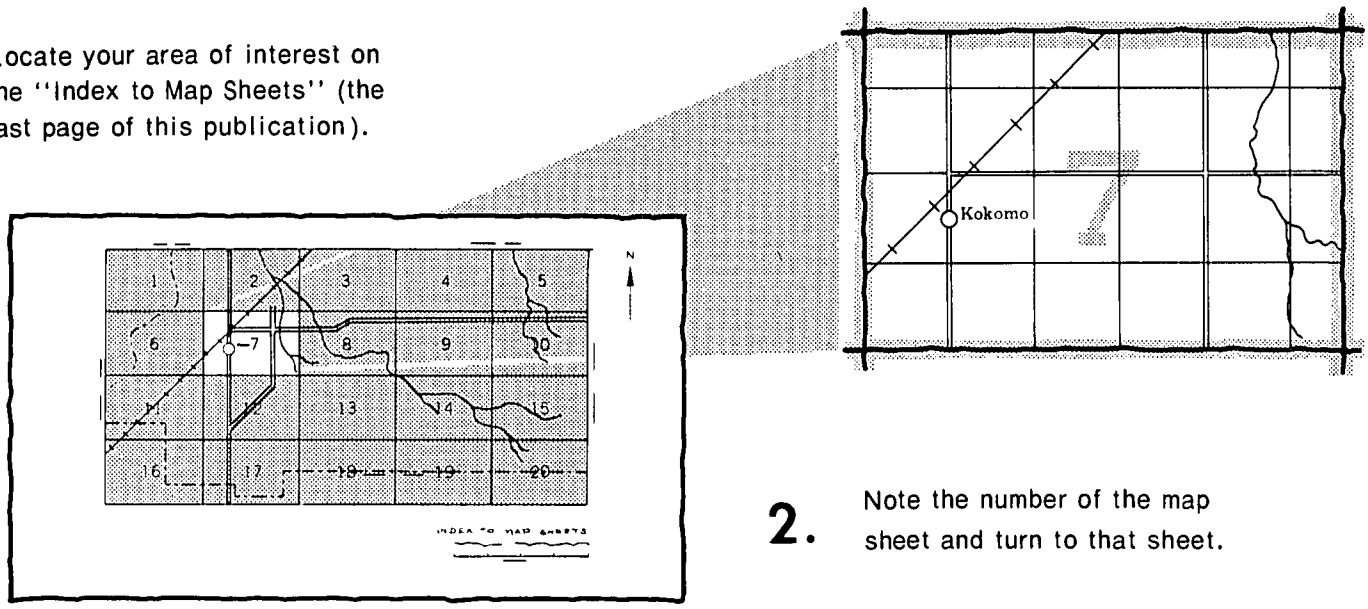
SOIL SURVEY OF

Anderson County, Tennessee

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Tennessee Agricultural Experiment Station

HOW TO USE

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



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

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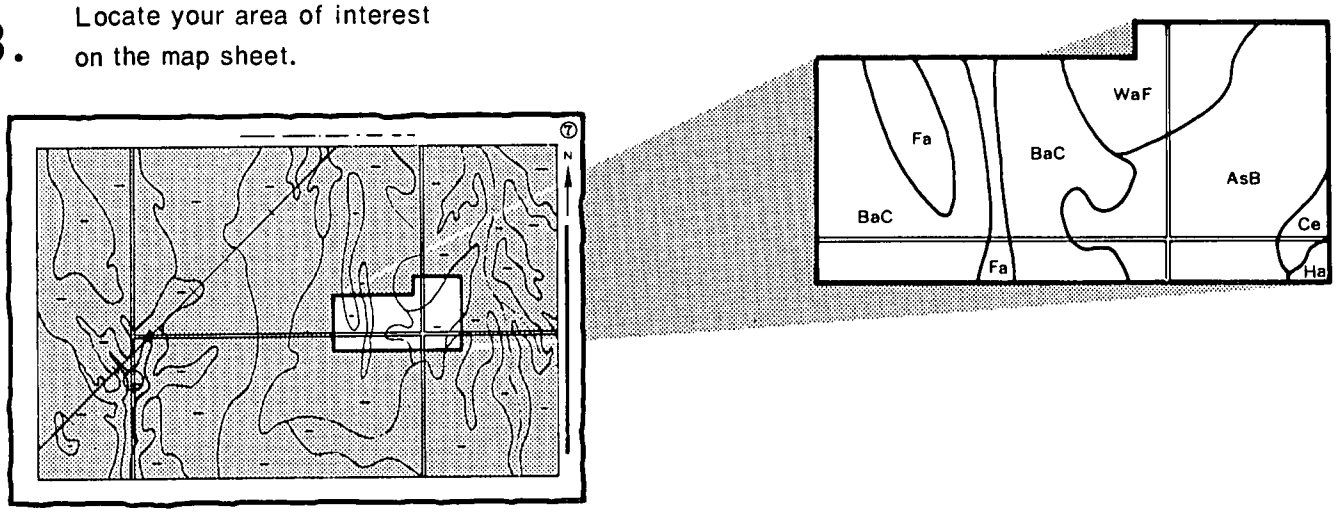

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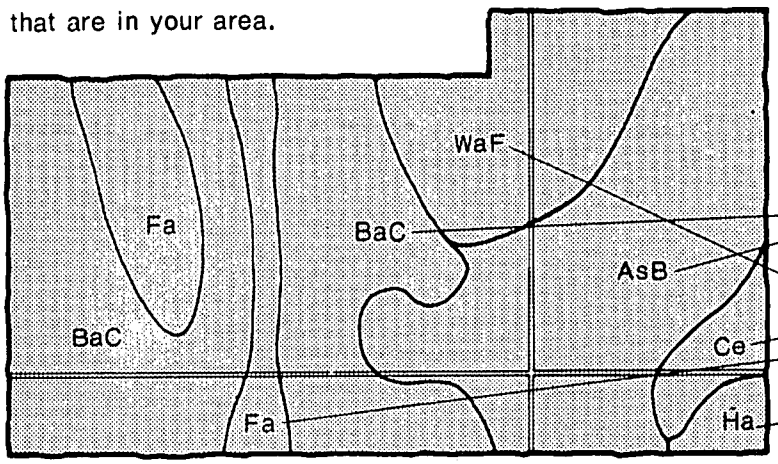

Symbols

AsB
BaC
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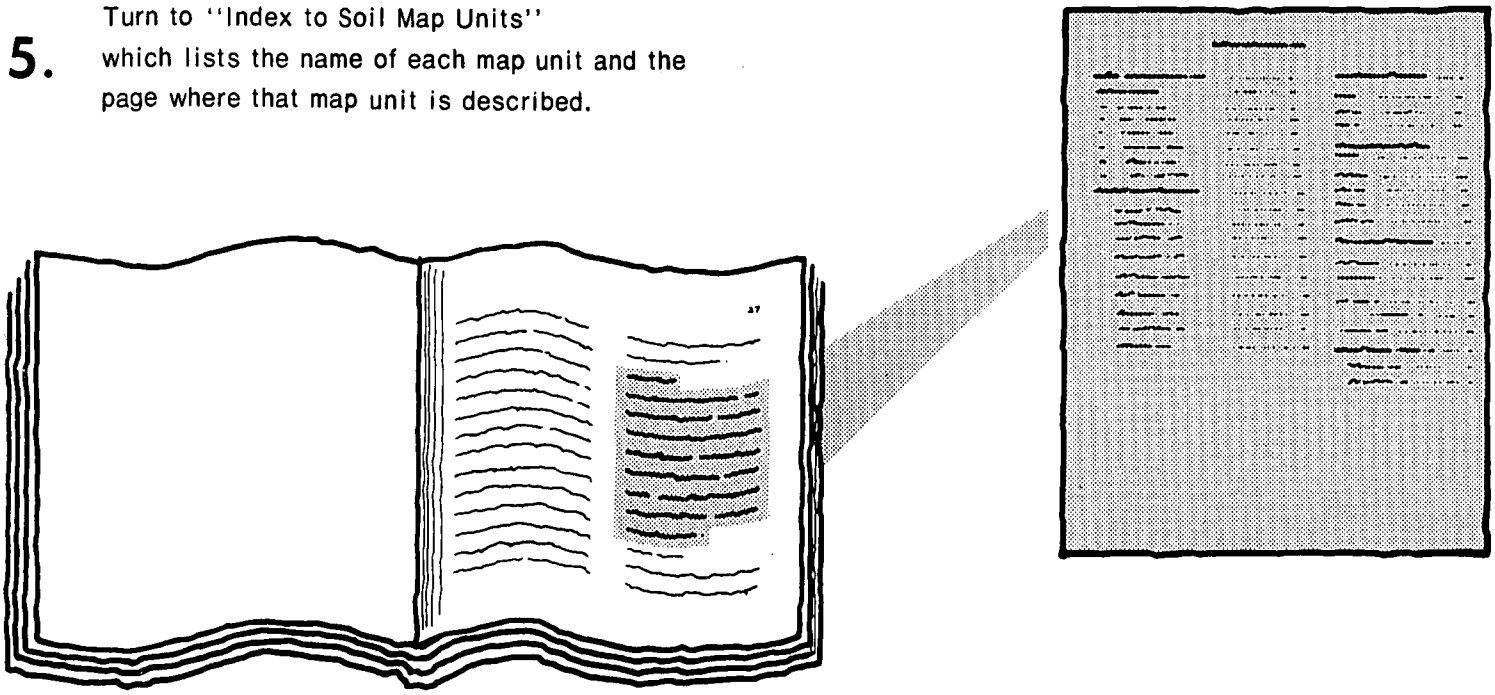
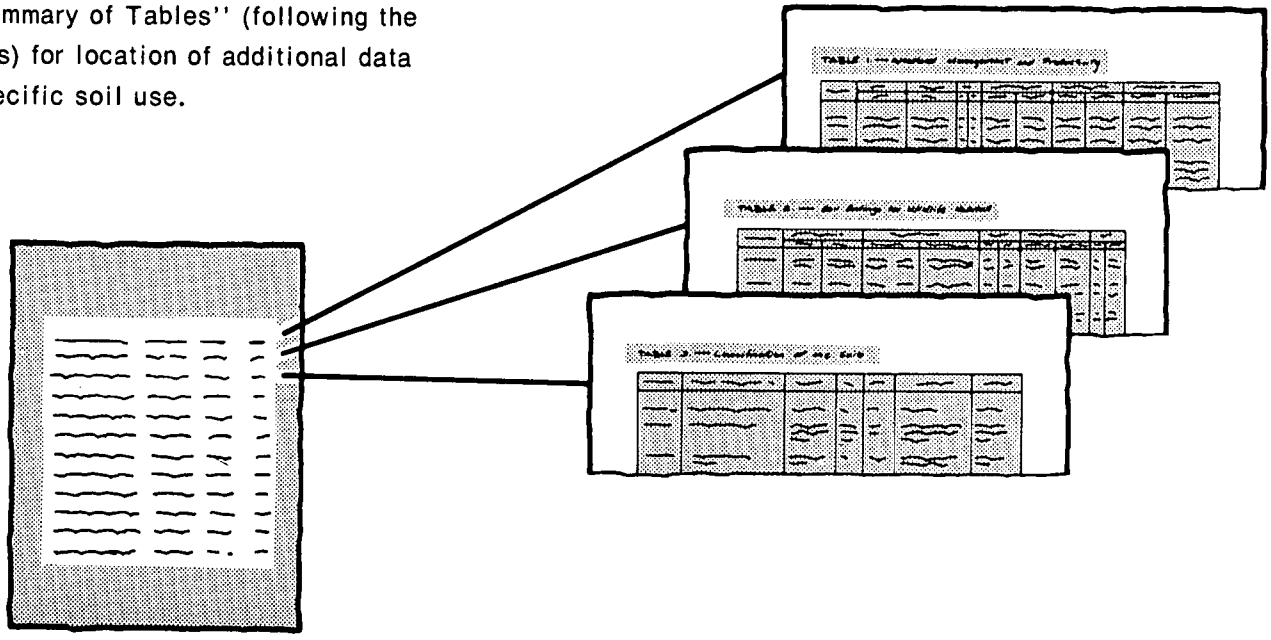
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1973-77. Soil names and descriptions were approved in 1978. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service and the Tennessee Agricultural Experiment Station. It is part of the technical assistance furnished to the Anderson County Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Farmstead and pasture on Montevallo shaly silt loam, 5 to 12 percent slopes. Armuchee and Muskingum soils are on the wooded ridge in the background.

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foreword

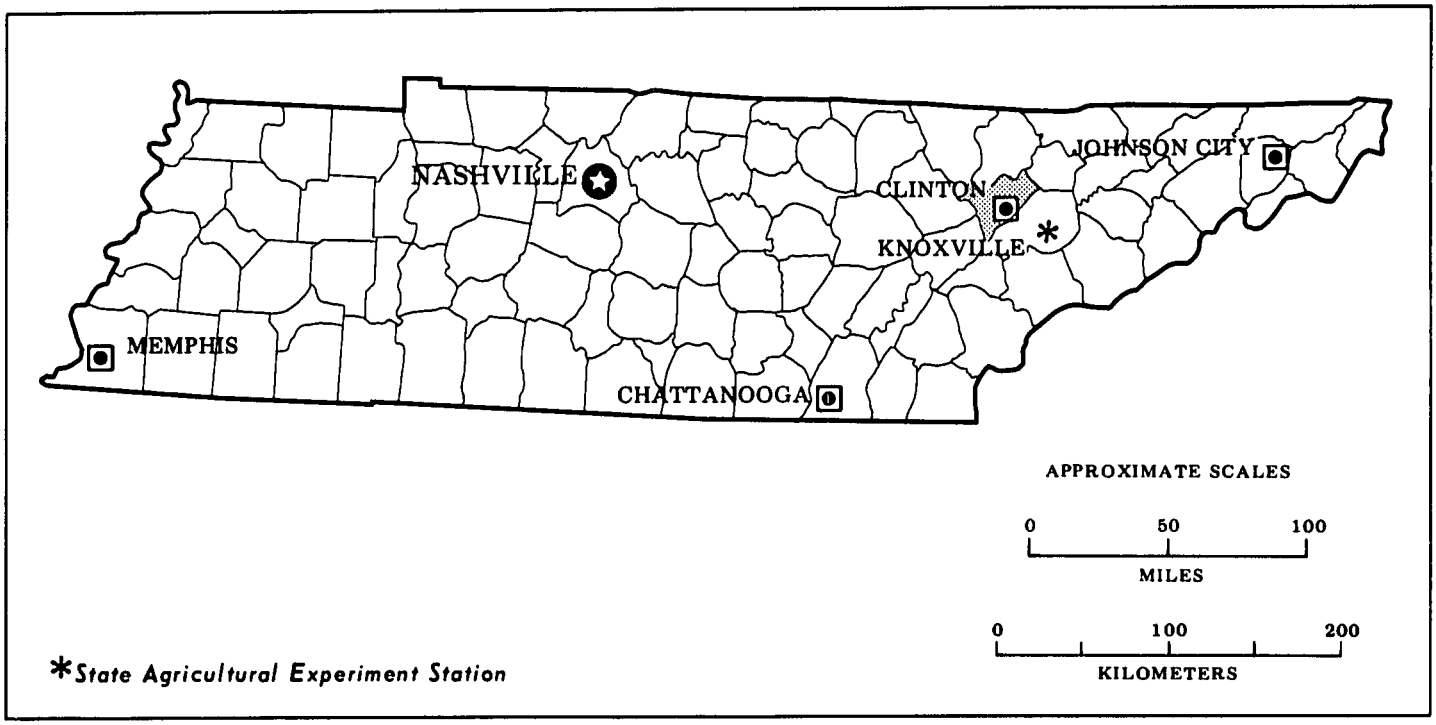
This soil survey contains information that can be used in land-planning programs in Anderson County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Donald C. Bivens
State Conservationist
Soil Conservation Service



Location of Anderson County in Tennessee.

soil survey of
Anderson County, Tennessee

By Rector H. Moneymaker, Soil Conservation Service

Soils surveyed by Rector H. Moneymaker, Clarence T. Conner
David McKinney, Steven E. Monteith, Steven A. Ottinger, and
Wayne J. Treadway, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with the Tennessee Agricultural Experiment Station

ANDERSON COUNTY, an area of 335 square miles, or 214,400 acres, is in the northeastern part of Tennessee. It is bounded on the north by Campbell County, on the northeast by Union County, on the southeast by Knox County, on the west by Morgan County, and on the northwest by Scott County. According to census data, the population of the county in 1974 was 60,300. Clinton, the county seat, is about 7.5 miles north of the Knox County line on U.S. Highway 25. Oak Ridge is the largest city. The Energy Research and Development Administration, one of the largest energy research and production centers in the country, is located in Anderson County. Norris Dam and Melton Hill Dam on the Clinch River are part of the tributary development system under the Tennessee Valley Authority.

According to the 1967 Conservation Needs Inventory, about 63 percent of the county was forest, 17 percent pasture, 7 percent federal land, and 4 percent cropland. About 6 percent was urban. The rest was water areas or land under miscellaneous uses.

General type farming is predominant. Raising beef cattle is the leading farm enterprise. Many farms are operated part time. The operators commute to Oak Ridge, Clinton, Knoxville, and other nearby cities for employment.

The soils of the county formed under trees. They are dominantly light colored, highly leached, and strongly acid and range from shallow to deep over rock. Those in the southeastern two-thirds of the county—the Great Valley—have a loamy or clayey subsoil. Most of the soils in the northwestern third of the county, in the Cumberland Mountains, have a loamy subsoil.

general nature of the county

The climate of Anderson County, the history, the natural resources, the physiography, geology, relief, and drainage, and the transportation facilities are discussed in this section.

climate

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

In Anderson County in winter, valleys are very cool with occasional cold and warm spells. The upper slopes and mountaintops are generally cold. In summer, valleys are very warm and frequently hot. Mountains are warm during the day but are cool at night. Precipitation is heavy and is evenly distributed throughout the year. Summer precipitation falls chiefly during thunderstorms. In winter, precipitation in the valleys is chiefly rain. Occasionally it is snow. In the mountains it is chiefly snow, but rains are frequent. Snow cover persists only at the highest elevations.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Oak Ridge, Tennessee, in the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last

freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 39 degrees F, and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Oak Ridge on January 30, 1966, is -9 degrees. In summer the average temperature is 75 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Oak Ridge on July 28, 1952, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 55 inches. Of this, 25 inches, or 45 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 7.43 inches at Oak Ridge on August 10, 1960. Thunderstorms occur on about 53 days each year, and most occur in summer.

Heavy rains from prolonged storms, at any time of the year, occasionally cover the entire county and adjacent counties and cause severe flooding in valleys.

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

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 60 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 6 miles per hour, in April.

history

By Katherine B. Hoskins, Anderson County historian.

Anderson County, the twentieth county to be organized in Tennessee, was created in 1801—5 years after Tennessee became a state and 25 years after the Declaration of Independence was signed. It was named for Senator Joseph Anderson.

The county seat has always been at Clinton, originally named Burrville for Aaron Burr. Clinton is on the Clinch River, the Southern Railway, and U.S. Highway 25W. It is about 18 miles northwest of Knoxville, 170 miles east of the state capitol at Nashville, and 559 miles southwest of Washington, D.C.

resources and industry

Streams and waterways, soils, forests, mineral deposits, and animal life are the main natural resources of Anderson County. The Clinch River is the main waterway, but there are numerous other large and small streams. Resources are naturally balanced. The climate is temperate and is healthful to both animal and plant life.

Anderson County was largely an agricultural county until after the Civil War. Then coal mines were opened in the Coal Creek and Briceville areas. Several mining camps and towns sprang up in the 1870's and 1880's, of which Briceville and Coal Creek, now Lake City, remained permanent towns. Most of the mines around what is known as Oliver Springs were located in Morgan and Roane Counties. Oliver Springs, which is partly in Anderson County and partly in Roane County, was organized in the early 1880's. The Windrock mines in Anderson County were nearby.

The lumber industry flourished in the late 1800's and early 1900's. Logs were rafted down the Clinch River—some to sawmills and factories in Anderson County, others to Chattanooga and other points south. A zinc smelting works brought zinc ore down the Clinch River from mines in other counties. A large textile industry on the Clinch River drew water from the river for the dyeing process in finishing hosiery. Recently, other industries have been attracted by the water transportation available in the county's industrial park in the bend of the river.

Norris Dam, begun in 1933 in Anderson County, was the first of a series of dams built in the Tennessee Valley for flood control and generation of electricity. It was completed in 1936. For the first time, electricity was brought into many homes in the county. It was a new era for the county, bringing a measure of prosperity in the midst of a nationwide economic depression.

In the 177 years since the organization of the county, agriculture, including livestock, has remained a constant and important part of the county's industrial life.

physiography, geology, relief, and drainage

The southeastern two-thirds of Anderson County is in the Great Valley of East Tennessee, a part of the Valley and Ridge province. The northwestern third is in the Cumberland Mountains. The part of the county in the Great Valley is an area of ridges and valleys. Long parallel ridges separated by narrow valleys extend across the county in a northeast-southwest direction. The part in the Cumberland Mountains is an area of steep high mountains with narrow uneven tops and narrow intermountain valleys.

The geology of the county is complex. The soils of the Great Valley are underlain by dolomite, shale, sandstone, and limestone that have undergone severe folding and faulting. These rocks range in age from Cambrian to

Mississippian. The soils of the Cumberland Mountains are mainly underlain by sandstone and shale of Pennsylvanian age.

The Great Valley part of the county is drained by the Clinch River and its tributaries. The Cumberland Mountains are drained by the New River, a tributary of the Cumberland River, and by the Clinch River and its tributaries.

The highest elevation in Anderson County, 3,534 feet, is at the top of Cross Mountain. At the lowest elevation, about 760 feet, the Clinch River and Poplar Creek flow out of the county into Roane County.

transportation

Anderson County has a well developed network of roads. Interstate Highway 75 and U.S. Highway 25W transect the eastern half of the county in a north to south direction. I-75, generally known as the North-South Highway, links Anderson County to Michigan to the north and Florida to the south. U.S. Highway 441 begins at Lake City, passes through the northeastern part of the county into Knox County, and extends to Knoxville and beyond.

The farm to market road system is well developed. Numerous state highways link a network of good county roads to Clinton, the county seat, and to cities in nearby counties and states. Most county roads are paved.

In addition to the road system, the county is served by two major railroads.

