5–5. 5	Low	Moderate	Moderate.
100	100	95–100	90–100	0. 20–0. 63	0. 18–0. 23	4. 5–5. 0	Low	High	High.
100	100	95–100	90–100	<0. 20	0. 10–0. 15	4. 5–5. 0	Low	High	High.
100	100	95–100	80–100	<0. 20	0. 10–0. 15	5. 1–5. 5	Low	High	High.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Low	High.
100	100	95–100	90–100	0. 20–0. 63	0. 19–0. 21	6. 1–7. 3	Low	Moderate	Low.
100	100	95–100	90–100	0. 20–0. 63	0. 15–0. 18	5. 6–7. 3	Moderate	Moderate	Moderate to low.
100	100	90–100	75–85	0. 20–0. 63	0. 16–0. 18	5. 6–7. 3	Low	Moderate	Moderate to low.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 24	4. 5–5. 5	Low	High	High.
100	100	95–100	80–90	0. 63–2. 0	0. 18–0. 23	4. 5–6. 0	Low	High	High.
100	100	95–100	80–95	0. 20–0. 63	0. 16–0. 19	4. 5–5. 0	Moderate	High	High.
100	100	95–100	90–95	<0. 20	0. 14–0. 17	4. 5–5. 0	High	High	High.
100	100	95–100	85–95	<0. 20	0. 14–0. 17	4. 5–5. 0	High to moderate.	High	High.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	100	90–100	85–96	0. 63–2. 00	0. 18–0. 23	4. 5–5. 0	Low	Moderate	High.
100	100	90–100	70–96	<0. 20	0. 10–0. 15	4. 5–5. 5	Low	Moderate	High.
50–70	45–65	40–60	35–55	>6. 3	0. 08–0. 10	4. 5–5. 5	Low	Low	High.
20–35	15–30	10–25	5–20	>6. 3	0. 03–0. 03	4. 5–5. 5	Low	Low	High.
40–65	35–60	30–55	25–50	>6. 3	0. 08–0. 10	4. 5–5. 0	Low	Low	High.
20–35	15–30	10–25	0–15	>6. 3	0. 02–0. 09	4. 5–5. 0	Low	Low	High.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface (typical profile)	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Henry:[2] Hn	0–½	0–8	Silt loam	ML	A–4
		8–26	Silt loam	ML or ML–CL	A–4
		26–50	Silty clay loam (fragipan)	CL or ML–CL	A–4 or A–6
Huntington:[1] Hu	4+	0–24	Silt loam	ML or ML–CL	A–4
		24–50	Silt loam	ML or ML–CL	A–4 or A–6
Iuka:[1] Iu	1½–2	0–22	Silt loam	ML	A–4
		22–30	Fine sandy loam	SM or ML	A–4
		30–50	Sandy loam	SM	A–2 or A–4
Lax: LaC, LcC3	1½–2	0–8	Silt loam	ML	A–4
		8–22	Silt loam to silty clay loam	ML or CL	A–4 or A–6
		22–33	Silt loam (fragipan)	ML or CL	A–4 or A–6
		33–50	Very gravelly loam	GC or GW–GC	A–2 or A–1
Lexington: LeC, LeD, LgC3, LgD3	6+	0–8	Silt loam	ML or ML–CL	A–4
		8–28	Silty clay loam	CL or ML	A–6
		28–60	Clay loam to sandy loam	CL or SM	A–2 or A–6
Loring: LoB, LoB2, LoC2	2–3	0–8	Silt loam	ML	A–4
		8–29	Heavy silt loam	ML or ML–CL	A–4 or A–6
		29–50	Silt loam (fragipan)	ML or ML–CL	A–4
Mantachie:[1] Ma	½–1½	0–18	Silt loam	ML	A–4
		18–26	Loam	ML	A–4
		26–37	Fine sandy loam	SM	A–2 or A–4
		37–50	Gravelly sandy loam	GM or SM	A–2
McGary:[1] Mc	½–1½	0–6	Silt loam	ML or ML–CL	A–4 or A–6
		6–12	Silty clay loam	CL or ML–CL	A–6 or A–7
		12–50	Silty clay or clay	CL or CH	A–7
Melvin:[1] Me	0–½	0–50	Silt loam	ML or CL	A–4 or A–6
Memphis: MmB, MmC2	3½+	0–6	Silt loam	ML	A–4
		6–29	Silty clay loam	CL or ML–CL	A–4 or A–6
		29–50	Silt loam	ML or ML–CL	A–4
Newark:[1] Ne	½–1½	0–50	Silt loam	ML or ML–CL	A–6 or A–4
Ochlockonee:[1]					
Oc	4+	0–7	Gravelly silt loam	ML	A–4
		7–50	Gravelly to very gravelly fine sandy loam.	GM	A–2
Oh	4+	0–7	Silt loam	ML	A–4
		7–21	Loam	ML	A–4
		21–35	Fine sandy loam	ML or SM	A–4
		35–50	Gravelly sandy loam	SM	A–2
Ruston: RuD, RuE, RxE	6+	0–13	Fine sandy loam	SM or ML	A–4
For Lexington part of unit RxE, see Lexington series.		13–25	Sandy clay loam	SC or ML–CL	A–6
		25–43	Sandy loam	SM or SC	A–2 or A–4
		43–52	Sandy clay loam	SC or ML–CL	A–6
		52–72	Sandy loam	SM or SC	A–2 or A–4
Saffell: SgC, SgD, SgE	6+	0–18	Gravelly loam	ML or SM–SC	A–4
For Guin part, see Guin series.		18–35	Gravelly sandy clay loam	SC or SM	A–2 or A–4
		35–60	Very gravelly sandy loam	GM–GW or GM	A–1 or A–2
		60–70	Sandy loam	SM or SC	A–2
Swamp: Sw.					
No estimates; all properties variable.					

See footnotes at end of table.

significant in engineering—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH value*			
100	100	95–100	85–100	0. 63–2. 00	0. 18–0. 23	4. 5–6. 1	Low	Moderate	High to low.
100	100	95–100	75–100	0. 63–2. 00	0. 19–0. 21	4. 5–5. 0	Low	Moderate	High.
100	100	90–100	80–100	<0. 20	0. 10–0. 15	4. 5–5. 0	Low	High	High.
100	95–100	90–100	85–95	0. 63–2. 00	0. 18–0. 23	6. 1–6. 5	Low	Low	Low.
95–100	95–100	90–100	70–95	0. 63–2. 00	0. 18–0. 23	5. 6–7. 3	Low	Low	Low.
90–100	85–100	80–95	75–90	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	High.
90–100	90–95	75–90	40–55	0. 63–2. 00	0. 13–0. 16	5. 1–5. 5	Low	Low	High.
75–90	70–85	55–70	25–45	2. 0–20. 0	0. 09–0. 12	5. 1–5. 5	Low	Moderate	High.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Moderate	High.
100	95–100	90–100	80–95	<0. 20	0. 10–0. 15	4. 5–5. 0	Low	Moderate	High.
20–60	15–55	10–50	5–35	2. 0–20. 0	0. 04–0. 09	4. 5–5. 0	Low	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	95–100	90–100	85–95	0. 63–2. 00	0. 19–0. 21	5. 1–5. 5	Low	Moderate	High.
100	95–100	40–75	20–65	0. 63–6. 3	0. 15–0. 18	5. 1–5. 5	Low	Low	High.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	100	95–100	90–100	0. 63–2. 00	0. 19–0. 21	5. 1–5. 5	Low	Moderate	High.
100	100	95–100	85–100	0. 20–0. 63	0. 12–0. 17	5. 1–5. 5	Low	Moderate	High.
100	95–100	90–100	70–90	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Low	Moderate.
95–100	95–100	85–95	60–75	0. 63–2. 00	0. 14–0. 18	4. 5–5. 0	Low	Moderate	High.
90–95	90–95	75–85	30–40	0. 63–2. 00	0. 10–0. 14	4. 5–5. 0	Low	Low to moderate.	High.
50–70	40–60	30–50	15–35	2. 0–6. 3	0. 05–0. 10	4. 5–5. 0	Low	Low	High.
100	95–100	95–100	90–100	0. 63–2. 0	0. 18–0. 23	4. 5–5. 5	Low	Low	Moderate.
100	95–100	95–100	90–100	0. 20–0. 63	0. 19–0. 21	4. 5–5. 5	Moderate	Moderate	Moderate.
100	95–100	95–100	95–100	<0. 20	0. 14–0. 17	5. 6–7. 3	High	High	Moderate to low.
95–100	95–100	90–100	85–95	0. 63–2. 00	0. 18–0. 23	5. 6–7. 3	Low	High	Low.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	100	95–100	90–100	0. 63–2. 00	0. 16–0. 19	5. 1–5. 5	Low	Moderate	High.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	5. 1–6. 0	Low	Low	Moderate.
100	100	90–100	80–95	0. 63–2. 00	0. 19–0. 21	5. 6–6. 5	Low	High	Low.
70–80	65–75	60–70	50–60	2. 00–6. 30	0. 10–0. 14	5. 1–5. 5	Low	Low	Moderate.
40–50	35–50	30–40	15–25	>6. 30	0. 06–0. 10	4. 5–5. 5	Low	Low	Moderate.
95–100	95–100	90–100	70–90	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
95–100	95–100	85–95	60–75	0. 63–2. 00	0. 14–0. 18	5. 1–5. 5	Low	Low	High.
95–100	95–100	70–85	40–55	2. 00–6. 30	0. 12–0. 16	4. 5–5. 0	Low	Low	High.
60–75	50–70	40–60	15–35	2. 00–10. 00	0. 06–0. 12	5. 1–5. 5	Low	Low	High.
95–100	95–100	85–90	35–55	0. 63–2. 00	0. 12–0. 16	4. 5–5. 5	Low	Low	Moderate.
95–100	95–100	85–95	40–55	0. 63–2. 00	0. 14–0. 18	4. 5–5. 5	Low	Low	High.
95–100	95–100	85–95	30–40	2. 00–6. 30	0. 10–0. 14	4. 5–5. 0	Low	Low	High.
95–100	95–100	80–90	35–55	2. 00–6. 30	0. 14–0. 18	4. 5–5. 0	Low	Low	High.
95–100	95–100	80–90	30–40	2. 00–6. 30	0. 10–0. 14	4. 5–5. 0	Low	Low	High.
70–80	65–75	60–70	40–60	2. 00–6. 30	0. 08–0. 11	4. 5–5. 5	Low	Low	High.
65–90	60–85	50–80	30–50	0. 63–6. 30	0. 05–0. 08	4. 5–5. 5	Low	Low	High.
25–45	20–40	20–40	10–25	>6. 30	0. 03–0. 08	5. 1–5. 5	Low	Low	High.
85–100	75–95	65–85	20–35	>6. 30	0. 10–0. 14	5. 1–5. 5	Low	Low	High.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface (typical profile)	Classification		
			USDA texture	Unified	AASHO
Urban land: Ur No estimates; all properties variable.					
	Feet	*Inches*			
Vicksburg: Vb	4+	0–50	Silt loam	ML or ML–CL	A–4
Waverly: Wa	0–½	0–50	Silt loam	ML or ML–CL	A–4
Wheeling: [1] WhA, WhB, WhC, WnC3	4+	0–19 19–37 37–50	Silt loam Silty clay loam Silt loam	ML or ML–CL CL or ML–CL ML, ML–CL, or SM	A–4 A–4 or A–6 A–2 or A–4

[1] These soils are subject to flooding.

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. Because that appear in

Soil series and map symbols	Suitability as source of—			Limiting soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Alluvial land: Ad. Too variable to rate.				
Bibb: Bb, Bc	Fair to poor: seasonal high water table; some areas are gravelly.	Poor: limited quantity; excessive fines.	Fair: seasonal high water table.	Seasonal high water table; subject to flooding.
Bodine: BoD, BoF	Poor: high chert content; very low fertility; slope.	Not suitable	Good	Slope
*Brandon: BrC, BrD, BrE, BsC3, BsD3, BtC. For Memphis and Loring parts of unit BtC, see Memphis series and Loring series.	Fair: Low or very low organic-matter content; slope.	Good for gravel; about 2 to 4 feet of silty overburden.	Good	Slope
Calloway: CaA, CaB, CaB2	Fair: seasonal high water table; low organic-matter content.	Poor: 6 to 20 feet of silty overburden.	Fair to poor: seasonal high water table; poor stability.	Seasonal high water table; subject to flooding in some areas.

significant in engineering—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of soil*	*pH value*			
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Low	Moderate to high.
100	100	95–100	90–100	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Moderate to high.	Moderate to high.
100	95–100	95–100	75–90	0. 63–2. 00	0. 18–0. 23	5. 1–5. 5	Low	Low	Moderate.
100	95–100	95–100	80–95	0. 63–2. 00	0. 19–0. 21	4. 5–5. 5	Low	Low	High.
100	95–100	90–95	30–85	0. 63–2. 00	0. 18–0. 23	4. 5–5. 5	Low	Low	High.

[2] These soils are subject to flooding if they are on stream terraces.

properties of the soils

these soils may have different properties and limitations, it is necessary to follow carefully the instructions for referring to other series the first column]

Limiting soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Reservoir area	Embankment				
Seasonal high water table; pervious material.	Sandy and gravelly strata; subject to piping.	Subject to flooding; seasonal high water table; high corrosivity.	Seasonal high water table; hazard of flooding.	Subject to flooding	Not needed.
Pervious substratum; slope.	Large volume of chert.	Not needed	Slope; low available moisture capacity.	Slope	Cherty surface; low fertility; droughty; slopes erodible.
Pervious substratum; slope.	Fair stability	Not needed	Slope	Slope	Slope.
Seasonal high water table.	Piping hazard; poor stability.	Slow permeability; fragipan at a depth of about 18 inches; seasonal high water table; high corrosivity.	Seasonal high water table; slow permeability; moderate to shallow rooting depth above fragipan.	Seep spots; terraces not generally needed.	Seepage from side slopes; somewhat poorly drained.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as source of—			Limiting soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Collins: Co	Good	Poor: not generally a source.	Poor: poor stability and compaction; erodible.	Subject to flooding
Dumps: Du. Too variable to rate.				
Egam: Eg	Poor to fair: high clay content.	Poor: not generally a source.	Fair: moderate shrink-swell potential; fair compaction.	Subject to flooding
Falaya: Fa	Good to fair: seasonal high water table.	Poor: not generally a source.	Poor to fair: poor stability and compaction; seasonal high water table.	Subject to flooding; seasonal high water table.
Forestdale: Fo	Poor: clayey subsoil; seasonal high water table.	Poor: not generally a source.	Poor: highly plastic; high compressibility.	Seasonal high water table; infrequent flooding.
Grenada: GrA, GrB, GrB3, GrC, GrC3.	Good to fair where not severely eroded; low to very low organic-matter content.	Fair to poor: 4 to 15 feet of overburden.	Fair: fair to poor stability and compaction.	Seasonal high water table.
Guin: GsC, GtE	Poor: high gravel content; slope.	Good source of gravel: sandy strata below a depth of 3 feet in some places.	Good	Slope
Gullied land: Gu. Too variable to rate.				
Henry: Hn	Fair to poor: seasonal high water table; low natural fertility.	Poor: very thick overburden.	Fair to poor: seasonal high water table; poor stability.	Seasonal high water table; infrequent flooding in some areas.
Huntington: Hu	Good	Poor: not generally a source.	Fair: fair stability and compaction.	Subject to flooding
Iuka: Iu	Good	Fair: sandy or gravelly strata at a depth below 3 feet.	Fair to good: lower horizons better than upper horizons.	Subject to flooding
Lax: LaC, LcC3	Good to fair to depth of about 2 feet.	Good: 2 to 3½ feet of overburden over gravel.	Fair to good: lower gravelly horizons better than silty upper horizons.	Seasonal high water table.
Lexington: LeC, LeD, LgC3, LgD3.	Good to fair to depth of about 2 feet.	Fair to poor: fines excessive in sandy strata.	Fair to good: lower sandy and loamy horizons are better than silty upper horizons.	Slope
Loring: LoB, LoB2, LoC2	Good to fair to depth of about 2 feet.	Poor: fines excessive in gravelly or sandy strata.	Fair: fair stability and compaction.	Seasonal high water table.

properties of the soils—Continued

Limiting soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Reservoir area	Embankment				
Pervious material	Piping hazard; poor stability.	Not generally needed.	Subject to flooding	Subject to flooding	Not needed.
Excessive seepage in subsoil.	Moderate shrink-swell potential; fair compaction.	Moderately slow permeability.	Moderately slow permeability; subject to flooding.	Subject to flooding	Not needed.
Pervious substratum and subsoil.	Poor stability; piping hazard.	Subject to flooding; high corrosivity.	Subject to flooding; seasonal high water table.	Subject to flooding	Not needed.
Seasonal high water table.	High compressibility; high shrink-swell potential; poor compaction.	Slow permeability; seasonal high water table at surface; subject to flooding; high corrosivity.	Slow permeability; seasonal high water table.	Not needed	Poorly drained; clayey subsoil.
Pervious substratum at a depth of 4 to 15 feet.	Fair stability; piping hazard.	Needed only on level areas; slowly permeable fragipan at depth of about 2 feet.	Slowly permeable fragipan at a depth of about 2 feet.	Slight wetness	Seepage from side slopes.
Very pervious gravelly material; slope.	Fair stability; moderate to high permeability.	Not needed	Gravelly soil with rapid permeability and low available moisture capacity; slope.	Slope	Slope; erodible; low available moisture capacity.
Seasonal high water table.	Piping hazard; poor stability.	Shallow to slowly permeable fragipan; suitable outlets are limited.	Seasonal high water table; slowly permeable fragipan; shallow rooting depth.	Not needed	Poorly drained.
Pervious material	Piping hazard; fair stability.	Not needed	All features favorable.	Not needed	Not needed.
Pervious material	Piping hazard; fair stability.	Practice is not essential.	Subject to flooding	Subject to flooding	Not needed.
Pervious material at depth of 2 to 3 feet.	Fair stability; piping hazard in upper 2 to 3 feet.	Not needed	Slow permeability in fragipan.	All features favorable.	All features favorable.
Pervious substratum.	Fair stability	Not needed	Slope	Slope	Slope.
Pervious substratum at a depth of 4 to 6 feet.	Piping hazard; fair stability and compaction.	Not needed	Moderately slow permeability in fragipan.	All features favorable.	All features favorable.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as source of—			Limiting soil features affecting—
	Topsoil	Sand and gravel	Road fill	Highway location
Mantachie: Ma	Good to fair: seasonal high water table; sandy and gravelly strata below 2 feet.	Fair to poor: fines generally excessive.	Fair: seasonal high water table; fair stability.	Seasonal high water table; subject to flooding.
McGary: Mc	Fair in upper 6 inches; poor below; clayey subsoil; seasonal high water table.	Poor: not a source	Moderate to poor: high shrink-swell potential; high compressibility; seasonal high water table.	Seasonal high water table; infrequent flooding.
Melvin: Me	Fair to poor: seasonal high water table.	Poor: very limited source.	Fair to poor: stability and compaction; seasonal high water table.	Subject to flooding; seasonal high water table.
Memphis: MmB, MmC2	Good in surface layer; fair in subsoil.	Fair to poor: 4 to 7 feet of overburden; fines generally excessive.	Fair stability and compaction.	All features favorable
Newark: Ne	Good to fair: seasonal high water table.	Poor: not a source	Fair to poor: poor stability and compaction; seasonal high water table.	Seasonal high water table; subject to flooding.
Ochlockonee: Oc, Oh	Good where not gravelly.	Fair to poor: fines generally excessive.	Good to fair	Subject to flooding
*Ruston: RuD, RuE, RxE For Lexington part of RxE, see Lexington series.	Fair to poor: slope	Fair to good source of sand below 3 feet; fines generally excessive.	Good to fair: stability and compaction.	Slope
*Saffell: SgC, SgD, SgE For Guin part, see Guin series.	Poor: shallow to gravel, slopes.	Good for gravel	Good	Slope
Swamp: Sw. Too variable to rate.				
Urban land: Ur. Too variable to rate.				
Vicksburg: Vb	Good	Poor: not generally a source.	Poor: poor stability and compaction; erodible.	Subject to flooding
Waverly: Wa	Fair to poor: seasonal high water table.	Poor: not generally a source.	Fair to poor: seasonal high water table; poor stability and compaction.	Seasonal high water table; subject to flooding.
Wheeling: WhA, WhB, WhC, WnC3.	Good in uppermost foot; clay content restricts workability of the subsoil.	Fair to poor: sandy or gravelly strata may have excessive fines; 4 to 15 feet of overburden.	Fair: fair stability and compaction.	Infrequent flooding

properties of the soils—Continued

Limiting soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways
Reservoir area	Embankment				
Pervious material	Piping hazard; fair stability.	Subject to flooding	Subject to flooding; seasonal high water table.	Subject to flooding	Not needed.
Limited storage	Poor stability; high compressibility.	Slow permeability	Slow permeability; seasonal high water table.	Not needed	Seasonal high water table; clayey subsoil; seepy areas.
Pervious material	Poor stability; piping hazard.	Suitable outlets unavailable in some areas; subject to flooding; high corrosivity.	Seasonal high water table; subject to flooding.	Subject to flooding	Not needed.
Pervious material at depth of 4 to 7 feet.	Piping hazard; fair stability.	Not needed	All features favorable.	All features favorable.	All features favorable.
Moderate permeability.	Piping hazard; poor stability and compaction.	Subject to flooding; high corrosivity.	Seasonal high water table; subject to flooding.	Subject to flooding	Not needed.
Pervious material; subject to flooding.	Fair to poor stability and compaction; piping hazard.	Not needed	Subject to flooding; gravelly areas have rapid permeability.	Subject to flooding	Not needed.
Pervious material; slope.	Piping hazard; fair stability.	Not needed	Slope	Slope	Slope.
Pervious substratum and subsoil; slope.	Fair stability	Not needed	Gravelly soil; low available moisture capacity; slope.	High gravel content; slope.	High gravel content; low available moisture capacity; erodible; slope.
Pervious material	Piping hazard; poor stability and compaction; erodible.	Not needed	Subject to flooding	Subject to flooding	Not needed.
Pervious material	Piping hazard; poor stability and compaction.	Subject to flooding	Seasonal high water table; subject to flooding.	Subject to flooding	Not needed.
Pervious material	Fair stability and compaction.	Not needed	All features favorable.	All features favorable.	All features favorable.