River transportation is not well developed, but there is some barge traffic on the Clinch River between Clinton and points on the Tennessee River.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils at the boundaries of the general soil map at the back of this survey do not match, in all instances, those of adjacent counties. Differences in the maps have resulted from the differences in soil patterns, the larger publications scale of this map, which allows for more detail, and the recent advances in soil classification.

soil descriptions

1. Fullerton-Claiborne-Bodine

Deep, rolling to steep, well drained cherty and noncherty soils underlain by dolomite; on uplands

Areas of these rolling to steep soils cross the county generally in a northeast-southwest direction. They are on hills and ridges that have rolling tops and hilly and steep sides. The largest area is in the northeastern part of the county.

This unit makes up about 25 percent of the county. It is about 60 percent Fullerton soils, 10 percent Claiborne soils, 10 percent Bodine soils, and 20 percent soils of minor extent.

Fullerton soils are deep, cherty, and well drained and have a red clayey subsoil. They are on rolling ridgetops and on all aspects of steep side slopes. Claiborne soils are deep and well drained and have a red subsoil. They are loamy in the upper and middle parts of the subsoil and clayey in the lower part. They are mostly on north-, east-, and south-facing slopes. Bodine soils are deep, very cherty, and well drained and have a yellowish brown loamy subsoil. They are mostly on steep west- and north-facing slopes.

Of minor extent in this unit are the well drained Dewey and Dunmore soils on uplands, the well drained Etowah soils on stream terraces and benches, the well drained Emory, Greendale, and Minvale soils on foot slopes and benches, and the moderately well drained Hamblen soils on bottom lands.

Most of this unit is woodland. Cleared areas are used mostly for hay and pasture. Small acreages are cultivated. Tobacco is the main cash crop. Raising beef cattle is the main farm enterprise. Slope is the main limitation to farming and to most other uses.

This unit has poor potential for cultivated crops and fair potential for hay and pasture. It has fair to poor potential for most urban uses. Slope is the main limitation. Some areas are subject to slides when cuts are made across the base of long steep slopes. This fact should be taken into consideration in selecting sites for structures. The only urbanized areas are within the city limits of Oak Ridge and Norris and adjacent to Clinton.

2. Collegedale-Gladeville-Rock outcrop

Deep and shallow, rolling and hilly, well drained soils that are underlain by limestone and have many outcrops of limestone; on uplands

This unit is on valley uplands. Within the valleys are low-lying hills that have short, moderately steep side slopes and broad, gently sloping and rolling tops. Some areas are deeply pitted by limestone sinks. Outcrops of limestone are common.

This unit makes up about 10 percent of the county. It is about 55 percent Collegedale soils, 5 percent Gladeville soils, 5 percent Rock outcrop, and 35 percent soils of minor extent.

Collegedale and Gladeville soils are in similar positions. Both are intermingled with Rock outcrop. Collegedale soils are deep, and Gladeville soils are shallow. Both have a clay subsoil. The outcrops extend from a few inches to 3 feet or more above the soil surface.

Of minor extent in this unit are the moderately deep, well drained Carbo and Upshur Variant soils on uplands, the moderately well drained Capshaw soils on upland flats, and the moderately well drained Hamblen soils on creek bottoms.

This unit is used mostly for hay and pasture (fig. 1). Some tracts are cultivated. Some are reverting to

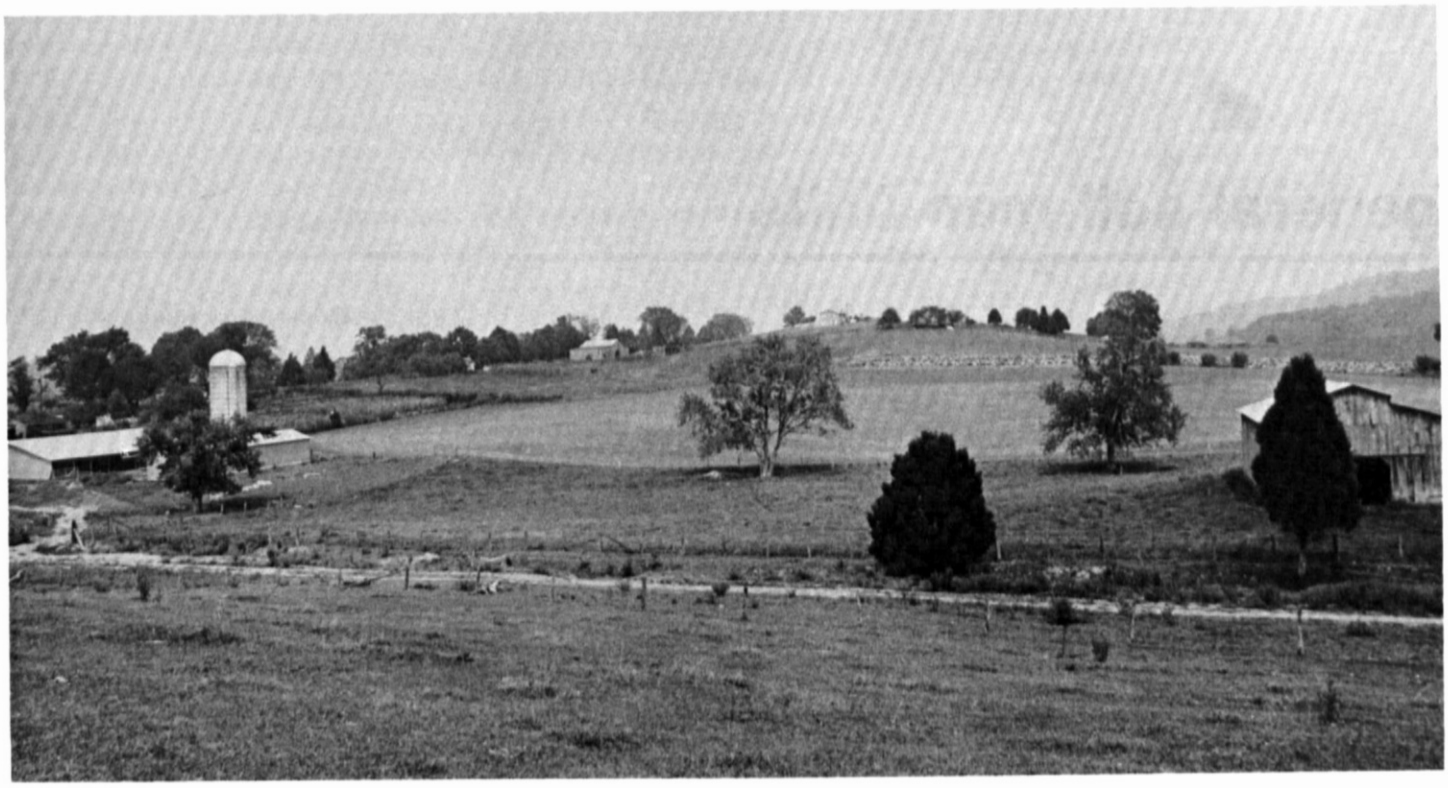


Figure 1.—In this typical landscape of the Collegedale-Gladeville-Rock outcrop map unit, Collegedale soils make up the areas of pasture and hay. Gladeville soils make up the wooded area on the left in the background. Outcrops of limestone are near the barn and trees in the center.

woodland. The large amount of clay in the subsoil, the moderately slow permeability, and the shallowness over bedrock are severe limitations.

This unit has poor potential for cultivated crops and poor to fair potential for small grains, hay, and pasture. It has poor potential for most urban uses. Compensating for the limitations mentioned in the preceding paragraph is difficult.

3. Lehew-Armuchee-Muskingum

Moderately deep, steep, well drained soils underlain by multicolored shale, siltstone, and sandstone; on uplands

This unit consists of steep soils on high winding ridges that have sharp notched crests and steep sides. A network of V-shaped hollows or drainageways has cut deeply into the faces of the ridges.

This unit makes up about 11 percent of the county. It is about 35 percent Lehew soils, 25 percent Armuchee soils, 25 percent Muskingum soils, and 15 percent soils of minor extent.

These steep soils occur in all positions on the landscape. Lehew and Muskingum soils are moderately deep and have a loamy subsoil. Armuchee soils are moderately deep and have a clayey subsoil. Lehew soils formed in residuum of reddish sandstone and shale. Armuchee soils formed in residuum of shale. Muskingum soils formed in residuum of shale, siltstone, and sandstone.

Of minor extent in this unit are the well drained Jefferson and Shouns soils on benches and on foot slopes at the base of ridges.

This unit is almost all woodland. Only a few areas have been cleared and used for pasture, and most of these are reverting to woodland. The steepness of slope and the moderate depth over bedrock are severe limitations for farming and most other uses.

This unit has poor potential for farming and most urban uses. Compensating for the steepness of slope and the moderate depth over bedrock is difficult.

4. Armuchee-Montevallo-Hamblen

Shallow to deep, steep to nearly level, well drained and moderately well drained soils underlain by shale; on uplands and bottoms

This unit consists mainly of soils in long narrow valleys that cross the county in a southwest-northeast direction. Within these valleys are low-lying hills with short moderately steep side slopes that drop to long crooked drainageways.

This unit makes up about 15 percent of the county. It is 35 percent Armuchee soils, 15 percent Montevallo soils, 10 percent Hamblen soils, and 40 percent soils of minor extent.

Armuchee and Montevallo soils are well drained and are in similar positions on uplands. Armuchee soils are moderately deep and have a clayey subsoil that contains many shale fragments. Montevallo soils are shallow and have a loamy, very shaly subsoil. Hamblen soils are on first bottoms. They are loamy, moderately well drained, and deep over bedrock.

Of minor extent in this unit are the well drained Sequoia soils on uplands, the somewhat poorly drained Newark Variant soils on low terraces, and the somewhat poorly drained Newark soils on first bottoms.

This unit is mainly woodland, but a sizable acreage is pasture. Some tracts, especially along creeks, are used for row crops and hay. The shallowness over bedrock and steepness of slope are severe limitations. Drainage is poor in low areas along creeks. In addition, flooding is common in these areas late in winter and early in spring.

This unit has poor potential for cultivated crops and for most urban uses. Compensating for the shallowness over bedrock and the steepness of slope is difficult. The low areas along creeks are severely limited for urban uses because they are wet and subject to flooding.

5. Etowah-Staser-Hamblen

Deep, nearly level to rolling, well drained and moderately well drained soils; on stream terraces and bottoms adjacent to the Clinch River

These loamy soils are on terraces and bottoms. They occur as two areas in the county—in Eagle Bend and in an area adjacent to Eagle Bend east of Clinton on the Clinch River.

This unit makes up about 1 percent of the county. It is about 27 percent Etowah soils, 19 percent Staser soils, 9 percent Hamblen soils, and 45 percent soils of minor extent.

Etowah soils are on stream terraces. They are well drained. Staser and Hamblen soils are on first bottoms. Staser soils are well drained, and Hamblen soils are moderately well drained. All three soils have a loamy surface layer and subsoil.

Of minor extent in this unit are the well drained Waynesboro and Holston soils on high terraces and the moderately well drained Monongahela soils on intermediate terraces.

This unit is suitable for most uses but is used mainly as pasture. A few small tracts are row cropped. Several sizable areas are used for industrial purposes, and one area is urbanized. Wetness is a severe limitation in a few areas. Some of these areas are ponded during rainy seasons.

This unit has good potential for farming and for urban and industrial uses. The slope and the wetness in some areas are the only limitations.

6. Jefferson-Shouns-Collegedale-Armuchee

Deep and moderately deep, rolling and hilly, well drained soils; on uplands and on foot slopes in Dutch Valley

The only area of these soils in the county extends from the Roane-Anderson County line at Oliver Springs in the western part to Lake City in the northern part. It is a rolling and hilly valley flanked by steep mountain and ridge slopes (fig. 2).

This unit makes up about 3 percent of the county. It is about 30 percent Jefferson soils, 25 percent Shouns soils, 15 percent Collegedale soils, 10 percent Armuchee soils, and 20 percent soils of minor extent.

Jefferson and Shouns soils are in similar foot slope positions. They are deep and well drained and have a friable loamy subsoil. Collegedale and Armuchee soils are on uplands. Collegedale soils are at a slightly higher elevation than Shouns and Jefferson soils but, in most places, are at a lower elevation than Armuchee soils. Collegedale soils are deep over bedrock, and Armuchee soils are moderately deep. Both have a firm clayey subsoil.

Of minor extent in this unit are the moderately well drained Hamblen and Monongahela soils and the well drained Allen soils. Hamblen soils are on bottom lands, Monongahela soils are on stream terraces, and Allen soils are on foot slopes.

This unit is used mostly for pasture and hay. Some tracts are cultivated. Some are idle and are reverting to woodland. Slope and, in places, the clayey subsoil and moderate depth over bedrock are the main limitations for farming and most other uses.

This unit has fair to poor potential for row crops and fair potential for pasture and hay crops. It has poor to good potential for residential development and other urban uses.

7. Grimsley-Jefferson-Ramsey

Deep, sloping to steep, well drained stony soils in coves and on foot slopes and shallow, sloping to steep, well drained soils on the top and sides of Waldens Ridge

The only area of these soils in the county extends from the Roane-Anderson County line near Oliver Springs in the western part to the Campbell County line northwest of Lake City. It is an area of a high, steep, rugged ridge and adjacent foot slopes (fig. 3).

This unit makes up about 3 percent of the county. It is about 30 percent Grimsley soils, 25 percent Jefferson soils, 20 percent Ramsey soils, and 25 percent soils of minor extent.

Grimsley and Jefferson soils are in coves and on foot slopes. They are deep and loamy and have numerous cobbles and stones throughout and on the surface. Ramsey soils are on the crest and sides of the ridge, at a higher elevation than Jefferson and Grimsley soils. Ramsey soils are loamy, are shallow over sandstone

Figure 2.—Typical landscape of the Jefferson-Shouns-Collegedale-Armuchee area in Dutch Valley. Jefferson and Shouns soils are on the smooth foot slopes along the base of the wooded ridge. Collegedale and Armuchee soils are on the hillsides in the left foreground. The wooded ridge in the background is the Grimsley-Jefferson-Ramsey area.

bedrock, and have many rock outcrops and vertical bluffs.

Of minor extent in this unit are Muskingum and Gilpin soils. These well drained, moderately deep soils formed in residuum of shale. They are at lower elevations than Ramsey soils.

This unit is nearly all woodland. The few cleared areas around house sites, mostly at the base of slopes, are either in native pasture or are reverting to woodland. The main limitations for farming and most other uses are the steep slopes, the shallowness of the soil over bedrock, the rock outcrop, the steep bluffs, and the stones and boulders on the surface.

This unit has poor potential for farming and for most urban uses. Compensating for the severe limitations mentioned in the preceding paragraph is very difficult. Most of this unit is inaccessible except on foot.

8. Muskingum-Jefferson-Gilpin-Udorthents

Deep to shallow, steep, well drained soils underlain by sandstone and shale; on mountainsides, in coves, and on benches

This unit is in the northwestern part of the county, within the Cumberland Mountains. It is a predominantly steep, highly dissected mountainous area (fig. 4).

This unit makes up about 25 percent of the county. It is about 20 percent Muskingum soils, 20 percent Jefferson soils, 15 percent Gilpin soils, 15 percent Udorthents, and 30 percent soils of minor extent.

Muskingum and Gilpin soils are on the sides and tops of the mountains, at higher elevations than Jefferson soils. Both soils are moderately deep, well drained, and loamy. Jefferson soils are on the lower parts of mountainsides, in coves and on benches. They are

loamy and deep over bedrock and have numerous cobbles throughout and on the surface. Udorthents are the high walls and the heterogenous spoil excavated during the strip mining of coal. They range from deep to shallow. Areas are narrow, occur at various elevations, and extend for considerable distances almost on the contour.

Of minor extent in this unit are the shallow shaly Petros soils on ridge points and narrow ridgetops, the moderately deep Lily soils on upland flats, and the deep stony Grimsley soils in coves.

This unit is mostly woodland. The main limitations for farming and most urban uses are the steep slopes, the depth to bedrock, the rock outcrop, and the numerous small stones on the surface.

This unit has poor potential for cultivated crops, for pasture and hay, and for residences and other urban uses. Compensating for the severe limitations previously mentioned is difficult. Most of this area is inaccessible except by private roads and trails.

9. Muskingum-Udorthents-Petros

Deep to shallow, moderately steep and steep soils underlain by shale and sandstone; on high mountains

Areas of these moderately steep and steep soils are on high mountainsides in the northwestern part of the county. There are several nearly vertical sandstone bluffs.

This unit makes up about 6 percent of the county. It is about 35 percent Muskingum soils, 25 percent Udorthents, 20 percent Petros soils, and 20 percent soils of minor extent.

Muskingum soils are on mountainsides. They are

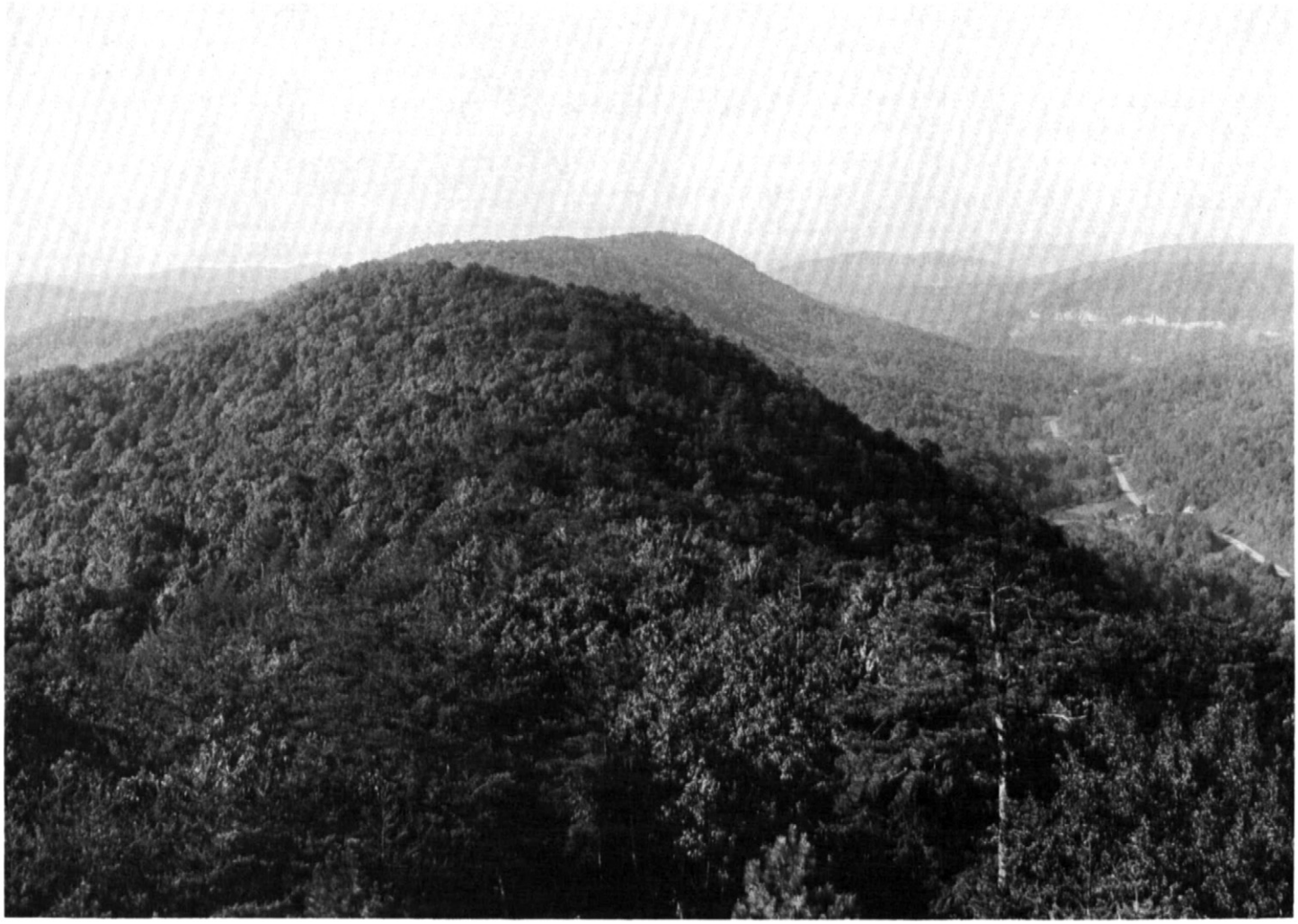


Figure 3.—Part of the Grimsley-Jefferson-Ramsey area on the general soil map. Grimsley and Jefferson soils are on the foot slopes. Ramsey soils are on the upper slopes and the crest of the ridge.

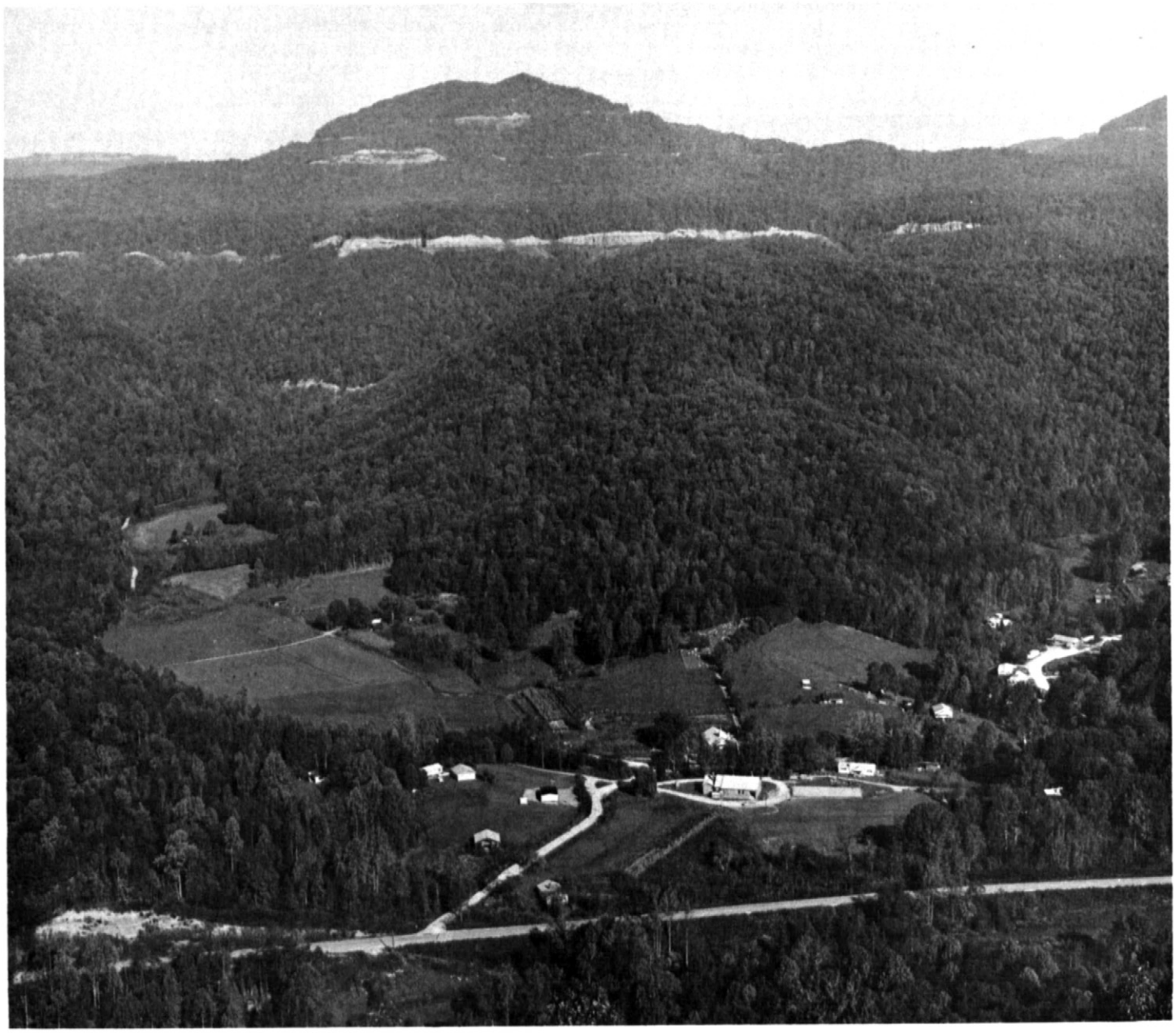


Figure 4.—An area of the Muskingum-Jefferson-Gilpin-Udorthents map unit. Jefferson soils are on foot slopes, mainly the cleared fields in the foreground. Muskingum soils are on the mountainsides. Gilpin soils are on the ridge crests. Udorthents are in the strip mine area in the background.

shaly, moderately deep, and well drained. Udorthents are the high walls and the heterogenous spoil excavated during the strip mining of coal. They range from deep to shallow. Areas of Udorthents are at various elevations, and some extend for considerable distances almost on the contour. Petros soils are very shaly, are shallow over bedrock, and are excessively drained. They are mainly on the points of ridges and on narrow mountaintops.