TABLE 7.—*Engineering*

[Test performed by Kentucky Department of

Soil name and location of sample	Parent material	Depth from surface	Moisture-density data [1]		California bearing ratio [2]	
			Maximum dry density	Optimum moisture	Unsoaked	Soaked
		Inches	*Lb./cu. ft.*	*Percent*		
Brandon silt loam:						
1 mile SW. of New Concord, Ky. (Modal) Laboratory No. S65Ky18–10.	Loess over gravelly Coastal Plain deposits.	3–9	105	17	33	13
		12–19	105	19	18	11
		32–48	113	15	99	45
Egam silty clay loam:						
2 miles NW. of Gilbertsville, Ky., 100 yards south of Tennessee River. (Modal) Laboratory No. S65Ky79–9.	Alluvium (Tennessee River).	0–12	99	21	14	5
		12–27	96	24	7	4
		40–72	96	23	23	7
2 miles NW. of Gilbertsville, Ky., ⅜ mile south of the Tennessee River. (B horizon is more acid and has a higher chroma than modal) Laboratory No. S65Ky79–8.	Alluvium (Tennessee River).	0–9	97	24	20	4
		23–56	98	22	35	5
		56–72	97	22	26	8
Forestdale silt loam, high clay variant:						
1½ miles SE. of Sharpe, Ky. (Modal) Laboratory No. S65Ky79–4.	Clayey and silty alluvium.	0–5	104	19	19	8
		8–33	97	22	14	2
		46–72	104	20	13	6
1⅝ miles SE. of Sharpe, Ky. (less clay in B horizon than in modal) Laboratory No. S65Ky79–5.	Clayey and silty alluvium.	0–7	104	18	36	10
		11–19	108	18	15	9
		19–48	103	22	23	3
		48–72	104	19	35	36
Grenada silt loam:						
1 mile NE. of Hazel, Ky. (Modal) Laboratory No. S65Ky18–1.	Loess.	0–7	102	17	42	8
		9–17	103	19	20	14
		26–47	101	20	22	8
		47–72	106	17	49	13
Guin very gravelly soils:						
1½ miles SE. of New Concord, Ky. (Modal) Laboratory No. S65Ky18–7.	Gravelly Coastal Plain deposits.	1–12	109	16	99	43
		18–40	123	11	99	79
		40–72	122	12	99	66
Henry silt loam:						
3 miles NE. of Hazel, Ky. (Modal) Laboratory No. S65Ky18–2.	Loess.	0–8	102	14	40	9
		13–26	107	16	32	7
		26–48	104	18	14	5
		48–72	107	17	22	3
Henry silt loam (terrace position):						
¾ mile NE. of Hazel, Ky. (Modal) Laboratory No. S65Ky18–13.	Loess alluvium.	1–7	100	18	43	16
		7–25	105	18	31	11
		25–43	101	20	36	15
		43–60	102	19	18	3

[1] Based on AASHO Designation: T99–57, Method A (*1*).

[2] Test performed by Kentucky's Modified Procedure (*8*).

[3] Mechanical analysis according to AASHO Designation: T88–57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for naming textural classes for soils. Based on total material unless otherwise noted. Laboratory test data corrected for amount discarded in field sampling.

[4] Borderline classifications are shown for all soils having a plasticity index within two points of A-line. Examples of borderline classifications so obtained are ML–CL and GC–GW.

test data

Highways, Highway Research Laboratory]

Mechanical analysis [3]							Liquid limit	Plasticity index	Classification	
Percentage passing sieve—			Percentage smaller than—						AASHO	Unified [4]
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
							Percent			
100	97	94	71	45	21	17	25	4	A-4(8)	ML-CL
100	96	94	74	51	31	26	36	6	A-4(8)	ML
[5] 42	34	31	29	24	15	13	13	10	A-2-4(0)	GC
----------	100	96	93	83	43	27	36	14	A-6(10)	ML-CL
----------	100	99	98	92	41	28	39	15	A-6(10)	ML-CL
100	97	92	84	51	34	26	39	12	A-6(9)	ML-CL
100	98	90	85	52	32	22	37	12	A-6(9)	ML-CL
100	99	94	90	73	48	39	39	15	A-6(10)	ML-CL
----------	100	98	97	78	50	38	40	2	A-4(8)	ML
100	95	87	84	71	28	19	24	5	A-4(8)	ML-CL
100	99	92	88	76	58	49	61	37	A-7-6(16)	CH
100	99	96	90	66	42	32	41	19	A-7-6(12)	CL
100	93	81	79	59	22	14	29	7	A-4(8)	ML-CL
100	95	85	82	62	36	27	31	13	A-6(9)	CL
100	99	94	90	77	57	47	59	37	A-7-6(20)	CH
100	98	89	83	65	47	39	37	15	A-6(10)	ML-CL
100	98	91	68	34	14	12	24	2	A-4(8)	ML
100	98	95	90	71	33	26	37	13	A-6(9)	ML-CL
100	99	96	86	58	28	22	33	10	A-4(8)	ML-CL
100	99	96	70	41	23	18	29	6	A-4(8)	ML-CL
[6] 56	51	42	39	27	8	4	([7])	----------	A-4(1)	GM
[8] 18	13	9	8	7	5	4	24	8	A-2-4(0)	GC-GW
[9] 31	24	11	7	5	4	3	([7])	----------	A-1(0)	GM-GW
100	99	95	88	61	16	11	([7])	----------	A-4(8)	ML
100	99	97	75	45	25	22	25	4	A-4(8)	ML-CL
100	100	98	92	76	40	27	29	10	A-4(8)	CL
100	90	81	73	51	30	27	33	4	A-4(8)	ML
100	98	81	71	41	19	12	23	2	A-4(8)	ML
100	96	93	84	67	29	18	27	5	A-4(8)	ML-CL
100	98	95	88	67	40	31	33	11	A-6(9)	ML-CL
100	98	93	73	46	28	26	35	13	A-6(9)	ML-CL

[5] Five percent of the material was more than 3 inches in diameter and was discarded in field sampling; 81 percent passed the 1-inch sieve; 72 percent passed the ¾-inch sieve; 59 percent passed the ⅜-inch sieve; and 52 percent passed the No. 4 sieve.

[6] One percent of the material was more than 3 inches in diameter and was discarded in field sampling; 87 percent passed the 1-inch sieve; 80 percent passed the ¾-inch sieve; 68 percent passed the ⅜-inch sieve; and 60 percent passed the No. 4 sieve.

[7] Nonplastic.

[8] Five percent of the material was more than 3 inches in diameter and was discarded in field sampling; 58 percent passed the 1-inch sieve; 49 percent passed the ¾-inch sieve; 35 percent passed the ⅜-inch sieve; and 28 percent passed the No. 4 sieve.

[9] Ten percent of the material was more than 3 inches in diameter and was discarded in field sampling; 55 percent passed the 1-inch sieve; 44 percent passed the ¾-inch sieve; 36 percent passed the ⅜-inch sieve; and 31 percent passed the No. 4 sieve.

Moisture-density data are important in earthwork, as optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content. If a soil is compacted at successively higher moisture content, assuming that the compactive effect remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the dry density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density.

The California Bearing Ratio is used to determine the bearing value of soil by expressing the ratio as a percentage of a standard penetration value for crushed stone.

Mechanical analyses show the percentages, by weight, of soil particles that would pass sieves of specified sizes. Sand and other coarser materials do not pass through the No. 200 sieve, but silt and clay do pass through the sieve. Silt material larger than 0.002 millimeter in diameter passes through the No. 200 sieve, and the clay that passes through the No. 200 sieve is that fraction that is smaller than 0.002 millimeter in diameter. The clay fraction was determined by the hydrometer method, rather than the pipette method that most soil scientists use in determining the clay in soil samples.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from semisolid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Use of Soils for Town and Country Planning

The interpretations in this section point out soil-related limitations and problems to be expected in use of the soils for town and country planning. The information is not intended to eliminate the need for onsite investigation for specific uses but, rather, to serve as a guide for screening sites and for planning more detailed investigations.

Table 8 shows the estimated degree of limitation (the most severe) and the kinds of limitations for town and country uses of the soils. The rating terms used are slight, moderate, and severe. Slight limitations, if any, are of minor consequence and are easy to overcome. Moderate limitations are such as to require careful planning, design, and management. Cost of corrective measures is an important consideration. Severe limitations are those where the limitations are such that use of the soils for a particular purpose is questionable and may be too expensive.

The kinds of limitations, expressed in terms of soil characteristics or properties, are shown only for the moderate and severe ratings. Some of the kinds of limitations are expressed in terms defined in the Glossary.

The ratings in table 8 are based on the following factors:

Ratings for sewage effluent disposal are based on soil permeability, depth to seasonal water table, depth to bedrock, surface rockiness, slope, surface stoniness, and flooding hazard. Possible pollution hazards to water supplies were not considered here, but would be a severe

TABLE 8.—*Limitations of soils for town*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. Because that appear in

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Locations for buildings (three stories or less with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Alluvial land: Ad. Too variable to rate.						
Bibb: Bb, Bc	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.
Bodine: BoD, BoF	Severe: slope	Severe: rapid permeability.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
*Brandon: BrC, BtC. For Loring and Memphis part of BtC, see Loring LoC2, and Memphis MmC2.	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.

See footnotes at end of table.

limitation on such soils as those of the Bodine, Guin, and Saffell series.

Sewage lagoons are shallow ponds in which sewage is disposed of by oxidation. Ratings for this use are based on permeability (basin floor), slope, depth to bedrock, quantity of coarse fragments (less than 10 inches in diameter), surface stoniness, kind of soil material at site, flooding hazard, and content of organic matter in the soil.

Building locations includes dwellings and service buildings limited to three stories or less with basements. The ratings for this use are based on depth to seasonal water table, depth to bedrock, slope, surface rockiness, surface stoniness, flooding hazard, frost action, and shrink-swell potential. Slope is more restrictive in subdivisions than other areas.

Ratings for campsites (tent and trailer sites) are based on intensive use and on depth to bedrock, permeability, depth to seasonal water table, surface rockiness, surface stoniness, texture of surface soil, and flooding hazard. Slope is more restrictive for trailer parks than for tent areas.

Ratings for county and access roads are for normal, hard-surface roads used by traffic in rural areas and small towns. These ratings are based on depth to seasonal water table, slope, depth to rock, surface rockiness, surface stoniness, and flooding hazard.

Ratings for streets and parking lots in subdivisions are based on depth to seasonal water table, slope, depth to rock, surface rockiness, surface stoniness, and flooding hazard. Slope is a more restrictive factor for parking lots and streets than for county and access roads.

Athletic fields are used intensively for sports, such as baseball, football, and volleyball. They normally require the playing area to be nearly level. They are subject to heavy foot traffic. Soil ratings are based on depth to seasonal water table, soil permeability, slope, depth to bedrock, surface rockiness, surface stoniness, surface texture, and flooding hazard.

Picnic and play areas are subject to less intensive use than athletic fields. Ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness, surface rockiness, texture of the surface soil, and flooding hazard. These factors are less restrictive than for athletic fields.

For lawns, landscaping and golf fairways it was assumed that soil material at the site will be used and that no fill or topsoil would be added. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness, surface rockiness, texture of the surface soil, and flooding hazard.

For sanitary land fill the soils are rated for suitability for disposal of trash and garbage by the trench method. No importation of fill or cover material was considered in the ratings. The ratings are based on depth to seasonal water table, permeability, slope, depth to bedrock, surface rockiness, surface stoniness, surface texture, and flooding hazard.

In rating the soils for use as cemeteries, it was assumed that soil material at the site will be used and fill or topsoil would be imported. Ratings of soil factors considered are depth to seasonal water table, slope, permeability, depth to bedrock, surface rockiness, surface stoniness, surface texture, and flooding hazard.

Paths and trails are for nonintensive uses, such as cross-country hiking and bridle paths that allow random movement of people. It is assumed that the areas will be used as they occur in nature. Soil features on which the ratings are based are wetness, slope, surface rockiness, surface stoniness, surface texture, and flooding hazard.

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these soils may have different properties and limitations, it is necessary to follow carefully the instructions for referring to other series the first column]

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Lawns, landscaping, and golf fairways	Sanitary land fill (trench method) [1]	Cemeteries	Paths and trails
Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table.
Severe: slope	Severe: cherty surface layer; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: cherty surface layer; slope.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Slight.

TABLE 8.—*Limitations of soils for town*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Locations for buildings (three stories or less with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
*Brandon—Continued						
BrD	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BrE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BsC3	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope; silty clay loam surface layer.	Severe: slope	Moderate: slope.
BsD3	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Calloway:[2]						
CaA	Severe: seasonal high water table; slow permeability in fragipan.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
CaB, CaB2	Severe: seasonal high water table; slow permeability in fragipan.	Moderate: slope.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Collins: Co	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard; seasonal high water table.	Moderate: flood hazard; seasonal high water table.	Severe: flood hazard.
Dumps: Du. Too variable to rate.						
Egam: Eg	Severe: flood hazard; moderately slow permeability.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard; moderately slow permeability; silty clay loam surface layer; seasonal high water table.	Moderate: flood hazard; moderately slow permeability; silty clay loam surface layer; seasonal high water table.	Severe: flood hazard.
Falaya: Fa	Severe: seasonal high water table; flood hazard.	Severe: flood hazard; moderate permeability.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.
Forestdale: Fo	Severe: seasonal high water table.	Severe: flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.

See footnotes at end of table.

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Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Lawns, landscaping, and golf fairways	Sanitary land fill (trench method) [1]	Cemeteries	Paths and trails
Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Moderate: slope.
Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope.
Severe: slope---	Severe: slope---	Moderate: silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: slope.	Moderate: slope; silty clay loam surface layer.	Moderate: silty clay loam surface layer.
Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Severe: slope---	Moderate: slope; silty clay loam surface layer.
Moderate: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability in fragipan.	Moderate: seasonal high water table.
Moderate: seasonal high water table; slope.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; soil depth limited by fragipan.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; slow permeability in fragipan.	Moderate: seasonal high water table.
Severe: flood hazard.	Moderate: seasonal high water table.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.
Severe: flood hazard.	Moderate: seasonal high water table; moderately slow permeability; silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Moderate: silty clay loam surface layer; flood hazard.	Severe: flood hazard.	Severe: moderately slow permeability; flood hazard.	Moderate: silty clay loam surface layer; flood hazard.
Severe: flood hazard.	Severe: seasonal high water table.	Moderate: seasonal high water table; flood hazard.	Moderate: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Moderate: seasonal high water table flood hazard.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.

TABLE 8.—*Limitations of soils for town*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Locations for buildings (three stories or less with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Grenada: [2]						
GrA	Severe: slow permeability in fragipan.	Slight	Moderate: seasonal high water table.	Moderate: slow permeability in fragipan.	Moderate: slow permeability in fragipan.	Moderate: seasonal high water table.
GrB, GrB3	Severe: slow permeability in fragipan.	Moderate: slope.	Moderate: seasonal high water table.	Moderate: slow permeability in fragipan.	Moderate: slow permeability in fragipan.	Moderate: seasonal high water table.
GrC, GrC3	Severe: slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope; slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.
Guin:						
GsC	Moderate: possible pollution hazard; slope.	Severe: rapid permeability; slope.	Moderate: slope.	Severe	Severe: slope	Moderate: slope.
GtE	Severe: slope	Severe: rapid permeability; very gravelly surface layer; slope.	Severe: slope	Severe: very gravelly surface layer; slope.	Severe: very gravelly surface layer; slope.	Severe: slope
Gullied land: Gu. (Too variable to rate).						
Henry [2]: Hn	Severe: seasonal high water table; slow permeability in fragipan.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Huntington: Hu	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.
Iuka: Iu	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard; seasonal high water table.	Moderate: flood hazard; seasonal high water table.	Severe: flood hazard.
Lax:						
LaC	Severe: slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope; slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.
LcC3	Severe: slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope; slow permeability in fragipan.	Severe: slope	Moderate: slope; seasonal high water table.
Lexington:						
LeC	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
LeD	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
LgC3	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope; silty clay loam surface layer.	Severe: slope	Moderate: slope.
LgD3	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnotes at end of table.

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Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Lawns, landscaping, and golf fairways	Sanitary land fill (trench method) [1]	Cemeteries	Paths and trails
Moderate: seasonal high water table.	Moderate: slow permeability in fragipan.	Slight	Slight	Moderate: seasonal high water table.	Severe: slow permeability in fragipan.	Slight.
Moderate: seasonal high water table; slope.	Moderate: slope; slow permeability in fragipan.	Slight	Slight	Moderate: seasonal high water table.	Severe: slow permeability in fragipan.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: seasonal high water table; slope.	Severe: slow permeability in fragipan.	Slight.
Severe: slope	Severe: slope; gravelly surface layer.	Moderate: slope; gravelly surface layer.	Severe: coarse fragments.	Moderate: slope; gravelly surface layer.	Moderate: slope; gravelly surface layer.	Moderate: gravelly surface layer.
Severe: slope	Severe: very gravelly surface layer; slope.	Severe: very gravelly surface layer; slope.	Severe: very gravelly surface layer; slope.	Severe: slope; very gravelly surface layer.	Severe: very gravelly surface layer; slope.	Severe: very gravelly surface layer; slope.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability in fragipan.	Severe: seasonal high water table.
Severe: flood hazard.	Moderate: flood hazard.	Slight	Moderate: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.
Severe: flood hazard.	Moderate: seasonal high water table; flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard; seasonal high water table.	Severe: flood hazard.	Moderate: flood hazard.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: slope; seasonal high water table.	Severe: slow permeability in fragipan.	Slight.
Severe: slope	Severe: slope	Moderate: slope; silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: slope; seasonal high water table.	Severe: slow permeability in fragipan.	Moderate: silty clay loam surface layer.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: silty clay loam surface layer.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope	Moderate: slope; silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: silty clay loam surface layer.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope; silty clay loam surface layer.

TABLE 8.—*Limitations of soils for town*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Locations for buildings (three stories or less with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Loring:						
LoB, LoB2	Severe: moderately slow permeability in fragipan.	Moderate: slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability in fragipan.	Moderate: seasonal high water table; slope; moderately slow permeability in fragipan.	Moderate: seasonal high water table.
LoC2	Severe: moderately slow permeability in fragipan.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table; moderately slow permeability in fragipan; slope.	Severe: slope.	Moderate: seasonal high water table; slope.
Mantachie: Ma	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.
McGary: Mc	Severe: slow permeability at a depth below 12 inches; seasonal high water table.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; flood hazard.
Melvin: Me	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.	Severe: flood hazard; seasonal high water table.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.
Memphis:						
MmB	Slight	Moderate: moderate permeability; slope.	Slight	Slight	Moderate: slope.	Slight
MmC2	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Newark: Ne	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.
Ochlockonee: Oc, Oh	Severe: flood hazard.	Severe: flood hazard; rapid permeability.	Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.
*Ruston:						
RuD	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
RuE, RxE For Lexington part of RxE, see Lexington series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnotes at end of table.

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Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Lawns, landscaping, and golf fairways	Sanitary land fill (trench method) [1]	Cemeteries	Paths and trails
Moderate: seasonal high water table; slope.	Moderate: seasonal high water table; moderately slow permeability; slope.	Slight	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability in fragipan.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability in fragipan; slope.	Slight.
Severe: flood hazard.	Severe: seasonal high water table.	Moderate: seasonal high water table; flood hazard.	Moderate: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Moderate: flood hazard; seasonal high water table.
Moderate: seasonal high water table; flood hazard.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability at a depth below 12 inches.	Moderate: seasonal high water table.
Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table.
Moderate: slope.	Moderate: slope.	Slight	Slight	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Slight.
Severe: flood hazard.	Severe: seasonal high water table.	Moderate: seasonal high water table. flood hazard.	Severe: flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Moderate: seasonal high water table; flood hazard.
Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 8.—*Limitations of soils for town*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Locations for buildings (three stories or less with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
*Saffell:						
SgC—For Guin part of this unit, see Guin, GsC.	Moderate: slope; subject to pollution hazard.	Severe: rapid permeability.	Moderate: slope.	Moderate: slope; gravelly surface layer.	Severe: slope	Moderate: slope.
SgD	Severe: slope; subject to pollution hazard.	Severe: moderately rapid permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
SgE—For Guin part of SgD and SgE, see Guin, GtE.	Severe: slope; subject to pollution hazard.	Severe: moderately rapid permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Swamp: Sw	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.
Urban land: Ur. Too variable to rate.						
Vicksburg: Vb	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.
Waverly: Wa	Severe: seasonal high water table; flood hazard.	Severe: flood hazard.	Severe: flood hazard; seasonal high water table.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table. flood hazard.
Wheeling:						
WhA	Slight	Moderate: moderate permeability.	Slight	Slight	Slight	Slight
WhB	Slight	Moderate: moderate permeability; slope.	Slight	Slight	Moderate: slope.	Slight
WhC	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
WnC3	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope; silty clay loam surface layer.	Severe: slope	Moderate: slope; silty clay loam surface layer.