Of minor extent in this unit are the well drained Jefferson, Grimsley, and Zenith soils. These soils are in coves and on benches below steep mountainsides. Zenith soils are mainly on north- and east-facing mountainsides and in coves.

This unit is nearly all woodland. Steepness of slope and shallowness are the main limitations for farming, residences, and for most urban uses.

This unit has poor potential for cultivated crops, hay and pasture, and most urban uses. Compensating for the steep slopes, the shallowness, and an occasional sandstone bluff is difficult. Most of this area is inaccessible except by private roads.

10. Sewanee-Ealy-Welchland

Deep, nearly level and gently sloping, well drained and moderately well drained soils; on bottoms and terraces along mountain streams

The only area of this unit is on the flood plains along the New River and Ligias Fork Creek in the northwestern part of the county.

This unit makes up about 1 percent of the county. It is about 35 percent Sewanee soils, 20 percent Ealy soils, 10 percent Welchland soils, and 35 percent soils of minor extent.

Sewanee and Ealy soils are on bottom lands. Welchland soils are on low terraces, at slightly higher elevations. They are cobbly and well drained. Sewanee soils are moderately well drained, and Ealy soils are well drained. Both soils are friable.

Of minor extent in this unit are the well drained Sequatchie soils and the moderately well drained Whitwell soils. These soils are on low terraces, a few feet higher in elevation than the main soils in the unit.

This unit is used mainly for row crops and pasture (fig. 5). A large part is idle. The content of small stones makes the Welchland soil droughty and seriously interferes with cultivation.

This unit has fair potential for farming and poor potential for urban uses. Compensating for the frequent flooding and the cobbles is difficult. Some of the soils are severely limited for septic tank absorption systems, foundations, and roads.

Figure 5.—This part of the Sewanee-Ealy-Welchland map unit is used for grain crops and hay. The mountainous landscape in the background is the Muskingum-Jefferson-Gilpin-Udorthents area.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Fullerton cherty silt loam, 5 to 12 percent slopes, is one of several phases in the Fullerton series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Muskingum-Petros complex, 15 to 60 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Jefferson soils, 20 to 50 percent slopes, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, Quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

soil descriptions

AeD—Allen loam, 10 to 25 percent slopes. This deep, well drained, moderately steep soil is on benches, foot slopes, and hillsides below high mountain ridges. It formed in material washed from steep slopes mainly underlain by sandstone and shale. Most of the acreage is in Dutch Valley. Areas range from 3 to 20 acres.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to 62 inches or more. It is strong brown and yellowish red loam in the upper part, red clay loam in the middle part, and dark red clay loam in the lower part.

This soil can be worked throughout a fairly wide range of moisture conditions. It is strongly acid or very strongly acid. Available water capacity is high, and natural fertility is low. In many places there are a few fragments of sandstone on the surface and in the soil.

Included with this soil in mapping are a few small areas of a soil that is similar but has a yellowish subsoil. In some fields there are a few eroded spots where the surface layer is reddish clay loam.

This soil has low potential for row crops. Its main limitation is slope. Medium to high yields of row crops can be obtained occasionally in a system that maintains the soil, such as a 4- or 5-year cropping system. The

potential is fair for small grains and high for pasture and hay crops.

The potential for urban use is poor to fair. Because of the strong slope, the main limitation, careful design and correct installation of foundations are needed for buildings and roads. The soil is subject to slides if cuts are made near the base of long slopes.

The capability subclass is IVe. The woodland group is 3o.

AmC—Armuchee silt loam, 5 to 12 percent slopes. This sloping soil is on low rolling hills and at the tops of steep ridges. It formed in material weathered from acid shale. Areas range from 3 to about 70 acres.

Typically, the surface layer is dark grayish brown and brown silt loam and shaly silt loam about 6 inches thick. The subsoil extends to a depth of 18 inches. It is strong brown shaly silty clay loam in the upper part and yellowish red shaly silty clay in the middle and lower parts. The underlying material is strong brown very shaly silty clay. Weakly consolidated shale is at a depth of about 24 inches.

This soil is low in fertility and is strongly acid or very strongly acid. The root zone is moderately deep. The available water capacity is low. The organic matter content is low. Permeability is moderately slow.

Included with this soil in mapping are small areas of a soil that is similar except that its surface layer and subsoil combined are more than 20 inches thick. Also included are small tracts of a soil that is more than 35 percent shale fragments and is less than 20 inches deep over soft shale bedrock. In eroded spots in some fields, the surface layer is strong brown or yellowish red shaly silty clay loam.

This soil has poor potential for row crops and fair potential for small grains, hay, and pasture. Its potential is limited because of the depth to bedrock, the low available water capacity, and the clayey subsoil. This soil can produce fair yields of pasture and hay and perhaps in the larger areas fair yields of small grains if adequate amounts of lime and fertilizer are used.

This soil has poor potential for most urban use. The soil is too shallow over bedrock and its percolation rate is too slow for septic tank absorption systems. Many areas can be used as homesites if sewers are available. Excavation into shale bedrock is commonly required for most foundations and roads. The upper few feet of bedrock can be removed by heavy equipment. Lawns are likely to be of poor quality.

The capability subclass is IVe. The woodland group is 4d.

AmD—Armuchee silt loam, 12 to 20 percent slopes. This moderately steep soil is on the sides of low hills and at the tops of steep ridges. It formed in residuum of acid shale. Areas range from 3 to 115 acres.

Typically, the surface layer is dark grayish brown and brown silt loam and shaly silt loam about 6 inches thick. The subsoil extends to a depth of 18 inches. It is strong brown shaly silty clay loam in the upper part and yellowish red shaly silty clay in the middle and lower parts. The underlying material is strong brown very shaly silty clay. Weakly consolidated shale is at a depth of 24 inches.

This soil is low in natural fertility, is strongly acid or very strongly acid, and has a low available water capacity. It is low in organic matter content. The root zone is moderately deep. Permeability is moderately slow. Numerous soft shale chips are scattered throughout the soil.

Included with this soil in mapping are a few small areas of a soil that is less than 20 inches deep over bedrock and is more than 35 percent shale fragments. Also included are a few areas of a soil that is similar except that its surface layer and subsoil combined are more than 20 inches thick. In eroded spots the surface layer is reddish shaly silty clay loam.

This soil has poor potential for farming. Its potential is limited by the slope, low available water capacity, clayey subsoil, and moderately deep root zone. Pasture and hay crops can be grown, but yields are low unless large amounts of fertilizer and lime are added.

This soil has poor potential for urban use. The less hilly areas are suitable as homesites if sewers are available. Foundations for houses and roads need to be well designed and correctly installed. Excavation into shale bedrock usually is necessary. The upper few feet of bedrock can be removed with heavy equipment.

The capability subclass is VIe. The woodland group is 4d.

AmE—Armuchee silt loam, 20 to 45 percent slopes. This steep soil is on ridges. It formed in residuum of acid shale. Areas range from 3 to 130 acres.

Typically, the 6-inch surface layer is dark grayish brown and brown silt loam and shaly silt loam. The subsoil extends to 18 inches. It is strong brown shaly silty clay loam in the upper and middle parts and yellowish red shaly silty clay in the lower part. The underlying material is strong brown very shaly silty clay. At a depth of 24 inches is weakly consolidated shale.

This soil has a low available water capacity, is low in natural fertility, and is strongly acid or very strongly acid. It is low in organic matter content. It has a moderately deep clayey root zone.

Included with this soil in mapping are a few small areas of a very shaly soil that is less than 20 inches deep over bedrock. Also included are a few long narrow strips, between the ridges, of moderately well drained soils on bottom land along streams.

This soil has poor potential for farming and for urban use. Its potential is limited by steep slopes, restricted depth to rock, the clayey subsoil, and low available water capacity.

The capability subclass is VIIe. The woodland group is 4d.

ArD3—Armuchee shaly silty clay loam, 12 to 20 percent slopes, severely eroded. This moderately steep, moderately deep soil is on low hills and narrow side slopes. It developed in residuum of acid shale. Areas range from 3 to 120 acres.

In most places, sheet erosion has removed all or nearly all of the original surface layer and left a thin surface layer of strong brown shaly silty clay loam. The subsoil is yellowish red shaly silty clay to a depth of about 14 inches. The underlying material is strong brown very shaly silty clay loam. Weakly consolidated shale is at a depth of about 20 inches.

This soil is strongly acid or very strongly acid. It has low available water capacity and natural fertility. It is low in organic matter content. It has a shallow clayey root zone.

Included with this soil in mapping are small tracts of a soil that is similar but has a brown silt loam surface layer. Also included in a few areas is a soil that is eroded almost down to the shale bedrock.

This soil has poor potential for farming. The moderately steep slopes, clayey subsoil, low available water capacity, and moderate depth over shale bedrock are the main limiting features. Pasture and hay can be grown, but yields will be low.

This soil has poor potential for most urban uses. Some areas where sewers are available can be used as homesites, but excavation for foundations and roads requires deep cuts into bedrock. Unless deep cuts are made, foundations for houses and roads are unstable, walls are likely to crack, and roads often break up.

The capability subclass is VIe. The woodland group is 4d.

ArE3—Armuchee shaly silty clay loam, 20 to 45 percent slopes, severely eroded. This moderately steep and steep, severely eroded soil is on ridges in uplands. It formed in material weathered from acid shale. Sheet erosion and in places gully erosion have been intense. Gullies 1 1/2 to 3 feet deep make up 5 percent of a few areas. Areas are commonly less than 20 acres but range from 2 to about 90 acres.

Typically, the 6-inch surface layer, mostly former subsoil material, is strong brown shaly silty clay loam. The subsoil is yellowish red shaly silty clay to a depth of about 12 inches. Below this is loosely layered soft shale with a small amount of strong brown silty clay in seams and cracks. Shale bedrock is 26 inches below the surface.

This soil has a shallow clayey root zone. It has low available water capacity and is strongly acid or very strongly acid. Natural fertility and the organic matter content are low.

Included with this soil in mapping are small areas of a similar soil that has many shale fragments in the surface layer and subsoil and is shallow over bedrock. Another included soil has a brown silt loam surface layer.

This soil has poor potential for farming and for urban use. It is too steep, too eroded, and too shallow over bedrock. Pasture plants such as tall fescue can be grown, but stands are difficult to establish and maintain.

The capability subclass is VIIe. The woodland group is 4d.

AuE—Armuchee-Muskingum complex, 25 to 60 percent slopes. This complex consists of small areas of steep Armuchee and Muskingum soils so intermingled that they could not be mapped separately. It occurs as areas of 20 acres to about 4,000 acres on high linear ridges that have steep side slopes and narrow, winding uneven tops (fig. 6).

The Armuchee soil makes up about 40 to 60 percent of each mapped area. Typically, the surface layer is dark grayish brown and brown silt loam and shaly silt loam about 6 inches thick. The subsoil extends to a depth of 18 inches. It is strong brown shaly silty clay loam in the upper part and yellowish red shaly silty clay in the middle and lower parts. The underlying material is very shaly silty clay. Weakly consolidated shale is at a depth of 24 inches.

This Armuchee soil has low available water capacity, low natural fertility, and low organic matter content. It is strongly acid or very strongly acid. The root zone is moderately deep and clayey.

The Muskingum soil makes up 40 to 60 percent of each mapped area. Typically, the upper 2 inches of the surface layer is very dark grayish brown silt loam. The lower 3 inches is light yellowish brown silt loam. The subsoil extends to a depth of 26 inches. It is yellowish brown shaly silt loam. The underlying material is weathered shale with yellowish brown silt coatings on and between shale fragments. At about 36 inches the shale gradually becomes hard enough so that it cannot be dug with a spade.

This Muskingum soil is moderately permeable and has medium available water capacity. It is low in natural fertility and is strongly acid. The root zone is moderately deep.

Included in mapping are a few areas of a soil that has a clayey subsoil and is 20 to 40 inches deep over soft shale. Also included are a few small areas of a deep, well drained soil that formed in local alluvium.

The soils in this complex have poor potential for farming and urban use. Compensating for the steep slopes, the limited depth over bedrock, and the medium to rapid runoff is difficult.

The capability subclass is VIIe. The woodland group is 4d for the Armuchee soil and 3r for the Muskingum soil.

BaE—Bland-Rock outcrop complex, 20 to 50 percent slopes. This complex consists of small areas of steep Bland soils and limestone outcrop so intermingled that they could not be mapped separately. It occurs mostly as 200- to 600-foot bands on the steep north-facing sides of ridges.

The Bland soil makes up about 50 to 75 percent of each mapped area. Typically, the surface layer is dark reddish brown silt loam 3 inches thick. The subsoil

Figure 6.—Armuchee-Muskingum complex, 25 to 60 percent slopes, is on the wooded ridge. The stock pond is in an area of Montevallo soil.

extends to a depth of 31 inches. It is reddish brown silty clay in the upper part, weak red clay in the middle part, and reddish brown silty clay in the lower part. Below this, and extending to bedrock at 36 inches, is dark reddish brown silty clay.

The clayey subsoil slows the movement of moisture and the growth of roots. The available water capacity is medium, and permeability is moderately slow. The content of organic matter is low. Natural fertility is medium. The soil is strongly acid to neutral.

Rock outcrop makes up 20 to 35 percent of each mapped area, protruding a few inches to about 2 feet above the surface.

Included in mapping are small areas of a soil that is less than 20 inches deep over bedrock.

This complex has poor potential for farming and for urban or recreation use. The steep slopes, limestone outcrops, and clayey subsoil severely limit its use.

The capability subclass is VIIs. The woodland group is 3c.

BoC—Bodine cherty silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on ridgetops. It formed in residuum of dolomite. Areas range from 2 to 55 acres, but most areas are less than 20 acres.

Typically, the surface layer is very dark grayish brown and light yellowish brown cherty silt loam about 11 inches thick. The subsoil to a depth of 63 inches is very cherty silt loam. It is brownish yellow in the upper part, light yellowish brown and yellowish brown in the middle part, and brownish yellow in the lower part.

This soil is extremely acid to strongly acid, has low natural fertility, and has low available water capacity. There are enough fragments of chert on the surface and in the surface layer to make tillage difficult. Permeability is moderately rapid.

Included with this soil in mapping are a few small areas of a soil that has a yellowish red and red clay and silty clay subsoil. Also included are small areas where rock crops out.

This soil has poor potential for cultivated crops and small grains and poor to fair potential for hay and pasture crops. The high content of chert fragments on the surface and in the surface layer hinders the use of machinery and causes the soil to be droughty.

This soil has fair potential for urban use. The large number of chert fragments is the chief limitation.

The capability subclass is IVs. The woodland group is 4f.

BoD—Bodine cherty silt loam, 12 to 25 percent slopes. This moderately steep soil is deep and well drained. It is on hills and ridges underlain by dolomite. Areas range from about 3 to 130 acres, but most are less than 30 acres.

Typically, the surface layer is very dark grayish brown and light yellowish brown cherty silt loam 11 inches thick. The subsoil extends to a depth of more than 63 inches. It is very cherty silt loam that is brownish yellow in the upper part, light yellowish brown and yellowish brown in the middle part, and brownish yellow in the lower part.

This soil is low in natural fertility and available water capacity. It is strongly acid to extremely acid. Permeability is moderately rapid. There are enough chert fragments on the soil and in the surface layer to hamper fieldwork.

Included with this soil in mapping are a few small areas of a soil that has a yellowish red and red clay or silty clay subsoil. Also included are a few small areas where rock crops out.

This soil has poor potential for row crops and small grains and poor to fair potential for hay and pasture. Slope, droughtiness, and the large amount of chert on and in the soil are the main limitations.

This soil has poor to fair potential for urban use. Slope is the main limiting feature.

The capability subclass is VIs. The woodland group is 4f.

BoE—Bodine cherty silt loam, 25 to 50 percent slopes. This is a deep, well drained, steep soil on the sides of ridges. Most areas are on north- and west-facing exposures. Areas range from 3 to about 300 acres but are commonly less than 75 acres.

Typically, the surface layer is very dark grayish brown and light yellowish brown cherty silt loam about 11 inches thick. The subsoil consists of brownish yellow, light yellowish brown, and yellowish brown very cherty silt loam. It extends to a depth of more than 63 inches.

This soil is strongly acid to extremely acid throughout. The available water capacity and natural fertility are low. Permeability is moderately rapid. Coarse fragments of chert on the surface and in the surface layer lower the capacity of the soil to hold water.

Included with this soil in mapping are a few small areas of a soil that is similar but has a 6- to 8-inch, dark brown surface layer. Also included are a few small areas of soils that have a yellowish red or red clay or silty clay subsoil and a few small areas where rock crops out.

This soil has poor potential for farming and urban use. It is too steep and droughty for cultivated crops and hay, and it is poorly suited to pasture. It is too steep for urban use. It is best suited to trees. Most areas are in cutover hardwoods.

The capability subclass is VIIs. The woodland group is 4f.

CaD—Calvin shaly silt loam, 8 to 25 percent slopes. This well drained, moderately deep, sloping to moderately steep soil is on uplands. It formed in residuum of reddish acid shale. Areas are commonly less than 12 acres but range up to about 40 acres.

Typically, the surface layer is dark brown and reddish brown silt loam and shaly silt loam 6 inches thick. The subsoil, which extends to a depth of 27 inches, is reddish brown. It is shaly silt loam in the upper part and very shaly silt loam in the lower part. The substratum is a few inches of weak red very shaly silt loam. Soft shale bedrock begins about 29 inches below the surface and gradually hardens with increasing depth.

This soil is low in natural fertility and has a medium available water capacity. It is medium acid to very strongly acid throughout. Permeability is moderately rapid. Runoff is medium to rapid.

Included with this soil in mapping are a few small areas of a soil that is similar except that erosion has removed the original surface layer. A few shallow gullies have formed in most of these areas. Also included are a few small areas of a soil that is less than 20 inches deep over bedrock.

This soil has poor potential for row crops and fair potential for pasture and hay. The main limitations are slope, droughtiness, and low fertility.

The potential for urban use is poor. The main limitations are the moderate depth over bedrock and, in places, the slope. Excavations for roads and buildings commonly require cutting into the bedrock. The upper few feet of rock can be removed with heavy equipment.

The capability subclass is IVe. The woodland group is 3f.

CaE—Calvin shaly silt loam, 25 to 45 percent slopes. This moderately deep, well drained, steep soil is on ridges and hills. It formed in residuum of reddish shale. Areas range from 2 to 50 acres, but most are less than 20 acres.

Typically, the surface layer is dark brown and reddish brown silt loam and shaly silt loam 6 inches thick. The subsoil extends to a depth of 27 inches. It is reddish brown shaly silt loam in the upper part and reddish brown shaly silt loam in the lower part. The substratum is a few inches of weak red very shaly silt loam. Soft shale bedrock begins 29 inches below the surface and gradually hardens with increasing depth.

This soil is low in natural fertility and is medium acid to very strongly acid throughout. Runoff is medium to rapid. Permeability is moderately rapid, and the available water capacity is medium.

Included with this soil in mapping are a few small tracts of a very shaly soil that is less than 20 inches deep over bedrock. In almost every field, there are a few small severely eroded spots.

This soil has poor potential for farming and urban use. It is best suited to trees. Its use is limited by the steep slope and moderate depth to bedrock. Some of the less steep areas can be used for pasture, but management is difficult because of slope.

The capability subclass is VIIe. The woodland group is 3f.

CbB—Capshaw silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is along streams, in slight depressions, and on broad upland flats. Areas commonly are 3 to 11 acres. A few range up to about 30 acres.

Typically, the surface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil extends to a depth of 45 inches. It is yellowish brown, friable silty clay loam in the upper part; light olive brown, firm clay in the middle part; and very firm, olive brown clay in the lower part. The middle part is mottled in shades of brown and red, and the lower part is mottled in shades of brown and gray. The underlying material is mottled light yellowish brown, yellowish brown, and gray clay. It extends to a depth of 60 inches. Bedrock begins at a depth between 48 and 72 inches.

The soil in unlimed areas is medium acid or strongly acid in the upper part and medium acid through mildly alkaline in the lower part. Available water capacity is high, runoff is slow to medium, and permeability is slow. The root zone is deep, but root development is slightly restricted by the clayey subsoil.

Included with this soil in mapping are a few small areas of a soil that has a very firm, yellow clay subsoil and a few areas of soils that have a red clay subsoil.

This soil has good potential for row crops, small grains, and hay and pasture. In some small, irregularly shaped areas, it has only fair potential for row crops because it is adjacent to less productive soils.