[1] If landfills are deeper than 5 or 6 feet, onsite studies need to be made of the underlying stratum, water table, hazard of aquifer pollution, and drainage into ground water.

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Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Lawns, landscaping, and golf fairways	Sanitary land fill (trench method) [1]	Cemeteries	Paths and trails
Severe: slope	Severe: gravelly surface layer; slope.	Moderate: slope; gravelly surface layer.	Moderate: slope; gravelly surface layer.	Moderate: slope.	Moderate: slope; gravelly surface layer.	Moderate: gravelly surface layer.
Severe: slope	Severe: slope; gravelly surface layer.	Severe: slope	Severe: slope; coarse fragments.	Severe: slope	Severe: slope	Moderate: slope; gravelly surface layer.
Severe: slope	Severe: slope; gravelly surface layer.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.	Severe: permanent high water table.
Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.
Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.	Severe: seasonal high water table; flood hazard.
Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Moderate: slope.	Moderate: slope.	Slight	Slight	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Slight.
Severe: slope	Severe: slope	Moderate: slope; silty clay loam surface layer.	Moderate slope; silty clay loam surface layer.	Severe: silty clay loam surface layer.	Moderate: slope; silty clay loam surface layer.	Moderate: silty clay loam surface layer.

[1] These ratings are for the upland positions of the soil. Terrace positions have flood hazards.

Formation, Morphology, and Classification of the Soils

The first part of this section discusses the factors that affect soil formation, and the second part explains the processes causing the differences in the morphology of the soils. The third part explains briefly the system of soil classification, and each soil series is classified in the family, subgroup, and order of the current classification system. The last part lists publications that contain the results of tests on soils sampled in the two counties.

Factors of Soil Formation

Soil is a product of the interaction of parent material, climate, living organisms, relief, and time. The nature of the soil at any point on earth depends on the combination of the five major factors at that point. All five of these factors come into play in the genesis of every soil. These factors of soil formation are so closely interrelated that few generalizations can be made about the effect of any one of them. The relative influence of each factor differs from place to place, and each factor modifies the effect of the other four. For example, the effects of climate and of plant and animal life are influenced by relief and by the nature of the parent material. In some places the influence of one factor is dominant.

In the following paragraphs, the five major factors of soil formation are discussed in relation to their effect on the soils of Calloway and Marshall Counties.

Climate

The soils of Calloway and Marshall Counties formed in a humid, temperate type of climate, characteristic of the south-central part of the United States. There is little variation in climate within the survey area, and it has been a uniform factor in soil development. The slight variations in climate that affect soil formation result from differences in relief. As is typical of soils that developed in humid, temperate climates, many of these soils, such as those of the Henry and Calloway series, are strongly weathered, highly leached, and acid in reaction. The high rainfall results in rather intense leaching and movement of soluble and colloidal materials downward in the soil. Because the soil is frozen for only short periods and to very slight depths, weathering and translocation of materials continue almost without interruption.

Living organisms

The native vegetation, like the climate, was fairly uniform and is relatively unimportant in accounting for differences among the soils of these counties. However, the vegetation has had a strong influence on the common characteristics of the soils.

The soils in this area developed under a dense stand of mixed hardwood forest. Most of the soils now have an Ap horizon that has been mixed by plowing, but the Bodine and Ruston soils have a dark grayish-brown A1 horizon, which indicates an accumulation of organic matter, over a brown A2 horizon.

Not much is known of the fungi and microlife, although they undoubtedly had a strong influence upon soil formation and development. The greatest activity of earthworms and other small animals is in the uppermost layers of the soil. Mixing of soil material by rodents does not appear to have been of much importance.

The complex of living organisms in the soil has been changed as a result of the clearing of forests, the cultivation of fields, the introduction of new species of plants, and artificial drainage of wet areas. These activities will affect the rate and direction of soil genesis in the future. Some of the results of man's effect upon soil genesis are now evident, but others may not become apparent for many centuries.

Parent material

Several different kinds of parent material have been identified in Calloway and Marshall Counties. These parent materials are loess, alluvium, cherty limestone residuum, and gravelly and loamy Coastal Plain materials.

Loess, a windblown silty material, covers nearly all the upland areas. Thickness of the loess averages about 6 feet on gently sloping upland areas, and it ranges from little or none to more than 10 feet in thickness. Because the loess is extensive and is the topmost layer in which soil-forming processes are active, it is the most important parent material. Most of the upland soils, such as the Grenada, Calloway, and Henry soils, developed in deep loess (48 inches or more in thickness). The Brandon, Lax, and Lexington soils developed in shallow loess and the underlying Coastal Plain materials (fig. 15). Most of the alluvium and colluvium in which the Falaya, Collins, and Waverly soils on the first bottoms, and the Calloway and Grenada soils on the stream terraces, formed was washed from soils developed in loess. A small part of the alluvium is of Coastal Plain origin. Huntington, Newark, and Melvin soils, along the Tennessee River, formed in alluvium washed from many different kinds of parent material. These soils are mostly silty and range from medium acid to neutral in reaction.

The Guin and Saffell soils of the uplands developed in gravelly Coastal Plain materials, and Ruston soils formed in loamy Coastal Plain materials where the sand-size particles are dominant. The Bodine soils developed in very cherty residuum from limestone.

Fragipans tend to develop in loamy textured parent material that has a low carbonate content or no carbonates and a high content of silt or very fine sand. Because loess is a silty, loamy material and is the parent material on most of the upland areas, soils that have a fragipan occupy extensive acreages. Soils of the Calloway and Grenada series are examples. In view of the fact that much of the alluvium is from loess, most of the soils of the second bottoms (terraces) have developed a fragipan.

The soils that developed in loess, such as those of the Memphis, Henry, and Loring series have a higher base saturation than Guin and Saffell soils, which developed in Coastal Plain material, or the Bodine soils, which developed in residuum from cherty limestone. This is due, at least in part, to the fact that the loessal deposit is more recent. Percent base saturation specifically, and

Figure 15.—**The two major parent materials of a Brandon silt loam are shown in this road cut. The upper part is loess, the lower part is very gravelly Coastal Plain material.**

other chemical data generally, suggest that the more poorly drained loessal soils have been subject to more severe weathering and leaching than the better drained members. Therefore, natural fertility varies not only with parent material but also with the soil-forming factors of relief and time.

Relief

The relief of Calloway and Marshall Counties is variable. Slopes range from nearly level to very steep. The maximum difference in elevation between the valleys and the adjacent hill crests is about 175 feet in the eastern part of the area near the Tennessee River. In the relatively level interstream areas, dissection is slight, and the difference in elevation on the interstream areas and the alluvial valleys rarely exceeds 50 feet.

Relief affects soil characteristics primarily by influencing the amount of rainfall that runs off the surface and the amount that enters and remains in the soil. Soils on steeper slopes are likely to be shallow because much of the rainfall runs off and carries soil with it. Therefore, little leaching and translocation of clay and colloidal material takes place. Guin and Bodine soils are examples of soils that are moderately steep to very steep slopes and the soil-forming processes have been slowed by the slope. Loring and Memphis soils are examples of gently sloping to sloping soils. On these soils there is some surface runoff, but a higher percentage of the rainfall enters the soil. There is less soil loss by erosion, and the downward percolation of water keeps the soil-forming processes active. Grenada soils are nearly level to sloping. More of the rainfall enters the soil, and the reduction of iron compounds and other soil-forming processes cause the lower part of the solum to have gray colors and to be brittle and slowly permeable. Nearly all areas of Grenada soils, even those on level topography, have a convex surface.

Calloway and Henry soils are examples of somewhat poorly drained and poorly drained soils that are nearly level to gently sloping and have concave surfaces. Nearly all the rainfall that falls on these soils enters the soil. In places there is some drainage from adjoining convex slopes. Soil-forming processes are influenced by a fluctuating water table, which causes the gray colors and the brittle, slowly permeable layers to be nearer the surface in Calloway and Henry soils and to be more restrictive to air and water movement than in the Grenada soils. Waverly and Melvin are examples of poorly drained, level, bottom land soils where the water table stands at or near the surface for long periods. There are no restrictive layers in these soils to prevent air and water movement, but the level relief and position on the landscape cause the accumulation of excess water which reduces the iron compounds and makes the soil gray in color.

Relief modifies the effects of climate, even though temperature and rainfall are about the same for both counties. Runoff from sloping areas collects in flat areas or in depressions; consequently, the level soils are wetter than the sloping soils. The amount of solar radiation an area receives is affected by slope and aspect also.

Time

In this survey area there is considerable difference in the ages of the soils. The age of a soil is determined by the degree of development of its horizons. The Vicksburg soils, for example, are young soils that have weakly developed horizons at best; they are on flood plains and periodically receive floodwaters, which leave sediments behind as the waters recede. The Grenada soils, by contrast, are older soils on terraces and uplands that have been in place long enough to have strongly developed horizons.

Morphology of Soils

Most of the soils of the survey area have strong horizonation. The exceptions are such alluvial soils as those of the Vicksburg and Ochlockonee series, and soils

that developed in very gravelly material, such as those of the Guin series. These soils have weak horizonation.

The differentiation of horizons of the soils is the result of several soil-forming processes. The most important of these are: (1) accumulation of organic matter, (2) leaching of carbonates and salts, (3) chemical weathering of the primary minerals and parent materials into silicate clay minerals, (4) translocation of silicate clay minerals, and probably of some silt-size particles, from one horizon to another, and (5) chemical change and transfer of iron. One or more of these processes have taken place in all the soils of the survey area. The degree of activity of each process, however, varies from soil to soil.

In all the soils, some organic matter had accumulated to form an A1 horizon, but the A1 horizon lost its identity in most places as a result of plowing and cultivation and became a part of an Ap horizon. In severely eroded areas, the original A horizon has been lost or nearly lost. The quantity of organic matter accumulated ranges from low to medium, but in severely eroded soils the organic-matter content is very low.

Leaching of carbonates and salts has occurred in all the soils, but it has been of little importance in horizon differentiation. The effects have been indirect; the leaching permitted translocation of silicate minerals in most of the soils, and most are deeply leached of carbonates and salts. This is reflected in the fact that most of the soils are strongly acid or very strongly acid.

The main result of the weathering of primary minerals to silicate minerals, largely by the process of hydrolysis, is the production of clays that have a mixed mineralogy. In the Memphis, Loring, Grenada, Calloway, and Henry soils, montmorillonite, illite, vermiculite, kaolinite, and quartz are in the coarse clay fraction of the A and B horizons, all in fairly large amounts. Total montmorillonite and vermiculite is highest and increases in concentration in the poorly drained members of the catena, but the opposite is true for illite. Montmorillonite is the predominant mineral in the medium and fine clay of all the soils formed in loess and is most abundant in the poorly drained soils. Generally, distribution of illite is just the opposite.

The translocation and development in place of silicate clay minerals have had a strong influence on the development of horizons in the soils on uplands and stream terraces. Clay has moved, in part, from the A to the B horizon. This is true of all soils that have a moderate to strongly developed B horizon and of some soils that have a weakly developed B horizon. The greatest concentration of clay is in the upper part of the B horizon in the well-drained Brandon and Memphis soils, but the greatest concentration of clay is in the lower part of the B horizon, or fragipan, of Grenada, Calloway, and Henry soils.

The reduction and transfer of iron has occurred to some degree in all soils that have impeded drainage. In the level and gently sloping soils, this process, known as gleying, has been of great importance. It has particularly affected the Henry, Waverly, Melvin, Falaya, and Calloway soils and the fragipan horizons of the Grenada and Lax soils.

Classification of the Soils

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and revised later (*16*). The system currently used was adopted by the National Cooperative Soil Survey in 1965 (*18*) and supplemented in March 1967 and September 1968. It is under continual study, and readers interested in the development of the system should refer to available literature (*15*, *7*). In table 9 the soil series of Calloway and Marshall Counties are placed in some categories of the current system and in the great soil groups of the older system.

Some of the soils of this survey do not fit in a series that has been recognized in the classification system, but recognizing a separate series for them would not serve a useful purpose. These soils strongly resemble soils of a recognized series, but they have one or more characteristics that are outside the range defined for the series. The differences are too small to be of consequence in interpreting their usefulness or behavior. Soil scientists designate such soils as taxadjuncts to the series for which they are named. In this survey, soils named in the Bibb, Huntington, Iuka, Lexington, Mantachie, McGary, Melvin, Memphis, Newark, Ochlockonee, Ruston, Saffell, and Wheeling series are taxadjuncts to those series.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. 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 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.—Ten soil orders are recognized in the current system. These are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. As shown in table 9, five of these orders are represented in the survey area. These are Alfisols, Entisols, Inceptisols, Mollisols, and Ultisols.

Alfisols have gray to brown surface horizons, medium to high base supply, and subsurface horizons of clay accumulation. They are usually moist but are sometimes dry during warm seasons. Entisols are young mineral soils in which there has been no horizon development. Inceptisols are mineral soils in which horizons have definitely started to develop. Mollisols have a thick, nearly black surface horizon that is rich in organic-matter content. They have a high base supply. Ultisols are generally moist. They have a horizon of clay accumulation and a low base supply.

SUBORDER.—Each order is divided 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 9, because it is indicated in the last word of the subgroup name.

GREAT GROUP.—Soil suborders are divided 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 9, because it is the last word in the name of the subgroup.

SUBGROUP.—Great groups are divided 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 the range of any other great group, suborder, or order. Table 9 shows the name of the subgroup for each soil series recognized in the survey area.

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. This classification for each soil series is shown in table 9.

SERIES.—The series consists of a group of soils that formed in a particular kind of parent material. They have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

TABLE 9.—*Soil series classified by higher categories*

Series	Current classification			Great soil group (1938 classification)
	Family	Subgroup	Order	
Bibb [1]	Coarse-loamy, siliceous, acid, thermic	Typic Haplaquents	Entisols	Low-Humic Gley soils.
Bodine	Loamy-skeletal, siliceous, thermic	Typic Paleudults	Ultisols	Regosols.
Brandon	Fine-silty, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Calloway	Fine-silty, mixed, thermic	Glossaquic Fragiudalfs	Alfisols	Planosols with fragipan.
Collins	Coarse-silty, mixed, acid, thermic	Aquic Udifluvents	Entisols	Alluvial soils.
Egam	Fine, mixed, thermic	Cumulic Hapludolls	Mollisols	Alluvial soils.
Falaya	Coarse-silty, mixed, acid, thermic	Aeric Fluvaquents	Entisols	Alluvial soils intergrading to Low-Humic Gley soils.
Forestdale, high clay variant.	Fine, montmorillonitic, thermic	Typic Ochraqualfs	Alfisols	Planosols with fragipan.
Grenada	Fine-silty, mixed, thermic	Glossic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils with fragipan.
Guin [2]	Sandy-skeletal, siliceous, thermic	Typic Dystrochrepts	Inceptisols	Regosols.
Henry	Coarse-silty, mixed, thermic	Typic Fragiaqualfs	Alfisols	Planosols with fragipan.
Huntington [1]	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Iuka [1]	Coarse-loamy, siliceous, acid, thermic	Aquic Udifluvents	Entisols	Alluvial soils.
Lax	Fine-silty, siliceous, thermic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils with fragipan.
Lexington [1]	Fine-silty, mixed, thermic	Typic Paleudalfs	Alfisols	Red-Yellow Podzolic soils.
Loring	Fine-silty, mixed, thermic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils with fragipan.
Mantachie [1]	Fine-loamy, siliceous, acid, thermic	Aeric Fluvaquents	Entisols	Alluvial soils intergrading to Low-Humic Gley soils.
McGary [1]	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils intergrading to Planosols.
Melvin [1]	Fine-silty, mixed, nonacid, mesic	Typic Fluvaquents	Entisols	Low-Humic Gley soils.
Memphis [1]	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Newark [1]	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols	Alluvial soils intergrading to Low-Humic Gley soils.
Ochlockonee [1]	Coarse-loamy, siliceous, acid, thermic	Typic Udifluvents	Entisols	Alluvial soils.
Ruston [1]	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Saffell [1]	Loamy-skeletal, siliceous, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Vicksburg	Coarse-silty, mixed, acid, thermic	Typic Udifluvents	Entisols	Alluvial soils.
Waverly	Coarse-silty, mixed, acid, thermic	Typic Fluvaquents	Entisols	Low-Humic Gley soils.
Wheeling [1]	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.

[1] These soils are taxadjuncts to their series in the following respects:

The Bibb, Iuka, and Ochlockonee soils have more silt-sized particles in the upper 2 feet of the profile and more gravelly strata at a depth below 2 feet.

The Huntington, McGary, Melvin, Newark, and Wheeling soils have a higher soil temperature.

The Lexington soils have a higher base saturation.

The Memphis soils have a lower base saturation.

The Ruston soils have a thinner solum.

The Saffell soils have more silt and less gravel in the upper 18 inches of the profile.

[2] Provisional classification.

Laboratory Tests

The following publications contain results of tests on soils sampled in Calloway and Marshall Counties:

1. Soil Science Society of America; Proceedings, v. 23, No. 6, November–December 1959, pages 474–478. This publication contains an article entitled "Chemical and Clay Mineralogical Properties of Certain Memphis Catena Soils of Western Kentucky," by T. B. Hutcheson and others. Two profiles each of Grenada, Calloway, and Henry soils were sampled in Calloway County. The cation exchange capacity and exchangeable cations, phosphorus, pH value, and organic-matter content were the properties reported. The percentage of clay was determined for the major horizons and the percentage of montmorillonite, illite, kaolinite, vermiculite, and quartz for each horizon is listed.

2. Soil Science Society of America; Proceedings, v. 29, No. 4, July–August 1965, pages 427–432. This publication contains an article entitled "Effect of Underlying Residue on the Chemical and Mineralogical Properties of Soils Developed in a Uniform Loess Overlay," by T. B. Hutcheson and H. H. Bailey. One profile of the Lexington soils was sampled in Calloway County. Samples of each horizon were used for the measurement of pH value, percentage of organic matter, soluble phosphorus, cation exchange capacity and exchangeable cations, and the clay, silt, and sand mineralogy.

3. Soil Science Society of America; Proceedings, v. 31, No. 2, March–April 1967, pages 200–202. This publication contains an article entitled "Relation of Extractable Molybdenum to Soil Series and Parent Rock in Kentucky," by H. F. Massey and others. Two profiles of Calloway, Grenada, and Henry soils were sampled in Calloway County.

4. Soil Survey, Calloway County, Kentucky; issued August 1945 by the United States Department of Agriculture. Pages 75, 76, and 77 of this publication list the chemical composition of the surface soil of the more important soils of Calloway County. The total pounds of nitrogen, phosphorus, potassium, and the pH value of the 0- to 7- and 7- to 18-inch horizons are given for samples taken at 50 locations of 25 soil series. On page 93 the mechanical analysis of several horizons of seven soil series is listed.

5. Soil Survey, Marshall County, Kentucky; issued September 1950 by the United States Department of Agriculture. Pages 75 and 76 of this publication list the chemical composition of the surface soil of the more important soils of Marshall County. The total pounds of nitrogen, phosphorus, potassium, and the pH value of the 0- to 7- and the 7- to 18-inch horizons are given for samples taken at 48 locations of 20 soil series.

6. Southern Cooperative Series Bulletin 61; "Certain Properties of Selected Southeastern United States Soils and Mineralogical Procedures for Their Study," Southern Regional Project S–14, January 1959. Pages 54 and 55 of this publication contain test data for two profiles of Grenada soils sampled in Calloway County. The pH value, cation exchange capacity, extractable cations, organic-matter content, parts per million of phosphorus, bulk density data, mechanical analysis, porosity, percolation rate, and mineralogical data are given for each horizon of the two profiles.

7. Soil Survey Laboratory Data and Descriptions for some Soils of Kentucky, Soil Survey Investigations Report No. 14, Soil Conservation Service of the United States Department of Agriculture, in cooperation with the Kentucky Agricultural Experiment Station, May 1967. This publication contains test data for a profile of a Grenada soil sampled in Calloway County (page 49), a profile of a Grenada soil sampled in Marshall County (page 53), and a profile of a Memphis soil sampled in Marshall County (page 83). The pH value, cation exchange capacity, extractable cations, base saturation, organic carbon, and mechanical analysis were determined for the different horizons of these soils.

General Nature of the Area

Early settlers found dense stands of upland hardwoods in the sloping to moderately steep areas near the large streams, but thick stands of grass with few, if any, trees in the level areas. This part of the survey area was known as the Barrens. The lack of trees was caused by frequent burning in order to provide better conditions for hunting buffalo.

As the number of settlers increased, the burning stopped and trees began to grow back. Beginning about 1863, some areas of the newly forested Barrens had to be cleared.

For more than 100 years, both Calloway and Marshall Counties were largely farming areas, but in more recent years, industry, recreation, and education have become increasingly important. Murray State Teachers College was founded in 1922. Kentucky Dam was completed in 1945, and Kentucky Lake covers several thousand acres of both Calloway and Marshall Counties. There now two State parks and numerous private resorts in these counties. The largest concentration of industry is in the Calvert City area on the Tennessee River below Kentucky Dam. Large industries employ many people in manufacturing chemicals, petroleum, coal, and rubber.

The land between Kentucky and Barkley Lakes is being developed into outdoor recreational areas by the Tennessee Valley Authority.

Geology, Physiography, Relief, and Drainage

Calloway and Marshall Counties are in the Jackson Purchase physiographic section of Kentucky. The geologic formations are the most recent in Kentucky. The area is a part of the northern extension of the east Gulf Coastal Plain. The Gulf of Mexico extended as far north as the southern part of Illinois during Cretaceous, Tertiary, and Quaternary geologic periods and covered formations of the Mississippian period with deposits of gravel, sand, silt, and clay. This deposition in most areas of Calloway and Marshall Counties is dominantly gravel, but in some places in these counties it is dominantly sand, clay, or silt. These formations are geologically young and have not consolidated into sandstone or shale, as have the strata of the underlying Mississippian formations.