The potential for urban use is fair. The main limitations are the clayey texture of the subsoil, the moderate to low strength, and the moderate shrink-swell potential. Slow permeability is a limitation for septic tank absorption fields. Except for slow permeability, the limitations for residential buildings and roads can be overcome by good design and proper installation of foundations.

The capability subclass is IIe. The woodland group is 3o.

CeC—Carbo silty clay loam, 3 to 12 percent slopes. This moderately deep, sloping soil is on broad smooth uplands. It formed in residuum of Chickamauga Limestone. Areas are commonly less than 20 acres but range up to about 50 acres.

Typically, the 6-inch surface layer is brown silty clay loam. The subsoil is yellowish brown clay mottled in shades of yellow and brown. Limestone bedrock is at a depth of 25 inches.

Permeability is slow. Natural fertility is medium, and tilth is poor. The available water capacity and organic matter content are low.

Included with this soil in mapping are a few areas of rock outcrop. Also included are small areas of a soil that is similar except that its surface layer and subsoil combined are 40 to 60 inches thick.

This soil has poor potential for farming and urban use. The subsoil is too clayey and the available water capacity is too low for row crops. Small grains and hay and pasture crops are fairly well adapted. Compensating for the clayey, slowly permeable subsoil, the high shrink-swell potential, and the moderate depth over bedrock is extremely difficult.

The capability subclass is IVe. The woodland group is 3c.

CnC—Claiborne silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on broad ridgetops and at the base of steep slopes. It is underlain by dolomite. Areas range from 2 to 37 acres, but most areas are less than 20 acres.

Typically, the 7-inch surface layer is dark brown silt loam. The subsoil, to a depth of more than 62 inches, is reddish brown silt loam in the upper part, yellowish red and red silty clay loam in the middle part, and red clay in the lower part. Coarse fragments, mainly chert, increase in abundance with increasing depth.

This soil is strongly acid or very strongly acid except for the surface layer in limed areas. The root zone is deep (fig. 7), and the available water capacity is high. Natural fertility is medium. Permeability is moderate.

Included with this soil in mapping are small tracts of a similar soil that contains numerous chert fragments in the surface layer. Also included are few spots of a

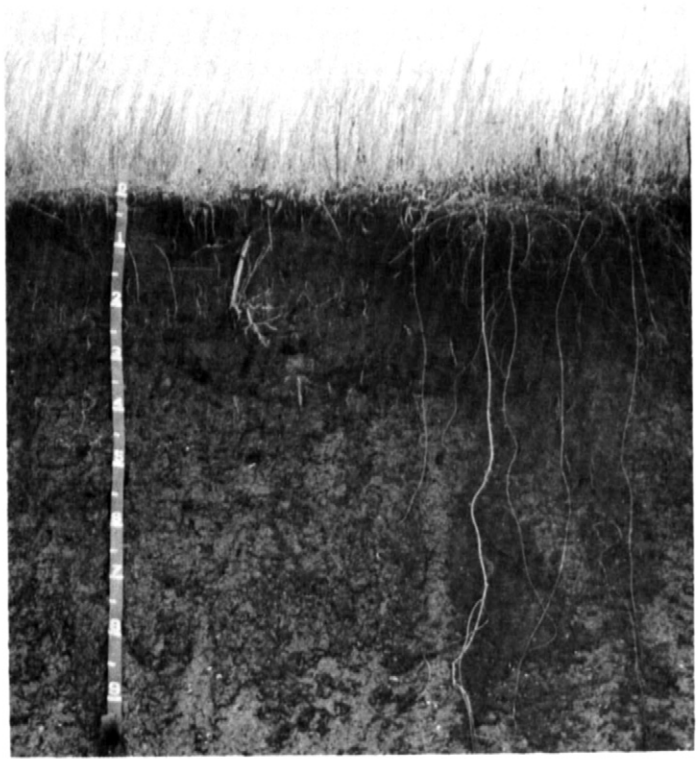


Figure 7.—Roots can penetrate to a depth of several feet in the loamy Claiborne soil.

similar soil that has a brown silt loam surface layer and a yellowish red silty clay loam subsoil.

This soil has fair potential for row crops and good potential for hay and pasture crops. Compensating for the slope, the main limitation, is easy. Moderately high yields of row crops can be obtained by using good management practices such as crop rotation, stripcropping, and minimum tillage. This soil can produce high yields of small grains, hay crops, and pasture crops.

This soil has good potential for most urban use. It is a suitable soil for homesites. Slope is a slight to moderate limitation but is easy to overcome.

The capability subclass is IIIe. The woodland group is 3o.

CnD—Claiborne silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil is on hillsides. It is underlain by dolomite. Areas are commonly 5 to 30 acres but range from 2 to about 90 acres.

Typically, the 7-inch surface layer is dark brown silt loam. The subsoil to a depth of 42 inches is successive layers of reddish brown silt loam and yellowish red and red silty clay loam. Below 42 inches to more than 62 inches, the subsoil is red clay. The content of chert fragments increases from 2 percent by volume in the surface layer to 10 percent in the lowest subsoil layer.

The available water capacity is high, and the root zone is deep. Unless limed, this soil is strongly acid or very strongly acid in all layers. The natural fertility is medium, and permeability is moderate.

Included with this soil in mapping are a few small areas of a similar soil on steeper slopes and some less steep soils. Also included on benches and foot slopes are a few tracts of a soil that has a brown surface layer and a yellowish red subsoil of silty clay loam.

This soil has poor potential for row crops. It is limited mainly by slope. Moderately high yields of adapted row crops can be produced in long rotations, under stripcropping, and by the use of minimum tillage. The soil is well suited to hay and pasture crops, and high yields of adapted grasses and legumes can be obtained. The potential for small grains is medium.

This soil has poor to fair potential for urban use. Its main limitation is slope. The less hilly areas are suitable for residential buildings. Before buildings and roads are constructed, this soil should be checked because it is subject to slides, especially if cuts are made near the base of long slopes. It is too steep for large industrial buildings.

The capability subclass is IVe. The woodland group is 3o.

CnE—Claiborne silt loam, 25 to 45 percent slopes. This deep, well drained, steep soil is on hillsides on high ridges. It is underlain by dolomite. Areas range from 3 to 100 acres, but most areas are between 10 and 50 acres.

Typically, the 7-inch surface layer is dark brown, friable silt loam. The subsoil is reddish brown silt loam in the upper part, yellowish red and red silty clay loam in the middle part, and red clay in the lower part. The subsoil extends to a depth of more than 62 inches. The content of chert increases in volume with increasing depth.

This soil is strongly acid or very strongly acid except where the surface layer has been limed. Natural fertility is medium. The root zone is deep. The available water capacity is high, and permeability is moderate.

Included with this soil in mapping are a few small areas of a soil that has a brown cherty silt loam surface layer and a yellowish red and red cherty clay subsoil. Also included are a few small areas of a soil that has a surface layer of dark brown cherty silt loam and a subsoil of brownish yellow and yellowish brown very cherty silt loam. In some areas there are V-shaped gullies 2 to 12 feet deep and 5 to 30 feet across.

This soil has poor potential for row crops, small grains, and hay. It has fair potential for pasture. The slopes are too steep for row crops. Establishing and maintaining pasture are difficult. Good yields of adapted pasture plants such as tall fescue, orchardgrass, and white clover can be obtained under good management.

The potential for most urban use is poor. The soil is too steep, and it is likely to slip and slide if cuts are made across slopes.

The capability subclass is VIe. The woodland group is 3r.

CoB—Collegedale silt loam, 2 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. It is underlain by limestone. Individual areas are 3 to 40 acres.

Typically, the surface layer is brown silt loam 5 inches thick. The subsoil is very firm clay to a depth of more than 64 inches. The upper part is yellowish red. The middle part is yellowish red and is mottled in shades of brown. The lower part is profusely mottled in shades of red and brown.

This soil is low in natural fertility. It is strongly acid or very strongly acid except where the surface layer has been limed. The available water capacity is medium or high, and permeability is moderately slow. The clayey subsoil somewhat restricts root development and the movement of water through the soil.

Included with this soil in mapping are areas of a similar soil that is less than 60 inches deep over bedrock. Also included are a few small areas of a shallow soil where rock crops out, areas of a soil that is less than 40 inches deep over bedrock and has a yellowish brown clay subsoil, and a few small eroded areas where the surface layer is reddish and clayey.

This soil has good or fair potential for row crops and good potential for small grains, hay, and pasture. The soil is slightly droughty, especially late in summer.

This soil has poor to fair potential for urban use. The subsoil shrinks and swells enough during wetting and drying to crack walls and cause foundation problems unless foundations are adequately designed and properly

installed. The moderately slow permeability is a limitation for septic tank absorption systems.

The capability subclass is IIe. The woodland group is 3o.

CoC—Collegedale silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on low rolling uplands. It is underlain by limestone. Areas are 3 to 100 acres.

Typically, the surface layer is brown silt loam 5 inches thick. The subsoil extends to a depth of 64 inches. It is yellowish red clay in the upper part and mottled yellowish red, light yellowish brown, and yellowish brown clay in the lower part.

This soil is low in natural fertility and is strongly acid or very strongly acid throughout except where the surface layer has been limed. Available water capacity is medium. Permeability is moderately slow. The clayey subsoil slows the movement of water and impedes the growth of roots.

Included with this soil in mapping are areas where rock crops out. Also included are a few spots of soils that are less than 60 inches deep over bedrock, a few eroded patches where the surface layer is reddish and clayey, and a few small areas where the surface layer is cherty.

This soil has poor potential for row crops. The main limitations are slope, clayey subsoil of moderately slow permeability, rapid runoff, and medium available water capacity. The potential is fair for small grain, hay crops, and pasture.

The potential for urban use is poor. The soil characteristics mentioned in the paragraph above, along with moderate shrink-swell potential and low strength, severely limit urban use. In addition, the moderately slow permeability is a limitation for septic tank absorption systems. If sanitary sewers are available and soil properties are considered in the design and installation of foundations, this soil can be used for urban purposes.

The capability subclass is IVe. The woodland group is 3o.

CoD—Collegedale silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil has a plastic clay subsoil. It occurs as irregularly shaped areas on low hills. It formed in residuum of limestone. Areas are 3 to 50 acres.

Typically, the surface layer is brown silt loam 5 inches thick. The subsoil extends to a depth of 64 inches. It is yellowish red clay in the upper part and mottled yellowish red, light yellowish brown, and yellowish brown clay in the lower part.

This soil has medium available water capacity. It is strongly acid or very strongly acid except where limed. Natural fertility is low. Permeability is moderately slow. The clay subsoil tends to slow the movement of water and restrict roots.

Included with this soil in mapping are a few areas where rock crops out. Also included are a few areas of soils that are less than 60 inches deep over bedrock and a few eroded patches where the surface layer is reddish and clayey.

This soil has poor potential for row crops and fair potential for small grains, hay crops, and pasture crops. The main limitations are the slope, clayey subsoil, moderately slow permeability, rapid runoff, and medium available water capacity.

This soil has poor potential for urban use. The limitations are the same as those mentioned in the preceding paragraph. The moderately slow permeability is a limitation for septic tank absorption fields. The less hilly areas are suitable as homesites if sewers are available and soil properties are considered in designing and installing the foundations.

The capability subclass is VIe. The woodland group is 3o.

CpC3—Collegedale clay, 5 to 12 percent slopes, severely eroded. This deep, well drained, sloping soil occurs as small irregularly shaped areas on low hills. It is underlain by limestone. Areas are mostly less than 15 acres but range up to about 45.

Typically, the surface layer is strong brown clay 7 inches thick. The subsoil is very firm clay that extends to a depth of 64 inches. It is yellowish red in the upper part and mottled yellowish red, light yellowish brown, and yellowish brown in the lower part.

This soil is low in natural fertility. The available water capacity is medium. Permeability is moderately slow. The clayey surface layer and subsoil restrict roots and the movement of water. Unless limed, this soil is strongly acid or very strongly acid throughout.

Included with this soil in mapping are a few small areas of a similar soil that is less than 60 inches deep over bedrock. Also included are areas with a few rock outcrops. In almost every field there are spots where the surface layer is brown silt loam.

This soil has poor potential for row crops. Its use is limited by the clayey surface layer and subsoil, moderately slow permeability, slope, medium available water capacity, and outcrops of rock. The soil has poor to fair potential for small grains, hay, and pasture. It is droughty late in summer.

This soil has poor potential for most urban use. Moderately slow permeability, slope, moderate shrink-swell potential, and low strength are severe limitations. The soil is suitable as homesites if sewers are available and soil properties are considered in the design and installation of foundations.

The capability subclass is VIe. The woodland group is 4c.

CpD3—Collegedale clay, 12 to 25 percent slopes, severely eroded. This moderately steep, plastic clay is mainly on the narrow sides of low ridges. It is deep and well drained. It is underlain by limestone. Areas are 3 to 25 acres.

Typically, the 7-inch surface layer, which is mostly subsoil material exposed by erosion, is strong brown clay. The clay subsoil extends to a depth of 64 inches. It is yellowish red mottled in shades of brown in the upper part and is mottled yellowish red, light yellowish brown, and yellowish brown in the lower part.

This soil is strongly acid or very strongly acid except where limed. It is low in natural fertility. Permeability is moderately slow. Available water capacity is medium. The clayey surface layer restricts the infiltration of water and the growth of roots.

Included with this soil in mapping are a few areas of a similar soil that is less than 60 inches deep over limestone. Also included are areas where rock crops out. In nearly every field there are small areas of soils that have a brown silt loam surface layer.

This soil has poor potential for row crops and poor to fair potential for small grains, hay, and pasture. Its potential is limited by the slope, the clayey surface layer and subsoil, moderately slow permeability, high runoff, medium available water capacity, and outcrops of limestone. Compensating for these limitations is almost impossible.

The soil features mentioned in the preceding paragraph and the moderate shrink-swell potential cause this soil to have poor potential for urban use.

The capability subclass is VIe. The woodland group is 4c.

CrC—Collegedale-Rock outcrop complex, 5 to 20 percent slopes. This rolling to hilly complex consists of small areas of Collegedale soils and dolomite and limestone outcrops so intermingled that they could not be mapped separately (fig. 8). Areas range from 3 to 150 acres.

The Collegedale soils make up about 60 to 80 percent of each mapped area. Typically, the surface layer is brown silt loam 5 inches thick. The subsoil extends to a depth of 64 inches. It is yellowish red clay mottled with brown in the upper part and mottled yellowish red, light yellowish brown, and yellowish brown clay in the lower part.

The Collegedale soils are low in natural fertility and are strongly acid or very strongly acid. The available water capacity is medium. Permeability is moderately slow. The clay subsoil restricts roots and the movement of water.

Rock outcrop covers about 15 to 30 percent of the area. Most outcrops protrude 1 to 3 feet above the surface.

Included with this complex in mapping are small areas of soils that have a brown silt loam surface layer and a yellowish red clay subsoil and are a few inches to 60 inches deep over bedrock.

The soils in this complex have poor potential for farming and urban use. Their potential is limited by the numerous rock outcrops, the clayey subsoil that shrinks and swells, the medium available water capacity, and the moderately slow permeability.

The capability subclass is VIs. The woodland group is 4x.

CrE—Collegedale-Rock outcrop complex, 20 to 35 percent slopes. This hilly to steep complex consists of small areas of Collegedale soils and dolomite and limestone outcrops so intermingled that they could not be mapped separately. It is on hillsides and the sides of ridges. Areas commonly are 3 to 30 acres. A few range up to 200 acres.

The Collegedale soils make up 60 to 80 percent of each mapped area. Typically, the surface layer is brown silt loam 5 inches thick. The subsoil extends to a depth of 64 inches. The upper part is yellowish red clay. Mottles in shades of brown occur between depths of 18 and 26 inches. The lower part of the subsoil is mottled yellowish red, light yellowish brown, and yellowish brown clay.

The Collegedale soils are strongly acid or very strongly acid. They are low in natural fertility and medium in available water capacity. Permeability is moderately slow. The clay subsoil restricts roots and the movement of water.

Rock outcrop covers 15 to 30 percent of the area. Most outcrops protrude 1 to 3 feet above the surface.

Included in mapping, near the Rock outcrop, are small areas of soils that have a brown silt loam surface layer and a yellowish red clay subsoil and are a few inches to 60 inches deep over bedrock. Also included are a few areas where slopes are steeper and a few areas where the surface layer is cherty.

The soils in this complex have poor potential for farming and urban use. The steep slopes, the numerous rock outcrops, the clayey subsoil that shrinks and swells, and the moderately slow permeability are soil features that are difficult to overcome.

The capability subclass is VIIs. The woodland group is 4x.

CyD—Cynthiana flaggy silty clay loam, 10 to 35 percent slopes. This shallow, moderately steep to steep soil is on hillsides. It formed in residuum of interbedded limestone and shale. Numerous flagstones are on the surface and in the soil. Areas range from 5 to 200 acres.

Typically, the 1-inch surface layer is very dark grayish brown flaggy silty clay loam. The subsoil is layers of light olive brown, dark yellowish brown, and yellowish brown flaggy clay to a depth of 12 inches. The underlying material is dark brown flaggy silty clay. Interbedded limestone and shale bedrock is 19 inches below the surface.

This soil is slightly acid to mildly alkaline. The available water capacity is low, and natural fertility is medium. Permeability is moderately slow.

Included in mapping are small areas of limestone rock outcrop. Also included are a few areas of a similar soil

Figure 8.—This area of Collegedale-Rock outcrop complex, 5 to 20 percent slopes, is used as native pasture.

that formed mainly in material weathered from shale and is strongly acid or medium acid.

This soil has poor potential for farming and urban use. The shallowness over bedrock, the clayey subsoil, the moderately slow permeability, and the moderately steep slopes are limitations that are difficult to overcome.

The capability subclass is VIIs. The woodland group is 4d.

DeC—Dewey silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil formed in a thin layer of alluvium and several feet of residuum of dolomite. Most areas occupy the broad tops of low ridges. Areas are commonly less than 15 acres. A few are more than 30 acres.

Typically, the 6-inch surface layer is dark brown silt loam. The subsoil extends to a depth of more than 62

inches. It is dark red clay in the upper part and red clay in the middle and lower parts.

This soil has medium available water capacity and medium natural fertility. Air and moisture easily enter and pass through the plow layer, but further movement is slowed by the clayey subsoil. The soil is strongly acid except where limed. Permeability is moderate.

Included with this soil in mapping are small areas of a soil that is dark reddish brown, friable silt loam or silty clay loam to a depth of about 40 inches.

This soil has fair potential for row crops and good potential for small grains, hay, and pasture. Its potential for row crops is limited by the slope and by the smallness and irregular shape of areas.

The potential for most urban uses is fair to good. The main limitations are the moderate shrink-swell potential, the clayey subsoil, and the slope. Good design and proper installation of foundations for roads and building sites can compensate for these limitations.

The capability subclass is IIIe. The woodland group is 3o.

DeD—Dewey silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil formed in a foot or two of alluvium and several feet of residuum over dolomite. It occurs as small irregularly shaped tracts on short hillsides. Most areas are less than 20 acres. A few are larger than 50 acres.

Typically, the 6-inch surface layer is dark brown silt loam. The subsoil extends to a depth of more than 62 inches. It is dark red clay to a depth of 17 inches and red clay below that depth.

This soil has medium natural fertility and medium available water capacity. The surface layer is permeable to air, roots, and moisture. Air and moisture easily enter and pass through the plow layer, but further movement is slowed by the clayey subsoil. Permeability is moderate. The soil is strongly acid except where limed.

Included with this soil in mapping are a few areas of a soil that is similar to this soil but is loamy in the upper 20 inches of its subsoil.

This soil has poor potential for row crops mainly because of the moderately steep slopes. Row crops can be grown, however, under management that includes minimum tillage or stripcropping. The potential is good for hay and pasture. All grasses and legumes adapted to the area grow well. The potential is fair for small grains.

The potential for urban use is poor to fair. Slope and moderate shrink-swell potential are the main limitations.

The capability subclass is IVe. The woodland group is 3o.

DgD3—Dewey silty clay loam, 12 to 25 percent slopes, severely eroded. This deep, well drained, moderately steep soil is on the sides of hills and ridges below the sloping Dewey soils. Areas range from 2 to about 20 acres.

The surface layer, which is mostly subsoil material exposed by erosion, is dark red silty clay loam 7 inches thick. The subsoil extends to a depth of more than 62 inches. It is dark red clay to a depth of about 12 inches and firm red clay below that depth.

This soil is medium to low in natural fertility and has medium available water capacity. The growth of roots and the movement of air and water into and through the soil are slowed by the clayey texture. Permeability is moderate. The soil is strongly acid throughout except where limed.

Included with this soil in mapping are a few small uneroded areas of a soil that has a dark brown surface layer. A few shallow gullies have formed in some areas.

This soil has poor potential for row crops and fair potential for small grains, pasture, and hay crops. Its potential is limited by the moderately steep slopes, the clayey surface layer, and small odd-shaped areas. The soil responds well to the management needed in growing grasses and legumes for hay and pasture.

This soil has poor to fair potential for urban use. Slope and moderate shrink-swell potential are the main limitations. The less steep areas can be used for houses. Care is needed in the layout of roads and in the design and installation of foundations for buildings and roads. The steepness of slope is a severe limitation for large industrial buildings.

The capability subclass is VIe. The woodland group is 4c.

DuC—Dunmore silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on uplands. It formed in residuum of dolomite. Areas are commonly less than 15 acres but range up to almost 60 acres.

Typically, the surface layer is dark grayish brown and yellowish brown silt loam about 11 inches thick. The subsoil extends to a depth of more than 62 inches. It is yellowish red silty clay loam and silty clay in the upper part and red clay in the lower part. The lower part is mottled in shades of brown.

This soil is low in natural fertility and is strongly acid or very strongly acid. The available water capacity is medium, and permeability is moderate.

Included with this soil in mapping are a few small areas of a similar soil that has a dark brown surface layer. Also included are small areas of a soil that is cherty throughout but is otherwise similar to this soil.

This soil has fair potential for row crops and good potential for small grains, hay crops, and pasture. Its potential is limited by the slope, the clayey subsoil, and the irregular shape of many of the small areas.

This soil has fair potential for urban use. The main limitations are the clayey subsoil, the moderate shrink-swell potential, and the slope. Any one of these limitations can cause failures. Good design and proper installation of foundations are needed for houses and roads.

The capability subclass is IIIe. The woodland group is 3o.

DuD—Dunmore silt loam, 12 to 25 percent slopes. This deep, moderately steep, well drained soil is on uplands. It formed in residuum of dolomite. Areas are commonly less than 20 acres but range up to about 40 acres.

Typically, the 11-inch surface layer is dark grayish brown and yellowish brown silt loam. The subsoil extends to a depth of 62 inches. It is yellowish red silty clay loam and silty clay in the upper part and red clay in the lower part. The lower layers are mottled in shades of brown.