In some places there is gravel cemented by iron oxide; in other places, there is locally derived sandstone blocks up to a foot in diameter, or thin ledges of ferruginous

sandstone. The latter is scattered throughout both counties. Along the eastern parts of these counties, near Kentucky Lake, cherty residuum and limestone of the Mississippian formations are exposed. The Coastal Plain deposits are thought to have been removed from these areas by geologic erosion, which has been accelerated by faulting and by the steep slopes near the Tennessee River.

Loess, a windblown silty deposit, covers nearly all of Calloway and Marshall Counties. Thickness of the loess ranges from none on some of the steeper slopes to 20 feet on some of the level uplands. The average thickness is about 6 feet on gently sloping uplands and about 30 inches on strongly sloping uplands.

Physiographically, the survey area is a plain that slopes gently to the north. It is modified by a drainage system branching into three subdivisions of relief: smooth uplands, rough uplands, and valleys. The smooth uplands are shown on the General Soil Map as soil associations 1 and 6; the rough uplands, as soil associations 2 and 7; the valleys, as soil associations 3, 4, and 5. The smooth uplands, occupying approximately 30 percent of the area, are characterized by nearly level to gently rolling topography (0 to 12 percent slopes) and consist largely of interstream divides or remnants of the original plain. Dissection is slight, and the difference in elevations of the interstream areas and the valleys does not exceed 50 feet. Except for a few areas, drainageways have penetrated most of the interstream divides. Some of the larger of these areas, where natural drainage channels have not penetrated, are locally called "Flatwoods."

The rough uplands consist of narrow ridgetops and strongly sloping to steep side slopes ranging from 12 to 60 percent. They occupy about 53 percent of the area. The relief is in a more advanced stage than the smooth uplands and is characterized by a thorough dissection of the original plain. Streams have cut valleys that are 75 to 150 feet below the general level of the interstream ridges. The valleys include bottom lands and stream terraces along the Tennessee River and the smaller rivers and creeks. They make up about 17 percent of the area. The valley floors of the smaller rivers and larger creeks are comparatively wide; those of East and West Fork of Clarks and Blood Rivers and Jonathan, Cypress, and Middle Fork Creeks are one-half to one and one-half miles wide. These streams in their lower courses have nearly flat gradients, and they flow through meandering courses in wide, flat plains that generally drain slowly.

The smaller creeks and branches have strong gradients, especially in the rough uplands. Many of these streams have carved deep, narrow channels in unconsolidated gravel, sand, and clay of the Coastal Plain. Large quantities of this material have been deposited in gently sloping alluvial fans where the streams enter larger valleys of lesser gradient. The streams flowing through the rough eastern part of the area, where the underlying material is highly weathered, cherty limestone residuum, have carved shallow channels in most places. Nearly flat to sloping, discontinuous stream terraces are along most of the large creeks and small river valleys.

The alluvial plain that makes up the flood plains of the stream and terraces of the Tennessee River ranges from one-half to two miles wide, but the flood plains are a few rods to about one-half mile in width. They are somewhat undulating and consist of natural levees near the river and low ridges. The intervening valleys are very low and are covered with water much of the time in winter and spring. The terraces are generally separated from the first bottom by moderately abrupt escarpments 10 to 20 feet high. They have low ridges and swales, roughly paralleling the river. Most of the soils in the swales are poorly drained.

All of the survey area lies in the Tennessee River Drainage Basin, except for an area of about 24 square miles in the southwestern corner of Calloway County. The northern part of this small area drains through Mayfield Creek into the Mississippi River. The southern part drains through Terrapin Creek and reaches the Mississippi River through North Fork Obion and Obion Rivers in Tennessee.

Farming

Farming by the early settlers was confined to gardens and other crops required to feed their families and to feed the livestock they required for food or for work animals. Corn was the chief crop in the first few years, but later, tobacco and wheat also became important crops. Pork was the principal meat, because few beef cattle, sheep, or poultry were raised.

Gradually, farming became more diversified. Oats, rye, cotton, sweet potatoes, and sweet sorghum were introduced. Hay and forage crops increased in importance as the raising of livestock became more general. Strawberries, raspberries, dewberries, fruit trees, sweet corn, popcorn, tomatoes, and other truck and orchard crops have been grown commercially in parts of these counties for varying periods of time. In 1939 cotton was the second ranking cash crop in Calloway County. It partly displaced tobacco as a cash crop largely because of the unfavorable price of tobacco. There were cotton gins at Murray and Benton. Cotton production gradually declined and was partly replaced by tobacco. In 1965 only 30 acres of cotton were harvested in Calloway County and only 4 acres in Marshall County.

Corn always has been the chief crop grown in these counties. The acreage of corn increased gradually until about 1909, when 45,955 acres were harvested; since then, the acreage of corn has decreased. In 1966, corn was grown on 19,300 acres of Calloway County and 10,000 acres of Marshall County. Corn yields have increased from an average of about 23 bushels per acre in Calloway County in 1939 to an average of 70 bushels per acre in 1965. Some farmers have obtained yields of 125 to 150 bushels per acre when the growing season was favorable.

Tobacco is the most important cash crop. The peak production of dark tobacco was in 1919, when 20,285 acres were harvested in Calloway County and 14,405 acres in Marshall County. In 1966, however, tobacco was harvested on only 2,630 acres of Calloway County and 940 acres of Marshall County.

Since 1940 the number of farms in both Calloway and Marshall Counties has been declining. More people work in industry, and small farms are being consolidated. The increase in industrial employment is due in part to people moving to large industrial centers and in part to more industries being located within commuting distance.

The effect of industry on farming is more pronounced in Marshall County than it is in Calloway County. To a great extent, this is due to the concentration of industry at Calvert City and the location of Marshall County near the city of Paducah.

The 1964 Census of Agriculture shows that there were 1,707 farms in Calloway County and 1,079 farms in Marshall County. In that year the average size of farms in Calloway County was 99.7 acres and in Marshall County, 93.7 acres. Commercial farms numbered 970 in Calloway County and 358 in Marshall County.

Most of the commercial farms are in the level to gently sloping areas shown on the General Soil Map as soil associations 1, 5, and 6. Much of soil associations 2 and 7 is owned by part-time or partly retired farmers. Land use in soil associations 3 and 4 is affected by industrial employment more than the land use in other parts of the area. Land use in soil association 7 and parts of soil association 2 is affected to some degree by the recreation and development potential created by Kentucky Lake.

Natural Resources

The chief natural resources of Calloway and Marshall Counties, other than the soil, are abundant water and gravel. The "Jackson Purchase" is the most favorable region in Kentucky for the development of ground water supplies. Large supplies of water for public and industrial use can be obtained at many places, and domestic supplies can be obtained at almost any place. Water is pumped from bedrock of Paleozoic age, Tuscaloosa and Ripley Formations of Cretaceous age, sands of Eocene age, gravel of Pliocene age, and alluvium of Quaternary age.

In addition to abundant ground water, Kentucky Lake, which covers the eastern parts of Calloway and Marshall Counties, is an important water resource. It provides employment, connections to inland waterways, areas for recreation and recreational development projects, and sources of cheap electric power and water for other uses.

Gravel is intermittently excavated from many pits and used for road surfacing and other construction. There have been more all-weather roads here for a longer period of time than in most counties in Kentucky.

Clay of the Clayton and McNairy Formations is mined for the manufacture of pottery, and sand from these formations is mined for the manufacture of glass. Concretions of titanium minerals in some of these formations near McCullough Fork may be potentially valuable as a source of titanium. Sand, silt, and clay from the Clayton and McNairy Formations are potential sources of optical grade glass, abrasives, and ceramic clay. The clay of Porter Creek is easily accessible and may be economically significant as fuller's earth. Firms in Bell City manufacture decorative pottery from clays of the Claiborne Formation obtained from the nearby pits.

Agricultural lime, road metal, and concrete aggregate are produced from a quarry in southeastern Calloway County. Piles of slag and charcoal about 1,500 feet east of the limestone quarry and small pits throughout the area are evidences of 19th century iron smelting.

Additional information about minerals of the area is in publications of the U.S. Geological Survey and the Kentucky Geological Survey.

Climate [5]

The climate of this area is temperate and favorable for many kinds of plants and animals. Generally, summers are warm and humid, and winters are moderately cold.

Precipitation is distributed reasonably well throughout the year; there is no distinct wet or dry season. Annual precipitation averages about 48 inches, which is sufficient for farm crops. Precipitation in the amount of 0.10 inch or more occurs on about 74 days in an ordinary year. It is noted in table 10 that June, July, and August rainfall averages between 3¼ and 4 inches per month. In each of these months, this is about 60 to 70 percent of the water that can be transferred to the atmosphere through transpiration from plants and evaporation of liquid water. Thus, in most seasons, maximum crop production is dependent in part upon soil moisture stored from precipitation received during the previous months of fall through spring. Major droughts are infrequent, but dry periods during the growing season are not unusual. In table 10 also, it is noted that an average of less than 1.3 inches of rain falls in July in one year out of 10. At the other extreme, more than 11 inches of precipitation occurs in January in about 1 out of 10 years.

During an ordinary year, the heaviest 1-hour precipitation totals at least 1.3 inches. There is a 30 percent chance that such a 1-hour amount will occur in July of any year, and less than a 1 percent chance that it will occur in December through February. On the average of about once in 10 years, there is a total of at least 5.0 inches of precipitation in 24 hours. There is about a 2 percent chance that this much will fall in a 24-hour period in any July, and there is less than a 2 percent chance that this will happen in any other month.

Thunderstorms occur on an average of about 52 days a year. They are most frequent from March through August but can occur in any month. Thunderstorms bring most of the brief, intense rainfall during summer. Less intense rainfall that lasts for several days sometimes occurs late in spring and delays tillage. These prolonged, low-intensity rains are those most apt to cause local floods because they often come when soils are frozen, snow covered, or saturated.

The average yearly snowfall is about 7 inches, but it is quite variable from year to year. During the period 1931 to 1960, the greatest annual total was 29.1 inches in 1960; the least recorded, a trace, occurred in 1952, 1953, and 1957.

All seasons are marked by weather changes resulting from passing weather fronts and the associated low- and high-pressure systems. This activity is least late in spring and in summer, somewhat greater in fall, and greatest in winter and early spring. Daytime temperatures depart least from the average during periods of minimum

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atmospheric disturbance and vary most from the average during the period of greatest atmospheric activity.

Extremes in temperature that can occur are indicated in table 10. A temperature of 99° F. or higher will occur on at least 4 days in July in 2 years out of 10; the days are not always consecutive. At the other extreme, a temperature of 11° F. or lower will occur on at least 4 days in January in 2 years out of 10.

A temperature of 32° F. or lower occurs on about 82 nights during an average year, but on all but about 7 days the temperature rises to above freezing during the day. Thus, a freeze-thaw cycle is usual for many of the days in cold weather. The temperature drops to zero or below on an average of once each winter.

The average length of the "growing season" in this area, from the last freezing temperature in spring to the first in the fall, is within the range of 195 to 200 days. Probabilities of freezing temperature occurring after specified dates in spring and before specified dates in fall are given in table 11. The probable risk of frost

TABLE 10.—*Temperature and precipitation data*

[Data recorded at Murray, Calloway County, Kentucky, for the period 1931–1960]

Month	Temperature				Precipitation						
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with—		Average total	1 year in 10 will have—		Days with snow cover of—		Average depth of snow on days with—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	Trace or more	1 inch or more	Trace or more	1 inch or more
	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Days	Days	Inches	Inches
January	48	29	68	11	5.2	1.1	11.0	3	1	1	2
February	51	31	69	14	4.1	1.3	8.2	2	1	1	2
March	60	37	78	22	5.3	2.7	9.3	1	1	3	5
April	71	47	84	33	4.1	2.1	6.4	(1)	0	(1)	0
May	80	56	90	42	4.2	1.7	7.5	0	0	0	0
June	88	64	98	53	3.5	1.1	6.9	0	0	0	0
July	91	67	99	58	3.9	1.3	7.3	0	0	0	0
August	91	66	100	55	3.3	1.1	5.8	0	0	0	0
September	85	58	97	46	3.1	.9	5.7	0	0	0	0
October	74	48	87	33	2.9	.9	5.2	0	0	0	0
November	60	36	76	18	4.0	1.3	6.7	1	(1)	(1)	2
December	50	31	66	15	4.1	1.9	6.9	2	1	1	2
Year	71	47	[2] 101	[3] 2	47.7	34.4	65.0	9	4	1	3

[1] Less than half a day.
[2] Average annual highest maximum.
[3] Average annual lowest minimum.

TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall*

[All freeze data are based on temperatures in a standard U.S. National Weather Service thermometer shelter at a height of approximately 5 feet above the ground and in a representative exposure. Lower temperatures occur at times nearer the ground and in local areas subject to extreme air drainage]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 11	March 21	April 2	April 14	April 25
2 years in 10 later than	March 3	March 14	March 27	April 8	April 20
5 years in 10 later than	February 17	March 2	March 15	March 28	April 10
Fall:					
1 year in 10 earlier than	November 29	November 19	November 4	October 25	October 8
2 years in 10 earlier than	December 4	November 25	November 10	October 30	October 13
5 years in 10 earlier than	December 14	December 5	November 20	November 8	October 23

damage to crops can be determined with the help of this table. Critical temperatures for individual crops must, of course, be known.

Winter months are cloudiest with an average of about 45 percent of possible sunshine in January. Sunshine increases to an average of about 70 percent of the possible time for the months of June through October.

Annual free water evaporation, that is, from shallow lakes and farm ponds, averages about 37 inches, a little over 10 inches less than the average annual precipitation. About 75 percent of this evaporation occurs during the 6-month period of May to October.

The area has a favorable and moderate climate. The fall season has many mild, sunny days and is considered one of the better times of the year for outdoor activities.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point. Commonly expressed as inches of water per inch of soil. Adjectival terms are used for the upper 30 inches of soil as follows: high—more than 3.9 inches; moderate—2.4 to 3.9 inches; low—2.4 to 1.8 inches; and very low—less than 1.8 inches of available moisture capacity.

Bedding. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Bottom land. Level to nearly level land on the bottom of a valley that has a stream flowing through it. Subject to flooding and often referred to as first bottoms.

Catena. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Chert. Angular fragments of rock up to 3 inches in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey. A soil that is more than 35 percent clay.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Coastal plains deposits or materials. The alluvium left as a marine deposit when an ancient sea covered the area, or the alluvium deposited on a marine terrace or in the first bottoms of streams shortly after the ancient sea had retreated to the south.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. The normal flood plain of a stream subject to frequent or occasional flooding. It includes the first bottoms, and, in some places, the second bottoms (terraces).

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard 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.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Loess. Fine-grained material, dominantly of silt-size particles, that has been deposited by wind.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, 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 system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material, soil. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. 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, moderately rapid, rapid,* and *very rapid.*

Reaction. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting zone. The depth of the soil that is penetrated, or can be penetrated, by plant roots. The presence of a fragipan, bedrock, very gravelly strata, or very clayey strata are features that limit depth of the root zone. Terms used in this survey to indicate rooting zone are: *very shallow*—less than 10 inches; *shallow*—10 to 20 inches; *moderately deep*—20 to 36 inches; *deep*—36 or more inches.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. 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). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with

rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand), or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, usually flat or undulating, bordering a stream, lake, or sea. Stream terraces are frequently called second bottoms as contrasted with first bottoms and do not overflow as frequently as first bottoms. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Upland (geology). 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 terrace. Land above the lowlands along rivers.

Variegation. Contrasting color patches that vary in number and size. Differs from mottling in being contrasting colors inherited from parent material and not believed to be associated with poor drainage.

Water table, seasonal high. The upper limit of soil or underlying material saturated with water during the seasons of highest rainfall, either as perched water that is separated from ground water by a nearly impervious soil layer, or as a part of the ground water.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which it belongs. In referring to a capability unit or a woodland suitability group, read the introduction to the section it is in for general information about its management. Other information is given in tables as follows:

Acreage and extent, table 1, p. 10.
Estimated yields, table 2, p. 40.
Management for woodland groups, table 3, p. 44.
Suitability of soils for wildlife, table 4, p. 46.
Engineering uses of the soils, tables 5, 6, and 7, pp. 50 through 61.
Limitations of soils for town and country planning, table 8, p. 62.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group
			Symbol	Page	Number
Ad	Alluvial land	7	VIIe-1	38	10
Bb	Bibb loamy fine sand, overwash	11	IIIw-3	37	2
Bc	Bibb silt loam	11	IIIw-3	37	2
BoD	Bodine cherty silt loam, 12 to 20 percent slopes	12	VIs-1	38	7
BoF	Bodine cherty silt loam, 20 to 60 percent slopes	12	VIIs-1	39	7
BrC	Brandon silt loam, 6 to 12 percent slopes	12	IIIe-1	36	5
BrD	Brandon silt loam, 12 to 20 percent slopes	12	VIe-1	37	8
BrE	Brandon silt loam, 20 to 30 percent slopes	13	VIIe-1	38	8
BsC3	Brandon silty clay loam, 6 to 12 percent slopes, severely eroded	13	IVe-1	37	6
BsD3	Brandon silty clay loam, 12 to 20 percent slopes, severely eroded	13	VIIe-2	38	6
BtC	Brandon-Memphis-Loring silt loams, 2 to 12 percent slopes	13	IIIe-1	36	5
CaA	Calloway silt loam, 0 to 2 percent slopes	14	IIIw-1	36	3
CaB	Calloway silt loam, 2 to 6 percent slopes	14	IIIw-2	36	3
CaB2	Calloway silt loam, 2 to 6 percent slopes, eroded	14	IIIw-2	36	3
Co	Collins silt loam	15	I-1	34	1
Du	Dumps	15	------	--	10
Eg	Egam silty clay loam	16	IIs-2	35	1
Fa	Falaya silt loam	16	IIw-2	35	2
Fo	Forestdale silt loam, high clay variant	17	IVw-1	37	4
GrA	Grenada silt loam, 0 to 2 percent slopes	18	IIw-1	35	3
GrB	Grenada silt loam, 2 to 6 percent slopes	18	IIe-2	35	3
GrB3	Grenada silt loam, 2 to 6 percent slopes, severely eroded	18	IIIe-3	36	9
GrC	Grenada silt loam, 6 to 12 percent slopes	19	IIIe-2	36	3
GrC3	Grenada silt loam, 6 to 12 percent slopes, severely eroded	19	IVe-2	37	9
GsC	Guin gravelly loam, 2 to 12 percent slopes	20	IVs-1	37	7
GtE	Guin very gravelly soils, 20 to 60 percent slopes	20	VIIs-1	39	7
Gu	Gullied land	20	VIIe-3	38	10
Hn	Henry silt loam	21	IVw-1	37	4
Hu	Huntington silt loam	21	I-1	34	1
Iu	Iuka silt loam	22	I-1	34	1
LaC	Lax silt loam, 6 to 12 percent slopes	22	IIIe-2	36	3
LcC3	Lax silty clay loam, 6 to 12 percent slopes, severely eroded	22	IVe-2	37	9
LeC	Lexington silt loam, 6 to 12 percent slopes	23	IIIe-1	36	5
LeD	Lexington silt loam, 12 to 20 percent slopes	23	VIe-1	37	5
LgC3	Lexington silty clay loam, 6 to 12 percent slopes, severely eroded	23	IVe-1	37	6
LgD3	Lexington silty clay loam, 12 to 20 percent slopes, severely eroded	23	VIIe-2	38	6
LoB	Loring silt loam, 2 to 6 percent slopes	24	IIe-3	35	5
LoB2	Loring silt loam, 2 to 6 percent slopes, eroded	24	IIe-3	35	5
LoC2	Loring silt loam, 6 to 12 percent slopes, eroded	24	IIIe-1	36	5
Ma	Mantachie silt loam	25	IIw-2	35	2
Mc	McGary silt loam	26	IIIw-1	36	4
Me	Melvin silt loam	26	IIIw-3	37	2
MmB	Memphis silt loam, 2 to 6 percent slopes	27	IIe-1	34	5
MmC2	Memphis silt loam, 6 to 12 percent slopes, eroded	27	IIIe-1	36	5
Ne	Newark silt loam	28	IIw-2	35	2
Oc	Ochlockonee gravelly loam	28	IIs-1	35	1
Oh	Ochlockonee silt loam	28	I-1	34	1
RuD	Ruston fine sandy loam, 12 to 20 percent slopes	29	VIe-1	37	8
RuE	Ruston fine sandy loam, 20 to 30 percent slopes	29	VIIe-1	38	8
RxE	Ruston-Lexington complex, 18 to 30 percent slopes	29	VIIe-1	38	8
SgC	Saffell-Guin complex, 6 to 12 percent slopes	30	IVs-1	37	7
SgD	Saffell-Guin complex, 12 to 20 percent slopes	30	VIs-1	38	7
SgE	Saffell-Guin complex, 20 to 50 percent slopes	30	VIIs-1	39	7
Sw	Swamp	31	VIIw-1	38	10
Ur	Urban land	31	------	--	10
Vb	Vicksburg silt loam	31	I-1	34	1
Wa	Waverly silt loam	32	IIIw-3	37	2
WhA	Wheeling silt loam, 0 to 2 percent slopes	32	I-1	34	5
WhB	Wheeling silt loam, 2 to 6 percent slopes	32	IIe-1	34	5
WhC	Wheeling silt loam, 6 to 12 percent slopes	32	IIIe-1	36	5
WnC3	Wheeling silty clay loam, 6 to 12 percent slopes, severely eroded	33	IVe-1	37	6

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Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).