This soil is low in natural fertility and is strongly acid or very strongly acid. The available water capacity is medium. Permeability is moderate.

Included with this soil in mapping are a few severely eroded spots that have a yellowish red and red clayey surface layer. Also included are a few small areas of a similar soil that is cherty.

This soil has poor potential for row crops and fair to good potential for small grains and for hay and pasture. The main limitations are slope and the clayey subsoil. Row crops can be grown if erosion control is adequate, including such practices as stripcropping and minimum tillage.

This soil has poor to fair potential for urban use. The slope, the clayey subsoil, and the moderate shrink-swell potential are the main limitations. Areas that are not too steep are suitable for houses if foundations are carefully designed and installed. The steepness of slope is a severe limitation for large industrial buildings.

The capability subclass is IVe. The woodland group is 3o.

Em—Emory silt loam, 0 to 4 percent slopes. This deep, well drained, nearly level to gently sloping soil is along drainageways, on foot slopes, and in depressions. It formed in local alluvium. Areas range from 2 to about 25 acres.

Typically, the 9-inch surface layer is dark brown silt loam. The subsoil is dark reddish brown silt loam in the upper part and reddish brown silty clay loam in the lower part. At a depth of 36 inches is an old buried soil that extends to more than 60 inches. It is reddish brown silty clay loam.

This soil has high natural fertility, is medium to strongly acid, and has a high available water capacity. Permeability is moderate. Runoff is slow to medium. Several areas are occasionally flooded. Water stands on some of these areas for a few hours after heavy rains.

Included with this soil in mapping are a few small areas of a similar soil that contains numerous chert pebbles. Also included are a few small tracts of a light colored soil.

This soil has good potential for farming. Its main limitation is the small size and irregular shape of areas. Water ponds in depressions, but the ponding can be corrected where it is feasible to provide outlets. This is one of the most fertile soils in the county. It is suited to all crops commonly grown, and it is especially well suited to garden crops (fig. 9).

This soil has poor potential for most urban uses. Low areas are susceptible to flooding and ponding for a few hours after heavy rains. Areas of sufficient size that are not subject to flooding or ponding are well suited to urban use.

The capability class is I. The woodland group is 2o.

EtB—Etowah silt loam, 2 to 5 percent slopes. This deep, well drained, gently sloping soil is on stream terraces and on benches in the uplands. It formed in alluvium or colluvium. Individual areas range from 2 to 76 acres, but most are less than 10 acres.

Typically, the surface layer is dark brown silt loam 6 inches thick. The subsoil, which extends to about 62 inches, is reddish brown and yellowish red silty clay loam in the upper part and red silty clay loam and clay loam in the lower part.

This soil is easy to work and to keep in good tilth. Natural fertility is moderately high, the root zone is deep and well aerated, and the available water capacity is high. Permeability is moderate. The soil is medium to strongly acid.

Included with this soil in mapping are a few areas in depressions and along drainageways where the soil has a dark reddish brown and reddish brown surface layer and subsoil. Also included in uplands are a few areas of a soil that has a red and dark red clay subsoil.

This soil has good potential for farming and for urban use. Slope is the main limitation. The soil is well suited to all crops commonly grown in the county, including alfalfa, tobacco, corn, small grains, and vegetables and grasses and legumes for hay and pasture.

The capability subclass is IIe. The woodland group is 2o.

EtC—Etowah silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on terraces along streams and on benches in the uplands. It formed in alluvium or colluvium. Areas range from 2 to 45 acres, but most are less than 10 acres.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil, which extends to a depth of 62 inches or more, is reddish brown, yellowish red, and red silty clay loam and clay loam. Below this is limestone or dolomite.

This soil is easy to work and to keep in good tilth. It is medium acid or strongly acid. The available water capacity is high. Natural fertility is moderately high. The root zone is deep and is well aerated.

Included with this soil in mapping are small areas of a similar soil that has slope of less than 5 percent. Also included are small areas in depressions and along drainageways where the soil has a reddish brown or dark reddish brown surface layer and subsoil.

This soil has fair potential for row crops and good potential for hay and pasture. The slope and the

Figure 9.—The garden to the right of the house is in an area of Emory silt loam, 0 to 4 percent slopes, which is one of the most fertile soils in the county. Lehew soils are on the wooded ridge in the background.

smallness and irregular shape of areas are the main limitations. Row crops can be grown in rotations. Stripcropping or minimum tillage is needed. The soil is especially well suited to all of the commonly grown grasses and legumes.

This soil has good potential for urban use. Slope is the main limitation. For houses and roads, good design and installation can compensate for the slope.

The capability subclass is IIIe. The woodland group is 2o.

FuC—Fullerton cherty silt loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on rolling ridgetops. It formed in residuum of dolomite. Areas range from about 2 to 160 acres, but most are less than 50 acres.

Typically, the surface layer is brown cherty silt loam 7 inches thick. It overlies a 5-inch layer of strong brown cherty silt loam. The subsoil extends to a depth of more than 64 inches. It is strong brown cherty silt loam in the upper part and yellowish red cherty silty clay and cherty clay in the lower part.

This soil is low in natural fertility and has a medium available water capacity. It is strongly acid or very strongly acid throughout except where the surface layer is limed. Permeability is moderate. Runoff is medium.

Included with this soil in mapping are a few areas of severely eroded Fullerton soils that have a surface layer of yellowish red cherty silty clay loam. Also included are spots of a similar soil that is not cherty and of a similar soil that has a sandy loam surface layer and is clay loam in the upper part of the subsoil.

This soil has fair potential for small grain, pasture, and hay crops. It has poor potential for row crops. The slope, low fertility, and droughtiness, the location atop hills and ridges, and the fact that the soil is difficult to work are limitations to cropland use.

This soil has fair potential for urban development. It is a suitable soil for homesites even though the chert is a problem on lawns. If well designed and installed, septic tank absorption systems function adequately. In places, deep cutting is needed for foundations for commercial

buildings. In a few places, deep cutting is hindered by large chert boulders or bedrock pyramids.

The capability subclass is IIIe. The woodland group is 3o.

FuD—Fullerton cherty silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil formed in residuum of dolomite. It is on hillsides and on fairly narrow ridgetops. Areas range from 2 to more than 200 acres.

Typically, the 7-inch surface layer is brown cherty silt loam. It overlies 5 inches of strong brown cherty silt loam. The subsoil is strong brown cherty silt loam in the upper part and yellowish red and red cherty silty clay and cherty clay in the lower part.

This soil has medium available water capacity and low natural fertility. It is strongly acid or very strongly acid except where limed. Permeability is moderate. Runoff is medium.

Included with this soil in mapping are a few areas of a soil that has a dark brown surface layer and a friable, reddish subsoil. Also included are a few severely eroded spots of Fullerton soils where the surface layer is yellowish red cherty silty clay loam and a few areas of a soil that has a sandy loam surface layer and is clay loam in the upper part of the subsoil.

This soil has poor potential for row crops and small grains. It has fair potential for hay crops and pasture (fig. 10). Its potential is limited by slope, low natural fertility, and droughtiness. Good yields of grasses and legumes for hay and pasture can be produced under good management, which includes fertilizing and liming, timely clipping, and controlled grazing.

Figure 10.—Pasture in an area of Fullerton cherty silt loam, 12 to 25 percent slopes.

This soil has poor to fair potential for most urban uses. Slope is the main limitation. The less steep slopes are suitable for homesites. If well designed and installed, septic tank absorption systems function satisfactorily. Chert on the surface is a problem on lawns. The soil is too steep for large commercial buildings because deep cuts and grading would be required for foundations.

The capability subclass is IVe. The woodland group is 3o.

FuE—Fullerton cherty silt loam, 25 to 45 percent slopes. This deep, well drained, steep soil is on the sides of ridges and hills. It developed in residuum of dolomite. Areas are commonly less than 50 acres but range to more than 200 acres.

Typically, the 7-inch surface layer is brown cherty silt loam. It overlies a 5-inch layer of strong brown cherty silt loam. The subsoil, which extends to a depth of more than 64 inches, is strong brown cherty silt loam in the upper part and yellowish red and red cherty silty clay and cherty clay in the lower part.

This soil is strongly acid or very strongly acid. It is low in natural fertility. Runoff is medium, and permeability is moderate. The available water capacity is medium. On the average, the soil contains more chert than other phases of the Fullerton soils.

Included with this soil in mapping are a few areas of a soil that has a dark brown surface layer and a reddish, friable subsoil. Also included are a few areas of a soil that has many chert fragments in the upper 20 inches of the subsoil and small tracts of a soil that has a sandy loam surface layer and is clay loam in the upper part of the subsoil.

This soil has poor potential for farming and for urban use. It is too steep for most uses. Fair yields of pasture plants can be grown in areas that are not too steep for the use of farm machinery. In most areas this soil is best suited to forest.

The capability subclass is VIIe. The woodland group is 3r.

GaC—Gilpin silt loam, 5 to 20 percent slopes. This moderately deep, well drained, rolling to hilly soil formed in residuum of shale and siltstone. It is on mountain uplands.

Typically, the 6-inch surface layer is very dark grayish brown and light yellowish brown silt loam. The subsoil, which extends to a depth of 29 inches, is yellowish brown silt loam in the upper part and yellowish brown shaly silty clay loam in the middle and lower parts. The lower part is mottled in shades of red and gray. Weakly consolidated shale is at a depth of about 29 inches.

This soil is low in natural fertility and has a moderately deep root zone. Unless limed, it is strongly acid to extremely acid. The available water capacity is medium, and permeability is moderate.

Included with this soil in mapping are a few areas of a similar soil that has appreciably more sand throughout. Also included are small areas of a similar soil that has a shaly silt loam subsoil and a few areas of a soil that is more than 40 inches deep over bedrock.

This soil has poor to fair potential for row crops. Its potential is limited by slope, moderate depth, and low fertility. It has fair potential for small grains, hay, and pasture crops.

The potential for urban use is poor to fair. Slope and moderate depth are the main limiting features. Where sanitary sewers are available, good design and installation of adequate foundations for houses and roads can largely compensate for these limitations.

The capability subclass is IIIe. The woodland group is 3o.

GdC—Gladeville-Rock outcrop complex, 5 to 20 percent slopes. This complex consists of small areas of Gladeville soils and limestone outcrop so intermingled that they could not be mapped separately. It is on broad and low rolling and hilly uplands.

The Gladeville soils make up 50 to 65 percent of each mapped area. Typically, the surface layer is very dark grayish brown flaggy silty clay loam about 6 inches thick. The underlying material is brown very flaggy clay. Limestone bedrock is at a depth of 9 inches.

These soils are high in natural fertility but have low available water capacity. They are neutral through moderately alkaline. Permeability is moderate. The root zone is shallow.

Rock outcrop covers 20 to 50 percent of the area. Most outcrops protrude a few inches to about 1 foot above the surface.

Included with this complex in mapping are a few areas of a severely eroded soil that does not have a dark surface layer. Also included are a few spots where the soil is more than 12 inches deep over limestone bedrock.

This complex has poor potential for farming and for urban use. Compensating for the shallow soil and closely spaced limestone outcrops is difficult, if not impossible.

The capability subclass is VIIs. The woodland group is 5x.

GeB—Greendale silt loam, 1 to 6 percent slopes. This deep, well drained, gently sloping soil occurs as long narrow strips along drainageways and on foot slopes. It formed in local and general alluvium that washed and rolled mainly from soils underlain by dolomite. Areas range from 2 to 26 acres.

Typically, the 7-inch surface layer is brown silt loam. The subsoil, to a depth of 28 inches, is dark yellowish brown silt loam. It is underlain by a buried soil. This buried soil has a surface layer that is dark brown loam and a subsoil that is yellowish brown loam and dark yellowish brown silt loam to a depth of 60 inches.

This soil is medium in natural fertility and has a high available water capacity. It is medium acid to strongly

acid throughout in unlimed areas. Permeability is moderate. Water stands in some low areas for a few hours after long or intense storms.

Included with this soil in mapping are a few small areas of a similar soil that contains chert fragments in each horizon. Also included are a few areas of a soil that has a dark brown surface layer and a few strips of a soil that is moderately well drained.

This soil has good potential for farming. Because it occurs as small irregularly shaped areas, it is mostly farmed the same as adjoining soils. High yields of all crops adapted to the survey area can be produced. Areas that are not ponded after rains are excellent for speciality crops such as tobacco and vegetables.

This soil has poor potential for urban use because of the occasional ponding and the runoff from adjacent slopes. Areas that are not subject to these problems are suitable for homesites. If properly designed and installed, septic tank absorption systems function adequately. Most areas are too small for large industrial buildings.

The capability class is I. The woodland group is 2o.

GrE—Grimsley stony loam, 15 to 50 percent slopes. This deep, well drained, moderately steep to steep soil is in coves and on the lower mountainsides. It formed in material washed and rolled from soils underlain by sandstone and shale. Areas range from 2 to 170 acres.

Typically, the surface layer is dark grayish brown and light yellowish brown stony loam 6 inches thick. The subsoil extends to a depth of 50 inches. It is yellowish brown very stony loam in the upper part and strong brown very stony loam in the lower part. The underlying material is yellowish brown very stony sandy loam. It is underlain by shale bedrock at a depth of 58 inches.

This soil is strongly acid or very strongly acid. It is low in natural fertility and in available water capacity. Permeability is moderately rapid. There are so many cobbles and stones on the surface and in the soil that tillage is impractical.

Included with this soil in mapping are a few areas where there are only a few stones. Included along drainageways are a few narrow strips of soils that are more than 60 inches deep over bedrock. Included along the perimeter of the mapped areas are a few narrow strips where the subsoil is silt loam.

This soil has poor potential for farming and for urban use. It is too cobbly or stony and, in most places, too steep for any use except for forest, recreation, or wildlife habitat.

The capability subclass is VIIs. The woodland group is 3x.

Ha—Hamblen silt loam. This deep, moderately well drained, nearly level soil formed in recent alluvium on flood plains. Areas range from 2 to about 100 acres.

Typically, the 8-inch surface layer is brown silt loam. The subsoil extends to a depth of 34 inches. It is brown silt loam mottled in shades of brown and gray. The underlying material to a depth of 60 inches is yellowish brown gravelly silt loam mottled in shades of gray and brown.

This soil is medium acid to neutral. It is high in natural fertility and has a high available water capacity. Permeability is moderate. Most areas are flooded after heavy, prolonged rains.

Included with this soil in mapping are a few small tracts of somewhat poorly drained soils on bottom land and a few areas of well drained soils.

This soil has good potential for farming. It is well suited to corn, soybeans, and most pasture and hay plants. Occasional flooding in most areas and excess water in the soil late in winter and early in spring are the main limitations.

This soil has poor potential for urban use because of wetness and flooding.

The capability subclass is IIw. The woodland group is 2w.

HoB—Holston loam, 2 to 5 percent slopes. This deep, well drained, gently sloping soil formed in old alluvium. It is on terraces along the larger streams. Areas range from 2 to about 35 acres, but most are less than 12 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil to a depth of 60 inches is yellowish brown loam in the upper part and strong brown clay loam in the middle and lower parts. The middle and lower parts are mottled in shades of brown and red.

This soil is low in natural fertility and is strongly acid or very strongly acid. The available water capacity is high. Permeability is moderate.

Included with this soil in mapping are a few small areas of a similar soil that has a fragipan. Also included are a few small tracts of a similar soil that contains numerous pebbles in the surface layer and the subsoil.

This soil has good potential for row crops, but it is limited for cropland use because it commonly occurs as small areas adjacent to steeper soils. Slope and low fertility are also limitations, but both can be easily overcome by good management practices. This soil has good potential for small grains, hay crops, and pasture. It is suited to all the grasses and legumes commonly grown in the county.

This soil has good potential for most urban uses. Slope is a slight limitation. Good design and installation procedures are needed.

The capability subclass is IIe. The woodland group is 3o.

HoC—Holston loam, 5 to 12 percent slopes. This deep, well drained, sloping soil is on terraces and benches. It formed in old alluvium washed from soils underlain by sandstone, shale, limestone, and dolomite. Areas commonly are less than 15 acres but range from 2 to about 30 acres.

Typically, the surface layer is brown loam about 8 inches thick. The upper 4 inches of the subsoil is yellowish brown loam. The rest, to a depth of 60 inches, is strong brown clay loam. The middle and lower parts are mottled in shades of brown and red.

This soil is low in natural fertility and is strongly acid or very strongly acid. The available water capacity is high. Permeability is moderate.

Included with this soil in mapping are a few small areas of a soil that is similar but has a mottled layer about 24 to 30 inches below the surface. Also included are a few areas of a soil that contains numerous pebbles.

This soil has fair potential for row crops and small grains and high potential for hay crops and pasture. Its potential for row crops and small grains is limited by slope and the small size of areas and in some places by the steep slopes of adjacent soils.

The potential for urban use is good. Good design and and correct installation can largely compensate for the slope, which is the limiting feature. Deep cuts are needed in some areas for large commercial buildings.

The capability subclass is IIIe. The woodland group is 3o.

JeC—Jefferson loam, 5 to 12 percent slopes. This sloping soil is on benches and foot slopes below the steep linear ridges that transect the valley and on gentle slopes at the base of mountains (fig. 11). It is deep and well drained. It formed in colluvium from soils underlain by sandstone and shale. Areas range from 2 to about 50 acres.

Typically, the surface layer is dark grayish brown and yellowish brown loam 7 inches thick. The subsoil, to a depth of 58 inches, is strong brown. It is loam in the upper part and clay loam in the lower part. The underlying material is strong brown clay loam that extends to a depth of 66 inches or more. The surface layer and subsoil are 5 to 10 percent pebbles.

This soil has good tilth and is easy to work. It is low in natural fertility. It is strongly acid or very strongly acid throughout except where the surface layer is limed. The

Figure 11.—The area of Jefferson loam, 5 to 12 percent slopes, in the foreground is used for hay and garden crops. Muskingum and Gilpin soils are in the mountainous area.

available water capacity is high. Permeability is moderately rapid.

Included with this soil in mapping are a few areas of a soil that has a reddish subsoil. Also included are a few areas of a similar soil that contains numerous pebbles.

This soil has fair potential for row crops and small grains. Its potential is limited by slope and by the irregular shape of small areas. The soil has good potential for hay and pasture. It is suited to all plants adapted to the local climate.

This soil has good potential for most urban uses. Slope is the main limitation, but it can be easily overcome for the common uses, such as for houses and roads, by good design and installation of foundations.

The capability subclass is IIIe. The woodland group is 3o.

JeD—Jefferson loam, 12 to 25 percent slopes. This moderately steep soil is at the base of the steep linear ridges that transect the valley and on benches and foot slopes below steep mountain slopes. It is deep and well drained. It formed in material washed and rolled from adjacent slopes underlain by sandstone and shale. Areas range from 2 to about 25 acres.

Typically, the surface layer is dark grayish brown and yellowish brown loam 7 inches thick. The subsoil extends to a depth of 58 inches. It is strong brown loam in the upper part and strong brown clay loam in the lower part. The underlying material to a depth of 66 inches is strong brown clay loam. The surface layer and subsoil are 5 to 10 percent pebbles.

This soil is easy to work and has good tilth. It is low in natural fertility. Except where limed, it is strongly acid or very strongly acid throughout. Permeability is moderately rapid, and the available water capacity is high.

Included with this soil in mapping are a few small areas of a soil that contains numerous pebbles.

This soil has poor potential for row crops. It is suited to row crops only if they are grown under stripcropping or minimum till systems or in a 5- to 6-year rotation. It has fair potential for small grains and for hay and pasture. Its potential is limited by slope and the small size of areas and by the steep slope of adjacent areas.

The potential for urban use is poor to fair. Slope is the main limitation. Good design and installation of foundations for buildings and roads are needed. Where this soil occurs below steep slopes, soil slides are a high risk if cuts are made across the slope.

The capability subclass is IVe. The woodland group is 3r.

JgC—Jefferson gravelly loam, 5 to 12 percent slopes. This sloping soil is deep and well drained. It is on benches and foot slopes at the base of steep ridges and mountains. It formed in sediments moved downslope from soils underlain by sandstone and shale. Areas commonly are less than 20 acres but range to about 40 acres.

Typically, the surface layer is dark grayish brown and yellowish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of 58 inches. It is strong brown gravelly loam in the upper part and strong brown gravelly clay loam in the lower part. The underlying material to a depth of 66 inches is strong brown gravelly clay loam. Pebbles make up about 20 percent of the surface layer and 25 percent of the subsoil.

The gravel makes this soil slightly droughty and hinders the use of farm machinery. The available water capacity is medium. The soil is strongly acid or very strongly acid in all parts except where the surface layer is limed. It is low in natural fertility. Permeability is moderately rapid.

Included with this soil in mapping are a few small areas where there are no or few pebbles. Some fields have a few eroded spots where the surface layer is yellowish clay loam.

This soil has fair to poor potential for row crops. Its potential is limited by slope and by gravel. Row crops such as corn and soybeans can be grown, but even under good management, yields are medium. The potential for small grains, hay, and pasture is fair.

The potential for most urban use is good. Slope and gravel are the main limitations. Good planning, design, and installation can compensate for the slope. In addition to making the soil droughty, the gravel is a problem in caring for lawns.

The capability subclass is IIIe. The woodland group is 3o.

JgD—Jefferson gravelly loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil is on benches and foot slopes. It formed in sediments washed from steep ridge and mountain slopes. Areas are commonly less than 20 acres but range from 2 to about 30 acres.

Typically, the surface layer is dark grayish brown and yellowish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of 58 inches. It is strong brown gravelly loam in the upper part and strong brown gravelly clay loam in the lower part. The underlying material is strong brown gravelly clay loam that extends to a depth of 66 inches. Pebbles make up about 20 percent of the surface layer and 25 percent of the subsoil.

This soil is low in natural fertility. It is strongly acid or very strongly acid throughout except where the surface layer is limed. The available water capacity is medium. Permeability is moderately rapid. The gravel in and on this soil makes the use of farm machinery difficult.

This soil has poor potential for row crops and small grains and fair potential for hay and pasture. The main limitations are the slope and the gravel.

The potential for urban use is poor to fair. Slope is the main limitation. The milder slopes are suitable for house sites, but the gravel is a problem in lawn management. Most of the acreage is too steep for large commercial buildings.

The capability subclass is IVe. The woodland group is 3r.

JgE—Jefferson gravelly loam, 25 to 45 percent slopes. This deep, well drained, steep soil is on foot slopes below steep ridge and mountain slopes. Areas are commonly between 4 and 20 acres but range from 2 to 70 acres.

Typically, the surface layer is dark grayish brown and yellowish brown gravelly loam 7 inches thick. The subsoil extends to a depth of 58 inches or more. It is strong brown gravelly loam in the upper part and strong brown gravelly clay loam in the lower part. The underlying material is strong brown gravelly clay loam that extends to a depth of 66 inches. Pebbles make up about 20 percent of the surface layer and 25 percent of the subsoil.

The available water capacity is medium. Natural fertility is low. The soil is strongly acid or very strongly acid. There is enough gravel in and on the surface layer to limit the use of farm machinery. Permeability is moderately rapid.

Included with this soil in mapping are a few small tracts of soils that are less than 60 inches deep over bedrock. Also included are a few areas of a similar soil that has no or few pebbles.

The potential for row crops, small grains, and hay is poor. The soil is too steep for row crops, and the slope and gravel cause difficulty in establishing and maintaining pasture. Fair yields of tall fescue, white clover, and orchardgrass can be grown under good management.

This soil has poor potential for urban use. It is too steep to provide suitable sites for houses, commercial buildings, and roads. It is likely to slide if deep cuts are made across slopes.

The capability subclass is VIe. The woodland group is 3r.

JmE—Jefferson-Grimsley complex, 20 to 50 percent slopes. This complex consists of small areas of the Jefferson and Grimsley soils so intermingled that they could not be mapped separately. These are deep, well drained, hilly and steep soils on benches and foot slopes and in coves.

Jefferson gravelly loam makes up about 35 to 65 percent of each mapped area. The surface layer is dark grayish brown and yellowish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of 58 inches. It is strong brown gravelly loam in the upper part and strong brown gravelly clay loam in the lower part. The underlying material is strong brown gravelly clay loam that extends to a depth of 66 inches. Pebbles make up about 20 percent of the surface layer and 25 percent of the subsoil.

Natural fertility is low. Available water capacity is medium. Permeability is moderately rapid. The soil is strongly acid or very strongly acid.

Grimsley stony loam makes up about 35 to 65 percent of each mapped area. It is mainly in coves but is also on some benches. Typically, the surface layer is dark grayish brown and light yellowish brown stony loam 6 inches thick. The subsoil extends to a depth of 50 inches. It is yellowish brown very stony loam in the upper part and strong brown very stony loam in the lower part. The underlying material is yellowish brown very stony sandy loam. Shale bedrock is at a depth of 58 inches.

This soil is strongly acid or very strongly acid. It is low in natural fertility and low in available water capacity. Stones and cobbles on and in the soil make up one-third to one-half of the volume. Permeability is moderately rapid.

Included with this complex in mapping at higher elevations are small areas of a soil that has a very dark gray and very dark grayish brown surface layer. Also included are a few areas of a similar soil that has few rock fragments.

The soils in this complex have poor potential for farming and for urban use. Stones and gravel and, in most places, steep slopes, are limitations that are difficult to overcome for these uses. Slides are a hazard if deep cuts are made across slopes.

The capability subclass is VIIe. The woodland group is 3r for Jefferson soil and 3x for Grimsley soil.

JSE—Jefferson soils, 20 to 50 percent slopes. This map unit consists of moderately steep and steep loamy soils in the Cumberland Mountains. It is mostly in coves and on the lower mountain slopes (fig. 12). It consists of Jefferson soils that have a wide range in stone content, ranging from few to about 35 percent by volume. Mapped areas range from 3 to more than 200 acres.

A typical area of this unit is about 50 percent Jefferson cobbly loam, 25 percent Jefferson gravelly loam, 15 percent Jefferson loam, and 10 percent Grimsley soils. Grimsley soils are mainly nearest the drainageways.

Typically, the surface layer of Jefferson soils is yellowish brown and light yellowish brown cobbly loam about 10 inches thick. The subsoil extends to a depth of about 58 inches. It is strong brown gravelly loam in the upper part and strong brown gravelly clay loam in the lower part. The underlying material extends to 66 inches. It is strong brown gravelly clay loam. The Jefferson soils in this unit are similar except for the size and amount of coarse fragments.

Jefferson soils are strongly acid or very strongly acid. Permeability is moderately rapid. Natural fertility is low. The available water capacity is ordinarily medium, but it is high for the nongravelly and noncobbly soils. In most areas Jefferson soils have enough coarse fragments on and in the soil to make tillage difficult. The larger part of this unit is too steep and too rough for farm machinery.

Included in mapping are small areas of a soil that is 20 to 40 inches deep over shale bedrock and has a silt loam subsoil. Also included is a soil that is more than 35 percent cobbles and stones.

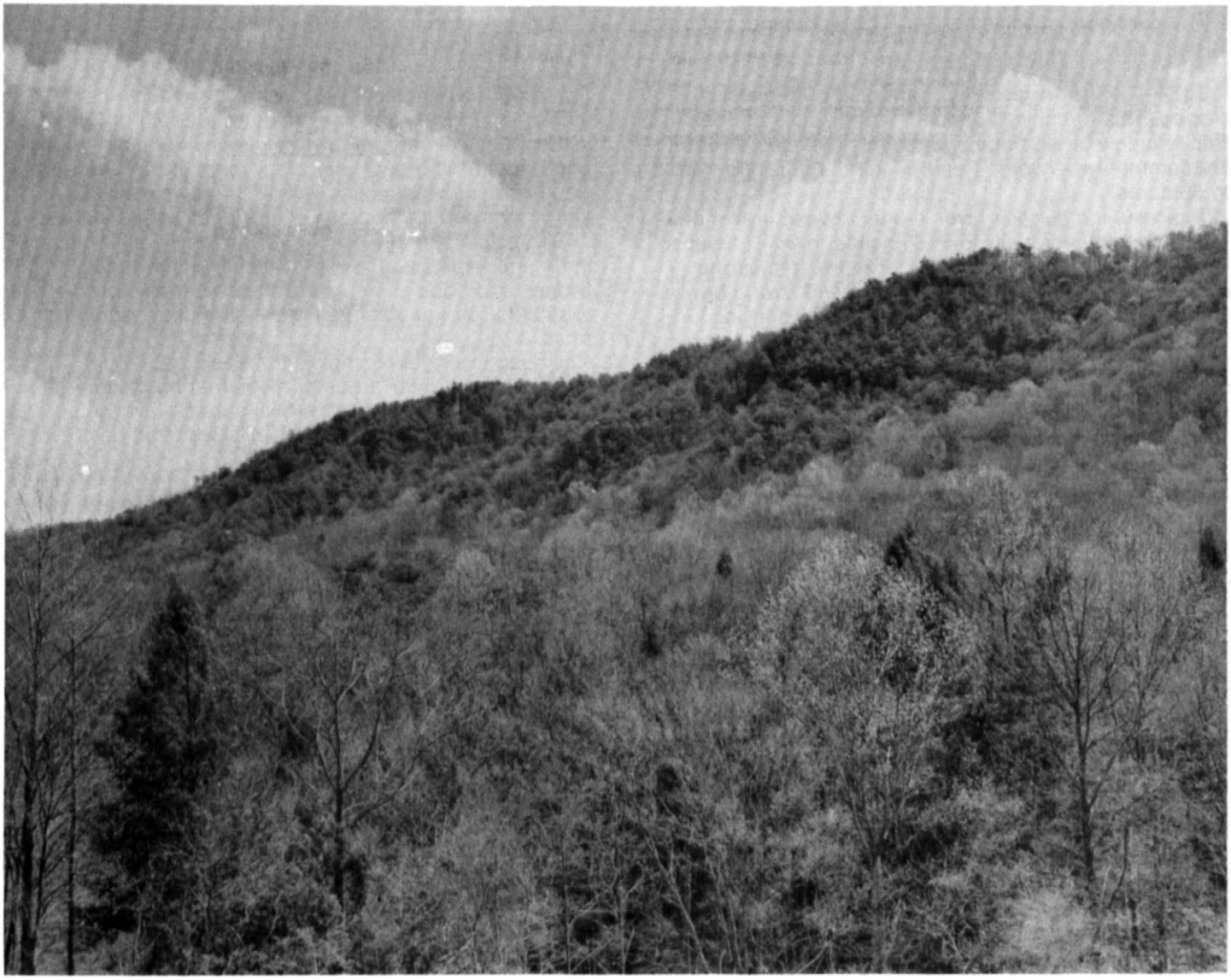


Figure 12.—The yellow-poplar trees in the foreground are in an area of Jefferson soils, 20 to 50 percent slopes. The wooded upper slope in the background is mainly Muskingum soils.

The Jefferson soils have poor potential for farming and for urban use. Most areas are too steep for farming and for homesites, commercial buildings, and roads.

The capability subclass is VIIe. The woodland group is 3r.

LeB—Leadvale silt loam, 2 to 7 percent slopes. This gently sloping, moderately well drained soil is at the base of hills and ridges underlain by shale. It has a fragipan. Areas commonly are less than 15 acres. A few are larger than 30 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to shale bedrock at a depth of 50 inches. The upper part is brownish yellow and yellowish brown silt loam and silty clay loam. The middle part, a firm, brittle, slowly permeable fragipan, is yellowish brown silty clay loam mottled in shades of gray and yellow. The lower part of the subsoil is mottled yellow and gray silty clay.

This soil is strongly acid or very strongly acid. It is low in natural fertility, low in organic matter content, and medium in available water capacity. The root zone is limited mainly to the 27 inches above the fragipan. This part of the soil is friable and is easily penetrated by roots. The fragipan restricts the movement of water through the soil.

Included with this soil in mapping are a few small tracts of a soil that does not have a fragipan but is otherwise similar. A similar soil that has gray mottles in the layer just below the surface layer is included in a few mapped areas.

This soil has good or fair potential for row crops and small grains and good potential for hay and pasture. In some places the potential is limited by the runoff from adjacent hills, the smallness of areas, and the proximity of this soil to steeper soils.

This soil has poor potential for some urban uses. For example, the use of this soil as septic tank absorption fields is severely limited by the slow permeability in the fragipan. The potential is fair for dwellings with sewers and for roads, streets, and recreation facilities. The perched water table is high enough during the rainy season to be a significant limitation. Some roads and streets break up late in winter and early in spring if they are not properly designed and constructed.

The capability subclass is IIe. The woodland group is 3o.

LhE—Lehew loam, 25 to 60 percent slopes. This moderately deep, steep soil is on linear ridges that are underlain by reddish sandstone and shale (fig. 13). It formed mainly in residuum of sandstone. Areas range from about 5 to more than 500 acres.

Typically, the surface layer is dark brown and reddish brown loam 7 inches thick. The reddish brown subsoil extends to a depth of 27 inches. It is channery loam in the upper part and very channery fine sandy loam in the

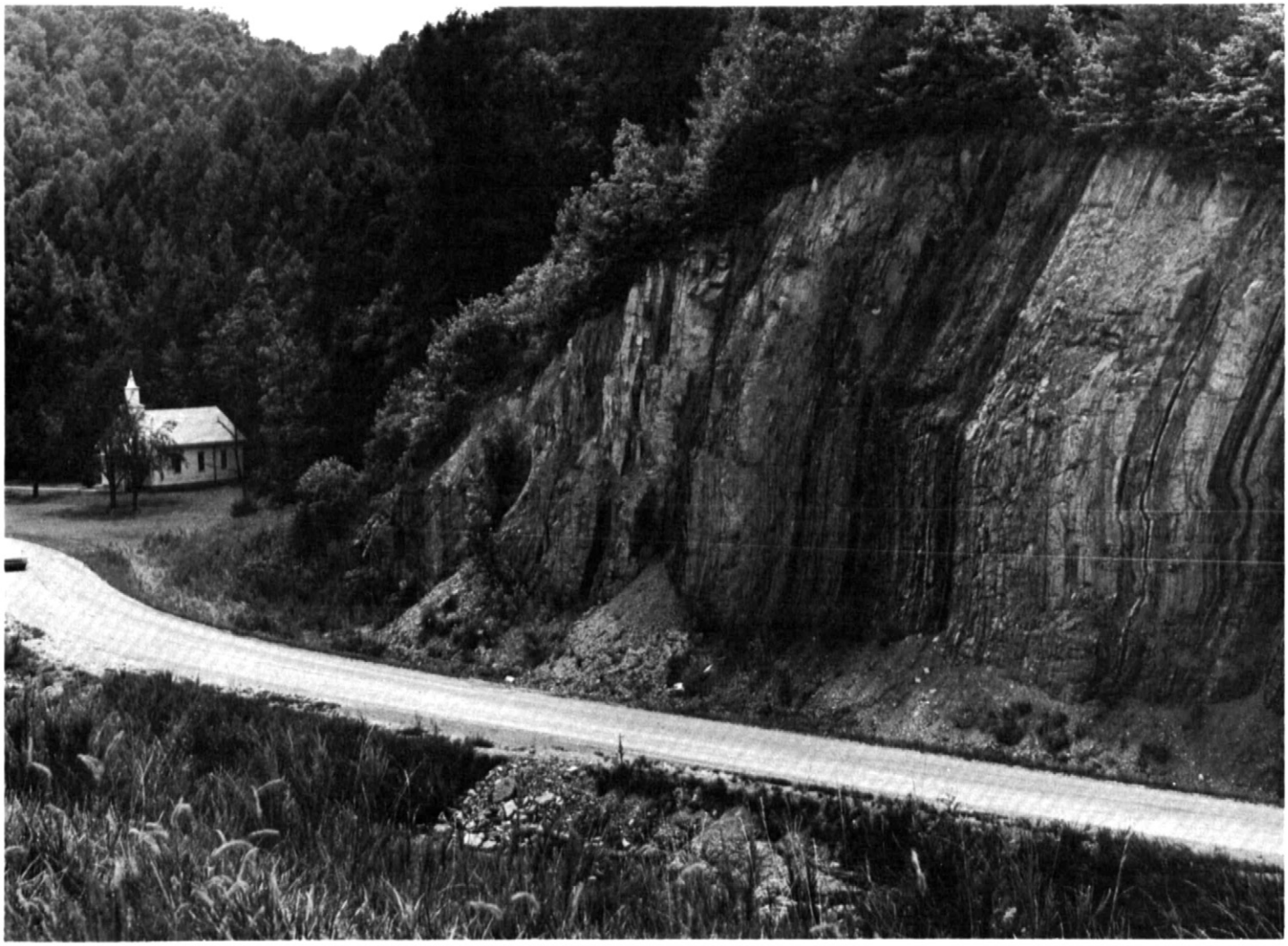


Figure 13.—This cut in an area of Lehew loam, 25 to 60 percent slopes, exposes the tilted, interbedded, multicolored shale and sandstone.

lower part. The underlying material is reddish brown very gravelly fine sandy loam. Bedrock is 36 inches below the surface.

This soil is low in natural fertility, low in organic matter content, and low in available water capacity. It is strongly acid or very strongly acid. Permeability is moderately rapid. Depth to bedrock is 20 to 40 inches.

Included with this soil in mapping are bands of a soil that is similar but is not reddish. Also included are a few narrow strips of a reddish soil that has a clayey subsoil and many limestone outcrops and a few areas of a soil that has a brown silt loam surface layer and a yellowish red silty clay subsoil.

This soil has poor potential for farming and urban use. It is limited by the steepness of slope, the low available water capacity, and the moderate depth to rock.

The capability subclass is VIIe. The woodland group is 4r.

LyC—Lily loam, 3 to 10 percent slopes. This moderately deep, well drained, gently sloping and sloping soil is on uplands that are underlain by sandstone. Areas range from 2 to about 50 acres.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil extends to a depth of about 33 inches. It is yellowish brown loam in the upper part, yellowish brown clay loam in the middle part, and yellowish brown loam in the lower part. The substratum is yellowish brown channery fine sandy loam that extends to bedrock at 39 inches.

This soil has good tilth and can be worked throughout a wide range of moisture conditions. It is very strongly acid. Natural fertility is low, but the available water capacity is high. The root zone is easily penetrated by the roots. Permeability is moderate.

Included in mapping are a few small areas of soils that have a silty clay loam subsoil and contain shale fragments. Also included are a few areas of a steeper soil that has a shaly silt loam subsoil.

This soil has good to fair potential for row crops and good potential for small grains and for hay and pasture crops. The small size and the shape of some areas limit the potential for row crops. The main limitations are the moderate depth over bedrock and the low natural fertility. Crops respond well to fertilizer and lime.

This soil has fair potential for most urban uses. Its main limitations are the moderate depth over bedrock and, in places, the slope. It is not deep enough for the efficient functioning of a septic tank absorption system.

The capability subclass is IIe. The woodland group is 4o.

MaC—Minvale silt loam, 3 to 15 percent slopes. This deep, well drained, sloping soil is on benches and foot slopes. It formed in material that moved downslope from soils underlain by dolomite. Areas are only 2 to 12 acres.

Typically, the 7-inch surface layer is brown silt loam. The subsoil extends to a depth of 62 inches. It is reddish yellow cherty silt loam in the upper part, yellowish red cherty silty clay loam in the middle part, and red cherty clay in the lower part. Mottles in shades of yellow and brown are in the lower part. Fragments of chert make up about 10 percent of the surface layer and 15 to 20 percent of the subsoil.

This soil is low in natural fertility. It has medium available water capacity. Permeability is moderate. The root zone is deep and is easily penetrated by the roots. The soil is strongly acid to very strongly acid throughout except where the surface layer is limed.

Included with this soil in mapping are small areas of a similar soil that has a sandy loam surface layer and a sandy clay loam subsoil. Also included are a few spots of another soil that is similar but has a dark brown surface layer.

This soil has fair potential for row crops but good potential for small grains, hay crops, and pasture. It is well suited to locally adapted grasses and legumes. Its potential for cultivated crops is limited by slope. Erosion is a moderate hazard. In addition, the small areas of this soil do not make up a whole field. Row crops can be grown under stripcropping or minimum tillage systems, which reduce runoff and control erosion.

This soil has good potential for urban use. Slope is a limitation for some uses, such as sites for large industrial buildings and playgrounds.

The capability subclass is IIIe. The woodland group is 3o.

McC—Minvale cherty silt loam, 3 to 15 percent slopes. This is a deep, well drained, sloping soil. It is on benches and foot slopes at the base of hills underlain by cherty dolomite. It formed in sediment washed and rolled from adjacent slopes. Areas range from 2 to about 30 acres, but most areas are less than 10 acres.

Typically, the surface layer is brown cherty silt loam about 7 inches thick. The subsoil extends to a depth of more than 62 inches. It is reddish yellow cherty silt loam in the upper part, yellowish red cherty silty clay loam in the middle part, and red cherty clay in the lower part. The lower part is mottled in shades of yellow and brown. Fragments of chert make up about 25 percent of the surface layer and 25 to 30 percent of the subsoil.

This soil has a deep root zone. Roots penetrate easily. Natural fertility is low. The available water capacity is medium. Permeability is moderate. The soil is strongly acid or very strongly acid except for the surface layer where limed.

Included with this soil in mapping are a few small areas of a soil that is similar but is less than 15 percent, by volume, fragments of chert in the surface layer. A few included soils have a cherty sandy loam surface layer and a sandy clay loam subsoil. Also included are a few spots of a very cherty soil on uplands.

This soil has fair potential for row crops such as corn and soybeans. Its potential is limited by slope, the chert fragments in the plow layer, the small size of most areas

and, in some places, the steep slopes of adjacent soils. Medium yields can be expected. The potential is good for small grains and pasture. Chert fragments on the surface interfere with harvesting hay crops. The soil is well suited to all the grasses and legumes commonly grown in the survey area.

The potential for urban use is good. Slope, the only significant limitation, can ordinarily be easily overcome by good design and installation procedures. The chert fragments cause a problem on lawns but are not a limitation for most uses.

The capability subclass is IIIe. The woodland group is 3o.

MhB—Monongahela loam, 2 to 5 percent slopes. This moderately well drained, gently sloping soil is on stream terraces. It has a fragipan. It formed in sediment washed from soils underlain by shale, sandstone, and limestone. Areas range from 2 to 115 acres, but most are less than 20 acres.

Typically, the surface layer is brown loam about 5 inches thick. The subsoil, to a depth of about 22 inches, is yellowish brown silt loam. It is mottled in shades of brown. The fragipan begins at 22 inches and extends to 41 inches. It is yellowish brown, firm and brittle silt loam mottled in shades of gray and brown. The underlying material is mottled in shades of gray and brown. It is clay loam and extends to a depth of more than 62 inches.

This soil is low in natural fertility. It is strongly acid or very strongly acid except where limed. It is low in organic matter content. The available water capacity is medium. Permeability is moderately slow and slow. The movement of water and the growth of roots are restricted by the fragipan. The frequency of flooding ranges from none to common.

Included with this soil in mapping are a few areas of a soil that is somewhat poorly drained. Also included are small areas of soils that do not have a fragipan.

This soil has good potential for row crops, hay, and pasture. A perched seasonal high water table and the moderate depth of the root zone are limitations for some crops. Some areas are susceptible to flooding. Alfalfa and orchardgrass are not well adapted.

This soil has fair potential for most urban uses. The slow and moderately slow permeability is a limitation for septic tank absorption systems. Areas that are not subject to flooding can be used for residential development with sanitary sewers.

The capability subclass is IIe. The woodland group is 3w.

MoC—Montevallo shaly silt loam, 5 to 12 percent slopes. This shallow, well drained, sloping soil is on low, rolling hills. It formed in material weathered from acid shale. Areas range from 3 to 75 acres.

Typically, the surface layer is yellowish brown shaly silt loam about 7 inches thick. The subsoil extends to a depth of 18 inches. It is light yellowish brown and brownish yellow very shaly silt loam. Weakly consolidated shale is at a depth of 18 inches. The shale bedrock gradually becomes harder with increasing depth.

This soil is low in natural fertility and ranges from medium acid to very strongly acid in all layers. The available water capacity is low. The root zone is shallow. Depth to soft shale is 10 to 20 inches.

Included with this soil in mapping are a few small areas of a soil that has a clayey subsoil and contains fewer fragments of shale. Also included is a soil that formed in residuum of shale and is less than 10 inches deep to the shale bedrock.

This soil has poor potential for farming. The main limitations are the shallowness over bedrock and the low available water capacity. Fair yields of hay and pasture can be obtained in years of adequate rainfall if lime and fertilizer are added.

This soil has poor potential for urban use. The main limitation is the shallowness over bedrock. The soil can be used as homesites if sewers are available. Deep cuts into shale bedrock are required for large commercial buildings.

The capability subclass is IVe. The woodland group is 4d.

MoD—Montevallo shaly silt loam, 12 to 20 percent slopes. This moderately steep, shallow soil is on low hills and narrow hillsides. It formed in residuum of acid shale. Areas range from 4 to about 100 acres.

Typically, the surface layer is yellowish brown shaly silt loam about 7 inches thick. The subsoil, to a depth of 18 inches, is light yellowish brown and brownish yellow very shaly silt loam. Weakly consolidated shale bedrock is at a depth of 18 inches. The shale becomes harder with increasing depth.

This soil is medium acid to very strongly acid and is low in fertility. The root zone is shallow. The available water capacity is low. Depth to soft shale is 10 to 20 inches.

Included with this soil in mapping are a few small areas of a soil that is less than 10 inches deep over shale. Also included are a few spots of a soil that has a yellowish red silty clay subsoil.

This soil has poor potential for farming. The main limitations are the shallowness over rock, the slope, and the low available water capacity. If the soil is heavily fertilized and limed, pasture plants such as tall fescue and white clover produce fair yields in years of adequate rainfall.

This soil has poor potential for urban use. Compensating for the shallowness over bedrock and the slope is difficult. Where sanitary sewers are available, some areas can be used for residential development. Deep cuts into shale must be made for foundations in most places.

The capability subclass is VIe. The woodland group is 4d.

MoE—Montevallo shaly silt loam, 20 to 40 percent slopes. This shallow, steep soil is on hills and ridges. It formed in residuum of acid shale. Areas are commonly less than 25 acres but range from about 4 to more than 100 acres.

Typically, the surface layer is yellowish brown shaly silt loam about 7 inches thick. The subsoil, which extends to a depth of 18 inches, is yellowish brown and light yellowish brown very shaly silt loam. Weakly consolidated shale bedrock is at a depth of 18 inches. The shale gradually becomes harder with increasing depth.

This soil has a shallow root zone and low available water capacity. It is medium acid to very strongly acid throughout. Natural fertility is low. The depth to soft shale is 10 to 20 inches.

Included with this soil in mapping are a few areas of a soil that has a yellowish red silty clay subsoil. Also included are small areas of a soil that is more than 20 inches deep over bedrock.

This soil has poor potential for farming and urban use. Compensating for the steep slopes, the shallowness over bedrock, and the low available water capacity is difficult. Pasture plants such as tall fescue and white clover are adapted, but yields are low. Because of the steep slopes, management, such as clipping and fertilizing, is difficult.

The capability subclass is VIIe. The woodland group is 5d.

MpE—Muskingum-Gilpin-Petros complex, 15 to 60 percent slopes. This complex consists of small areas of Muskingum, Gilpin, and Petros soils so intermingled that they could not be mapped separately. These are well drained and excessively drained, moderately deep and shallow soils in irregularly shaped, 8- to 275-acre areas on moderately steep and steep mountainsides.

Muskingum silt loam makes up about 40 to 60 percent of each mapped area. Typically, the surface layer is very dark grayish brown and light yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish brown channery silt loam. Weakly consolidated shale bedrock is at a depth of 26 inches. The shale gradually becomes harder with increasing depth.

This soil is strongly acid or very strongly acid. Natural fertility is low, and the organic matter content is low. The available water capacity is medium.

Gilpin silt loam makes up about 25 to 45 percent of each mapped area. Typically, the surface layer is very dark grayish brown and light yellowish brown silt loam 6 inches thick. The subsoil extends to a depth of 29 inches. It is yellowish brown silt loam in the upper part and yellowish brown shaly silty clay loam in the middle and lower parts. The lower part is mottled in shades of red and gray. Weakly consolidated shale is at a depth of 29 inches.

This soil is strongly acid to extremely acid. Natural fertility is low. The organic matter content is low. The available water capacity is medium.

Petros shaly silt loam makes up about 10 to 30 percent of each mapped area. Typically, the 7-inch surface layer is very dark gray and brown shaly silt loam. The subsoil extends to a depth of 18 inches. It is yellowish brown very shaly silt loam. Interlayered siltstone and shale bedrock is at 18 inches. Hard, rippable bedrock starts at about 25 inches.

This soil is strongly acid or very strongly acid. It is low in natural fertility, available water capacity, and organic matter content.

Included in mapping are small areas of a soil that is 7 to 20 inches deep over sandstone bedrock. Also included are small areas of sandstone outcrop.

The soils in this complex have poor potential for farming and urban use. Compensating for the steep slopes and shallowness over bedrock is difficult.

The capability subclass is VIIe. The woodland group is 3r for the Muskingum and Gilpin soils and 5f for the Petros soil.

MrE—Muskingum-Petros complex, 15 to 60 percent slopes. This complex consists of small areas of the Muskingum and Petros soils so intermingled that they could not be mapped separately. It is on high mountainsides, generally at an elevation of more than 2,300 feet. It is moderately steep and steep.

Muskingum silt loam makes up about 60 to 75 percent of each mapped area. Typically, the surface layer is very dark grayish brown and light yellowish brown and is about 5 inches thick. The subsoil is yellowish brown channery silt loam. Weakly consolidated shale is at a depth of 26 inches. It gradually becomes harder with increasing depth.

This Muskingum soil is low in natural fertility and low in organic matter content. It is strongly acid or very strongly acid. The available water capacity is medium.

Petros shaly silt loam makes up about 25 to 40 percent of each mapped area. It is mainly on points and narrow mountaintops. Typically, the surface layer is very dark gray and brown. It is about 7 inches thick. The subsoil is yellowish brown very shaly silt loam. Interlayered siltstone and shale bedrock is at a depth of 18 inches. Hard, rippable bedrock starts at about 25 inches.

This Petros soil is low in natural fertility, is low in organic matter content, and has a low available water capacity. It is strongly acid or very strongly acid throughout.

Included in mapping are small areas of a soil that is 7 to 20 inches deep over sandstone bedrock. Also included are small areas of sandstone outcrop and areas on stable slopes of a moderately deep soil that has a clayey subsoil.

The soils in this complex have poor potential for farming and urban use. Compensating for the steep

slopes and shallowness over bedrock is extremely difficult.

The capability subclass is VIIe. The woodland group is 3r for the Muskingum soil and 5f for the Petros soil.

Ne—Newark silt loam. This somewhat poorly drained, nearly level soil is on flood plains. It formed in recent loamy alluvium derived from soils underlain by dolomite, shale, limestone, and sandstone. Areas range from 3 to about 40 acres.

Typically, the 8-inch surface layer is brown silt loam. The silt loam subsoil extends to a depth of 30 inches. It is mottled brown and gray in the upper part, mottled light gray and brown in the middle part, and mottled light gray, strong brown, yellowish red, and light yellowish brown in the lower part. The substratum extends to 60 inches or more. It is gray silt loam mottled in shades of brown.

This soil is medium acid to mildly alkaline, is medium in natural fertility, and has a medium to high available water capacity. It is saturated with water to within a foot of the surface late in winter and early in spring. Most areas are flooded after rains of a few days duration.

Included with this soil in mapping are a few small areas of a moderately well drained soil on bottom land. Also included are a few tracts of a soil that has a mottled yellow subsoil and a few areas of another soil that has a very dark gray silty clay loam surface layer.

This soil has fair potential for farming. Its potential is limited by excess water in the soil and frequent flooding. If drained, the soil could produce moderate yields of corn and high yields of sorghum and soybeans. It is fairly well suited to pasture because plants grow well during the drier part of the year.

This soil is too wet and is flooded too often for homesites or for commercial uses.

The capability subclass is IIw. The woodland group is 2w.

Nv—Newark Variant loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil is on low stream terraces. It formed in alluvium washed from soils formed in residuum of shale, limestone, and sandstone. Areas commonly are less than 20 acres but range to about 40 acres.

Typically, the surface layer is grayish brown loam 11 inches thick. The subsoil extends to a depth of about 62 inches. The upper part is light brownish gray silt loam mottled with yellowish brown and gray. The middle part is light gray silty clay loam mottled with yellowish brown. The lower part is mottled light brownish gray, light gray, and yellowish brown silty clay loam. The lower part is about 25 percent pebbles.

This soil is high in natural fertility but low in organic matter content. Reaction ranges from medium acid to moderately alkaline. Permeability is moderately slow. The available water capacity is high.

Included with this soil in mapping are a few spots of a soil that has a compact, slowly permeable layer in the subsoil. Also included are a few areas of a poorly drained soil that is dominantly gray in all parts of the profile.

Most of the acreage is in pasture and hay. Some areas are cultivated. The soil has only fair potential for most row crops and small grains, but it has good potential for soybeans. Potential is limited by wetness and frequent flooding. The potential for hay and pasture is good, but the number of adapted species is limited.

Wetness and the hazard of flooding are the main limitations for most urban uses. Major flood control and drainage are needed.

The capability subclass is IIIw. The woodland group is 2w.

Pt—Pits, Quarries. These quarries are in limestone and dolomite bedrock. They are mostly adjacent to Gladeville and Fullerton soils. Most of the rock taken from the quarries is used in road construction. Some is used for industrial construction and fills and for other purposes. Some quarries are in use. Some have been abandoned. Areas range from 3 to 115 acres.

No interpretative groupings are assigned.

RaE—Ramsey-Rock outcrop complex, 25 to 65 percent slopes. This complex consists of areas of steep Ramsey soils and Rock outcrop so intermingled that they could not be mapped separately. It is mainly on Waldens Ridge. A few tracts are at the top of East Fork Ridge and in parts of the Cumberland Mountains. Areas range from about 10 acres to more than 1,000 acres.

Ramsey sandy loam makes up about 60 to 80 percent of each mapped area. Typically, the surface layer is very dark grayish brown and yellowish brown and is about 4 inches thick. The subsoil is yellowish brown sandy loam 5 inches thick. The underlying material is yellowish brown channery sandy loam. Sandstone bedrock is at a depth of 14 inches (fig. 14).

This soil is low in natural fertility and organic matter content and is strongly acid or very strongly acid. It is excessively drained and rapidly permeable.

Sandstone outcrop covers about 20 to 40 percent of the surface. Most of the outcrop protrudes 2 to 10 feet above the surface. There are many areas of bluffs.

Included in mapping are small areas of a shaly soil 10 to 20 inches deep and some areas of a soil that has a silt loam subsoil and is 20 to 40 inches deep over shale.

This complex has poor potential for farming and urban use. Compensating for the shallowness, the numerous rock outcrops, and the steep slopes is nearly impossible.

The capability subclass is VIIs. The woodland group is 4x.

SaB—Sensabaugh gravelly loam, 1 to 5 percent slopes. This deep, well drained, gently sloping soil is along drainageways, on slight benches, and on foot slopes. It formed in local alluvium washed mainly from Lehew and Muskingum soils. Areas are 3 to 25 acres.

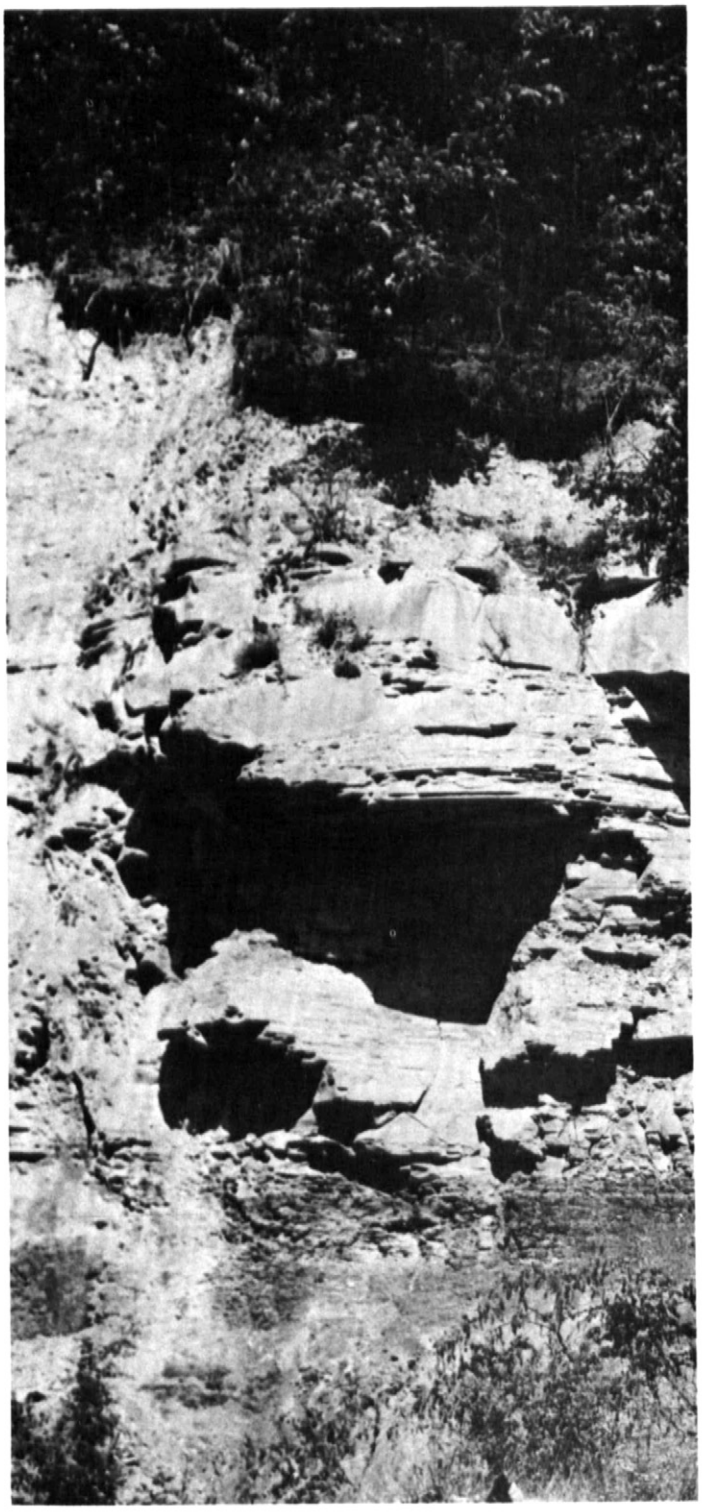


Figure 14.—This cut in the Ramsey soil exposes the massive sandstone bedrock.

Typically, the surface layer is dark yellowish brown gravelly loam about 8 inches thick. The subsoil extends to a depth of 33 inches. It is brown, friable gravelly loam. The underlying material extends to 60 inches. It is brown gravelly loam mottled in shades of brown.

This soil is high in natural fertility and has a deep root zone. It has good tilth and can be worked throughout a wide range of moisture conditions. It is slightly acid to medium acid. Permeability is moderate. The available water capacity is medium. A few areas are subject to short periods of flooding after heavy rains.

Included with this soil in mapping are small areas of moderately well drained soils. Also included are a few small areas of a similar soil that has a thick dark brown surface layer.

This soil has good potential for all the commonly grown crops. Its main limitation is that it occurs as small areas and long narrow strips.

This soil has poor potential for urban use. The few spots on benches and foot slopes can be used as homesites except where seepage from adjacent slopes is a problem. Areas along drainageways are not well suited to urban use because they are susceptible to flooding, runoff from adjacent slopes, and seepage.

The capability subclass is IIs. The woodland group is 2o.

ScB—Sequatchie loam, 0 to 5 percent slopes. This deep, well drained, nearly level to gently sloping soil is on low terraces along the larger streams in the county. Areas commonly are less than 15 acres but range up to about 40 acres.

Typically, the surface layer is very dark grayish brown loam 8 inches thick. The subsoil extends to a depth of 44 inches. It is brown silt loam in the upper and middle parts and yellowish brown loam in the lower part. The underlying material is yellowish brown loam mottled in shades of brown. It extends to 60 inches or more.

This soil is high in natural fertility and has a deep root zone. It is strongly acid or very strongly acid except for the surface layer where limed. The available water capacity is high, and permeability is moderate. Areas that are not protected by Norris Dam are occasionally flooded.

Included with this soil in mapping are a few small areas of a soil that is similar but is moderately well drained. Also included, on bottom land, are a few small areas of a well drained soil that has a very dark grayish brown surface layer about 24 to 40 inches thick.

This soil has good potential for row crops, small grains, pasture, and hay crops. Its main limitation is the size and shape of the areas. It can be farmed along with adjacent fields because most of the adjacent soils have fair or good potential. It is well suited to all crops commonly grown in the area.

Areas that are not subject to flooding have good potential for most urban uses. The size and shape of the areas are the main limitations. All areas should be checked for flooding before uses other than farming are planned.

The capability subclass is IIe. The woodland group is 2o.

SdC—Sequoia silt loam, 5 to 12 percent slopes. This moderately deep, well drained, rolling soil is on uplands. It formed in residuum of acid shale. Areas commonly are less than 15 acres but range up to about 40 acres.

Typically, the surface layer is yellowish brown silt loam about 5 inches thick. The subsoil extends to a depth of 38 inches. It is strong brown silty clay loam and silty clay in the upper part and yellowish red and red silty clay and shaly silty clay in the lower part. Soft reddish, brownish, and green shale bedrock is at a depth of 38 inches.

This soil is low in natural fertility and has a moderately deep root zone. It is very strongly acid or strongly acid except where recently limed. The available water capacity is medium. Permeability is moderately slow.

Included with this soil in mapping are small areas of a soil that is similar except that its surface layer and subsoil combined are less than 20 inches thick. Also included are spots of a severely eroded Sequoia soil that has a yellowish red or strong brown silty clay loam surface layer.

This soil has poor potential for row crops. Its potential is limited by the slope, the moderate depth, and the clayey subsoil of moderately slow permeability. It has fair potential for small grains, hay crops, and pasture.

This soil has fair to poor potential for urban use. The main limitation, in addition to those mentioned in the preceding paragraph, is moderate shrink-swell potential. The moderately slow permeability is a limitation for septic tank absorption systems. The other limitations can be largely overcome by good design and careful installation of foundations for buildings and roads.

The capability subclass is IVe. The woodland group is 3o.

SdD—Sequoia silt loam, 12 to 25 percent slopes. This well drained, moderately deep soil is on short hillsides and low hilly ridges. It is moderately steep and is only 20 to 40 inches deep over soft shale. Areas range from 3 to 25 acres.

Typically, the surface layer is yellowish brown silt loam 5 inches thick. The subsoil extends to a depth of 38 inches. It is strong brown silty clay loam and silty clay in the upper part and yellowish red and red silty clay and shaly silty clay in the lower part. Soft reddish, brownish, and green shale bedrock is at a depth of 38 inches.

This soil is strongly acid or very strongly acid except for the surface layer where limed. It is low in natural fertility. Permeability is moderately slow. The root zone is moderately deep, and the available water capacity is medium.

Included with this soil in mapping are small areas of a similar soil that is less than 20 inches deep over rock. Also included are narrow strips of a moderately well drained soil on bottom land and small areas of severely eroded Sequoia soils. These eroded soils have a strong brown or yellowish red silty clay loam or silty clay surface layer.

This soil has poor potential for row crops. Its potential is limited by slope, the clayey subsoil of moderately slow permeability, medium to rapid runoff, and medium available water capacity. The soil has only medium potential for small grains, hay, and pasture.

This soil has fair to poor potential for urban use. The limiting factors listed in the preceding paragraph plus a moderate shrink-swell potential are moderate or severe limitations for most urban uses. The moderately slow permeability is a limitation for septic tank absorption fields.

The capability subclass is VIe. The woodland group is 3o.

Se—Sewanee-Ealy complex, 0 to 3 percent slopes. This complex consists of intermingled areas of nearly level Sewanee and Ealy soils. These are well drained and moderately well drained soils on flood plains. They occur as irregularly shaped areas of 5 to 75 acres.

The Sewanee soil makes up about 65 to 80 percent of each mapped area. Typically, the 6-inch surface layer is brown silt loam. The subsoil extends to a depth of 30 inches. It is brown silt loam. The upper part is mottled in shades of brown, and the lower part is mottled in shades of gray and brown. The underlying material is light brownish gray silt loam mottled in shades of brown. It extends to 54 inches. Below this is hard sandstone bedrock.

This soil is medium in natural fertility and low in organic matter content. It is strongly acid or very strongly acid throughout except for the surface layer where limed. Permeability is moderate, and the available water capacity is high. The soil is subject to flooding. In some years it is not flooded. In other years it is flooded two or three times.

The Ealy soil makes up about 15 to 30 percent of each mapped area. Typically, its surface layer is brown loam 8 inches thick. The subsoil, to a depth of 28 inches, is brown loam. It is mottled in shades of brown in the lower part. The underlying material extends to 60 inches or more. It is dark grayish brown and dark yellowish brown loam mottled with shades of brown.

This soil is medium in natural fertility. It is strongly acid or very strongly acid throughout except for the surface layer where limed. The available water capacity is high, permeability is moderately rapid, and the organic matter content is low. The soil is subject to flooding. In some years it is not flooded. In other years it is flooded two or three times.

Included with this complex in mapping are a few small areas of a nearly level soil that is poorly drained. Also included are areas of a soil on low stream terraces that contain numerous pebbles and cobbles.

The soils in this complex have good potential for farming. They have poor potential for most urban uses.

The Sewanee soil is too wet for septic tank absorption systems, foundations, and roads. Both soils are subject to flooding.

The capability subclass is IIw. The woodland group is 2o for the Ealy soil and 2w for the Sewanee soil.

ShC—Shouns silt loam, 5 to 12 percent slopes. This deep, well drained, rolling soil is on foot slopes and benches below hills and ridges. It formed in sediment washed from soils underlain by shale and sandstone. Areas range from 2 to more than 100 acres.

Typically, the surface layer is brown silt loam 6 inches thick. The subsoil extends to a depth of more than 60 inches. It is strong brown silt loam in the upper part, red silty clay loam in the middle part, and red shaly silty clay loam in the lower part. The middle part is mottled in shades of brown.

This soil is strongly acid or medium acid except for the surface layer where limed. It is low in natural fertility but has a high available water capacity. It has good tilth and moderate permeability. It can be worked throughout a fairly wide range of moisture content.

Included with this soil in mapping are a few small areas of a similar soil that has a clayey subsoil. Also included are small tracts of a soil that has a dark brown surface layer and a strong brown subsoil and a few areas of a soil that has pebbles and stones in the surface layer and subsoil.

This soil has fair potential for row crops and good potential for small grains, pasture, and hay crops. The main limitation to row crops is slope. A few tracts receive excess water from adjacent slopes.

This soil has fair to good potential for urban use (fig. 15). Slope is the main limitation. Deep cuts, some into bedrock, are needed for large buildings. Cracked walls can result where foundations are partly on soil and partly on bedrock unless this fact is considered during design and installation.

The capability subclass is IIIe. The woodland group is 3o.

ShD—Shouns silt loam, 12 to 25 percent slopes. This deep, well drained, moderately steep soil is on benches and foot slopes at the base of hills and ridges. It formed in soil material moved downslope from soils

Figure 15.—This homestead and pasture are on Shouns silt loam, 5 to 12 percent slopes. Lehew and Muskingum soils are on the wooded ridge.

that formed in residuum of sandstone and shale. Most areas are less than 15 acres but range from 3 to about 40 acres.

Typically, the surface layer is brown silt loam 6 inches thick. The subsoil extends to a depth of more than 60 inches. It is strong brown silt loam in the upper part, red silty clay loam in the middle part, and red shaly silty clay loam in the lower part. The middle part is mottled in shades of brown.

This soil is low in natural fertility. It is medium to strongly acid except for the surface layer where limed. Tilth is good. The available water capacity is high. Permeability is moderate. The soil is easy to work and can be cultivated throughout a wide range of moisture conditions.

Included with this soil in mapping are a few small tracts of a soil that is similar but has a clayey subsoil. Also included are a few areas of a soil that has a dark brown surface layer and a strong brown subsoil and a few small tracts of a soil that has pebbles and stones in the surface layer and subsoil.

This soil has poor potential for row crops. Row crops can be grown, however, under stripcropping or minimum till systems or in long rotations. The soil has fair potential for small grains, hay, and pasture. Its potential is limited by slope, the small size of many areas, and the steep slope of adjacent areas.

The potential for urban use is poor to fair. Slope is the main limitation. Some areas can be used as homesites. In most areas, however, the slope is a severe limitation. This soil is too steep for commercial buildings.

The capability subclass is IVe. The woodland group is 3o.

St—Staser loam. This deep, well drained, nearly level soil is on first bottoms (fig. 16), mainly along the Clinch River. It formed in alluvium washed from soils underlain by dolomite, limestone, sandstone, and shale. Areas range from 3 to 60 acres.

Typically, this soil is very dark grayish brown loam to a depth of 25 inches. Below this, to a depth of 60 inches

Figure 16.—An area of Staser loam along the Clinch River. The row of trees to the right lines the bank of the river. Waynesboro soils are dominant on the rolling hills in the background.

or more, it is dark yellowish brown and dark brown silt loam.

This soil is high in natural fertility. It is medium acid, slightly acid, or neutral throughout. It is easy to work and easy to conserve. The available water capacity is high. Permeability is moderate and moderately rapid. Areas that are not protected by Norris Dam are occasionally flooded.

Included with this soil in mapping are small areas of a similar soil that has a clayey subsoil, a few areas of another similar soil that has a light brown surface layer, and narrow strips of a moderately well drained soil in similar positions.

This soil has good potential for farming. High yields can be obtained of all crops commonly grown. Flooding is a hazard in some areas, but it ordinarily does not seriously affect the use of this soil for crops, except possibly for small grains.

Areas that are protected from flooding have good potential for urban use. Residential and industrial sites are easy to prepare. Only minimum cutting and filling is needed. The site, however, should be checked for potential overflow. Also to be considered before this soil is used for urban purposes is its high value for producing food.

The capability class is I. The woodland group is 2o.

TaB—Tasso silt loam, 2 to 7 percent slopes. This deep, moderately well drained to well drained soil is on benches and foot slopes. It formed in local alluvium or colluvium that moved downslope from soils underlain by dolomite. The soil is gently sloping. Areas are mostly less than 10 acres but range from 2 to about 40 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of more than 72 inches. The upper 22 inches is yellowish brown silt loam. Below this is a layer that is about 50 percent friable silt loam and 50 percent a firm and brittle fragipan. This layer is yellowish brown. The fragipan part is mottled with gray. The lower part of the subsoil is yellowish red cherty silty clay loam that grades to cherty clay with increasing depth.

This soil is strongly acid or very strongly acid except for the surface layer where limed. The available water capacity is medum to high. Natural fertility is low.

Included with this soil in mapping are a few small areas of a soil that is similar but is well drained and does not have a fragipan. Also included are a few areas of cherty soils and of soils that have a dark surface layer.

This soil has good potential for row crops, small grains, hay, and pasture. Wetness is a slight limitation in winter and early in spring.

This soil has fair to poor potential for urban use. In most areas, limitations are severe for septic tank absorption fields. In a few areas, however, limitations are only moderate because the fragipan, which reduces permeability, is discontinuous. Onsite investigation is needed to determine suitability for absorption fields.

The capability subclass is IIe. The woodland group is 3o.

UDC—Udorthents, rolling. This unit is one of heterogenous earthy fill material, coal, fly ash, and landfill. The earthy fill material and coal was either deposited on shallow and moderately deep soils that formed in limestone residuum or deposited on limestone bedrock. The fly ash was deposited on alluvium. The land fill, consisting mainly of industrial waste, is in areas of shallow and moderately deep soils that formed in shale residuum. Areas range from 8 to 360 acres. The largest area surrounds the Bull Run Steam Plant. Slopes are dominantly 2 to 12 percent.

The earthy fill, excavated from the vicinity of the steam plant, ranges from silt loam to clay. It is 15 to 70 percent coarse fragments that range from gravel size to huge boulders. Thickness of the fill ranges from a few inches to 20 feet or more. The landfill varies in depth. About 2 to 3 feet of soil covers the waste. The coal is used to operate the steam plant. The fly ash from the plant is 3 to 20 feet deep.

This unit is about 32 percent earthy fill, 28 percent landfill, and 23 percent fly ash. The rest consists of the pile of coal, the excavated areas, and the areas covered with buildings.

Permeability, available water capacity, reaction, and runoff are variable. Internal drainage ranges from poor to good.

Included in mapping are a few areas of moderately deep soils that were not excavated and others that were not covered. Also included are a few areas of bedrock exposed by excavation and some small areas where the slope is more than 12 percent.

The potential for farming and dwellings is poor. The potential for industrial use is poor to fair. Unfavorable soil texture, huge boulders, wetness, and areas excavated to bedrock are some of the conditions that make this unit unsuitable for farming and urban uses. In addition, subsidence of the fill seriously limits this unit as a site for residences and industrial plants. Some spots can be used for urban purposes, but onsite investigation is needed to determine the potential of each site.

No interpretative groupings are assigned.

UDE—Udorthents, steep. This unit is in the Cumberland Mountains. It consists of the high walls that are formed and the heterogenous spoil that is excavated during the strip mining of coal. The spoil has been smoothed to form benches with steep to very steep outer slopes. The benches are 20 to 150 feet or more across, and the rocky walls are more than 60 feet high in places. These narrow strip mines are at various elevations on mountainsides and mountaintops. Almost on the contour, they extend around the mountainsides in

strips that range from a few hundred yards to several miles. Areas mapped range from 3 acres to more than 250 acres. Slopes are dominantly 12 to 20 percent on the benches but range from about 25 to 80 percent on the outer slopes. The high walls are nearly vertical.

The color, texture, and thickness of the spoil vary greatly and without coherent pattern within short distances. Most of the material is yellowish brown shaly silty clay loam. The color ranges from gray through yellow to several shades of brown. The fine earth fraction is mostly silty clay loam but ranges from silt loam to clay. It is 35 to 80 percent rock fragments, mostly shale but also sandstone and coal. The fragments are one-fourth inch to several feet across. There are many gravelly, cobbly, flaggy, stony, and bouldery areas. Depth to bedrock ranges from a few inches to 50 feet or more. The composition of the high walls varies. In places, Muskingum, Petros, Gilpin, Jefferson, Ramsey, or Grimsley soils are at the top of the high wall. In other places, shale or sandstone bedrock is at the top. The rest of the wall may be one kind of rock or a layering of more than one kind (fig. 17).

Natural fertility, the organic matter content, and the available water capacity are low. Reaction ranges from very strongly acid to extremely acid except where the material is limed.

Included with this unit in mapping are small areas of moderately deep and shallow soils that have not been disturbed by excavation. Also included are narrow bands of deep soils that formed in colluvium and some areas where slopes are less than 12 percent.

This unit has poor potential for farming and urban use. Tall fescue, sericea lespedeza, and black locust grow well in places. Compensating for the droughtiness, shallowness over bedrock, stoniness, and steep slopes is difficult.

No interpretative groupings are assigned.

UhD—Upshur Variant silt loam, 10 to 25 percent slopes. This well drained, moderately steep, reddish soil is on low hills and ridges. It is only 20 to 40 inches deep over reddish shale. Areas are 3 to 25 acres.

Typically, the surface layer is reddish brown silt loam 6 inches thick. The subsoil, which extends to soft shale, is reddish brown and dark reddish brown silty clay and clay in the upper part, reddish brown shaly clay in the middle part, and reddish brown very shaly silty clay in the lower part. At a depth of 36 inches is soft calcareous shale bedrock.

This soil is medium in natural fertility and available water capacity. Runoff is rapid, and permeability is slow. The soil is strongly acid to neutral in the surface layer and medium acid to mildly alkaline in the subsoil.

Included with this soil in mapping are a few small areas of a soil that is less than 20 inches deep over shale. Also included are a few areas where the subsoil is yellowish red. Limestone outcrop is common.

This soil has poor potential for farming and urban use.

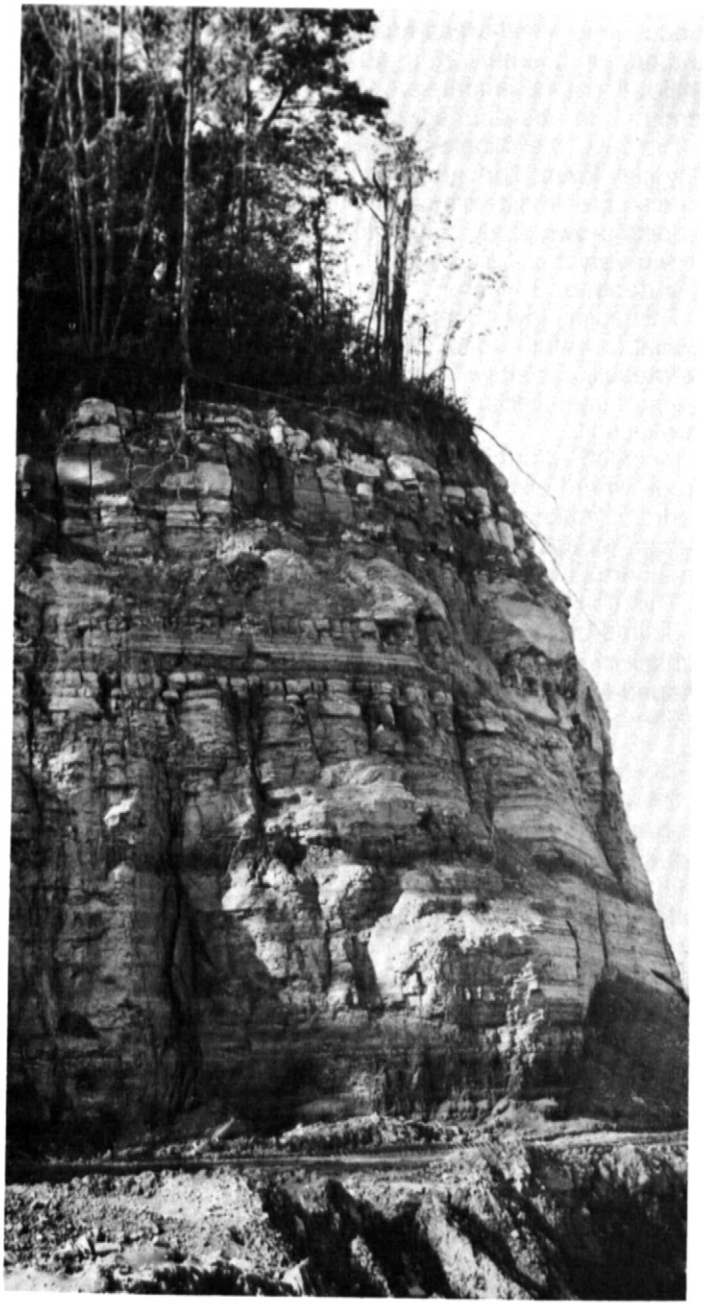


Figure 17.—Sandstone and shale are dominant in the wall of this coal strip mine. The spoil material has been smoothed, and part of it is used for the road.

The slope, the clayey subsoil that has slow permeability, and the small odd-shaped areas are serious limitations.

The capability subclass is VIe. The woodland group is 4c.

UpD3—Upshur Variant silty clay loam, 12 to 25 percent slopes, severely eroded. This moderately

steep, reddish soil is well drained and moderately deep. It occurs as small areas and narrow strips on low hills and ridges. It is only 20 to 40 inches deep over reddish shale. Areas commonly are less than 10 acres, but a few range up to about 25 acres.

Typically, the 4-inch surface layer is reddish brown silty clay loam. The subsoil is reddish brown and dark reddish brown silty clay and clay in the upper part, reddish brown shaly clay in the middle part, and reddish brown very shaly silty clay in the lower part. Soft shale is at a depth of 33 inches.

This soil is low in natural fertility and medium in available water capacity. Runoff is rapid, and permeability is slow. The soil is strongly acid to neutral in the surface layer and medium acid to mildly alkaline in the subsoil.

Included with this soil in mapping are a few small areas where erosion has exposed shale and limestone bedrock. Also included are a few tracts that have a 4- to 7-inch, reddish brown silt loam surface layer and other small areas where the subsoil is yellowish red.

This soil has poor potential for crops and urban use. It is limited by the slope, the clayey surface layer and subsoil, the slow permeability, and the small, irregularly shaped areas.

The capability subclass is VIIe. The woodland group is 4c.

Ur—Urban land. This unit consists of areas where more than 80 percent of the surface is covered with industrial plants, shopping centers, paved parking lots, and other impervious surfaces. These areas are in Oak Ridge. The largest area is the Y-12 Energy Research and Development Administration plant and its parking lots. Areas range from 8 to about 500 acres. The slope range is 2 to about 20 percent.

Included in mapping are a few areas that are not paved and not covered with buildings.

Examining or identifying the soil or earthy material in this unit is impractical. The largest area is restricted, and the rest is covered with buildings and pavement. Should the land use change, careful onsite investigation would be needed to determine the potential for any proposed use.

No interpretative groupings are assigned.

WaD—Waynesboro loam, 10 to 25 percent slopes. This deep, well drained, moderately steep soil is on high stream terraces at the outer edges of the valley formed by the Clinch River (fig. 18). The landscape is hilly. Areas range from 3 to about 30 acres.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil extends to a depth of 72 inches or more. The upper 22 inches is yellowish red and red clay loam. Below this is dark red clay.

This soil is strongly acid or very strongly acid except in fields that have been limed. It is low in natural fertility and content of organic matter. The available water capacity is high. Permeability is moderate.

Included in mapping are a few small areas of eroded soils that have a yellowish red clay loam surface layer. Also included are a few areas of a soil that has a dark brown surface layer and a few gravelly areas.

This soil has poor potential for row crops and small grains, fair potential for hay, and good potential for pasture. Slope is the main limitation. All of the commonly grown row crops grow well, but the soil is too steep for frequent cultivation.

The potential for urban use is poor to fair. The milder slopes can be used as house sites, but they are too steep for commercial buildings. Slope is also a limitation to the use of septic tank absorption systems.

The capability subclass is IVe. The woodland group is 3o.

WeB—Welchland-Ealy complex, 0 to 5 percent slopes. This complex consists of small areas of the cobbly, gently sloping Welchland soils and the loamy, nearly level Ealy soils so intermingled that they could not be mapped separately. They are well drained soils on low terraces and on first bottoms along the larger intermountain streams. The areas mapped range from about 5 to 45 acres.

Welchland cobbly loam makes up about 50 to 75 percent of each mapped area. Typically, the surface layer is dark brown cobbly loam 9 inches thick. The subsoil extends to a depth of 38 inches. It is dark yellowish brown and yellowish brown cobbly loam in the upper part, yellowish brown cobbly loam in the middle part, and dark yellowish brown very cobbly sandy loam in the lower part. The underlying material is brown very cobbly sandy loam to a depth of 60 inches or more.

This soil is low in natural fertility and is strongly acid or very strongly acid. The available water capacity is medium. Permeability is moderately rapid. There are enough cobbles and pebbles in the surface layer to interfere with cultivation. The soil is rarely flooded.

The Ealy soil makes up from about 25 to 40 percent of each mapped area. Typically, the surface layer is brown loam 8 inches thick. The brown loam subsoil extends to a depth of 28 inches. The underlying material to a depth of 60 inches is dark grayish brown loam in the upper part and dark yellowish brown loam in the lower part.

This soil is strongly acid or very strongly acid and is medium in natural fertility. Permeability is moderately rapid, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture conditions. It is occasionally flooded.

Small areas of moderately well drained and poorly drained soils are included with this unit in mapping. Also included on low terraces is a deep, well drained soil that has few or no pebbles or cobbles in the surface layer.

This complex has fair potential for farming and poor potential for urban use. Major limitations are the flood hazard and the cobblestones on the surface and in the soil. The Ealy soil is suited to all crops commonly grown in the county. The Welchland soil is suited to the

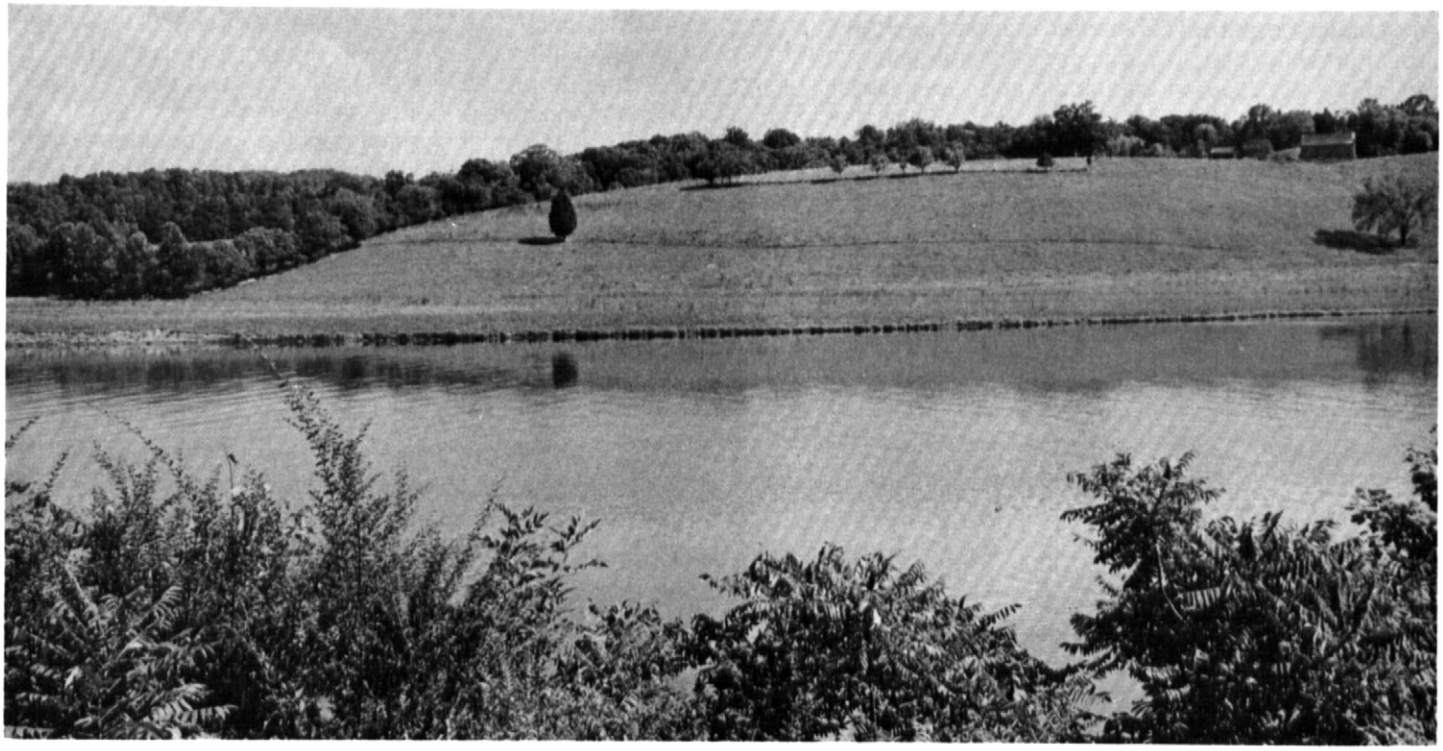


Figure 18.—Across the Clinch River is a typical area of Waynesboro loam. This is a deep, permeable soil that responds to management but is too sloping for frequent cultivation. A narrow strip of Staser loam is adjacent to the riverbank.

commonly grown crops, but it contains so many cobblestones and pebbles that the use of farm machinery is difficult.

The capability subclass is IIIs. The woodland group is 3x for the Welchland soil and 2o for the Ealy soil.

Wh—Whitwell loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on low terraces along the larger streams. It formed in old alluvium washed from soils derived from dolomite, sandstone, limestone, and shale. Areas are only 3 to 15 acres.

Typically, the surface layer is brown silt loam 8 inches thick. The silt loam subsoil extends to a depth of 36 inches. It is brown in the upper part, strong brown and yellowish brown mottled with gray in the middle part, and mottled strong brown, pale brown, and light brownish gray in the lower part. The underlying material is silt loam mottled in shades of gray and brown. It extends to a depth of 60 inches or more.

This soil is medium in fertility and is strongly acid or very strongly acid except where limed. The available water capacity is high. Permeability is moderate. Depth to the water table ranges from about 2 feet late in winter and early in spring to as much as 6 feet or more late in summer. The soil is flooded occasionally.

Included with this soil in mapping are a few narrow strips of well drained and moderately well drained soils on first bottoms. These included areas are mostly less than one-half acre.

This soil has good potential for farming. It is well suited to most crops, and high yields can be obtained. The soil is not well suited to tobacco and alfalfa because of wetness.

This soil has poor potential for most urban uses. The water table is within 2 to 3 feet of the surface during the rainy season. Septic tank absorption systems would not function adequately during this period, and lawns would be wet 2 or 3 months out of each year. Also, the soil is subject to flooding.

The capability subclass is IIw. The woodland group is 2w.

ZeE—Zenith loam, 20 to 65 percent slopes. This deep, well drained, dark colored soil is on north- and east-facing slopes of high mountains, mainly in coves at elevations above 2,800 feet. It formed in material washed from soils underlain by sandstone, shale, and siltstone. It is dominantly steep, but in some areas it is moderately steep. Areas are 5 to about 130 acres.

Typically, the surface layer is very dark gray and very dark grayish brown loam 8 inches thick. The subsoil

extends to a depth of 35 inches. It is dark yellowish brown gravelly loam in the upper part and yellowish brown gravelly loam in the middle and lower parts. The underlying material is yellowish brown gravelly clay loam that extends to the hard shale bedrock at 42 inches.

This soil is strongly acid or very strongly acid throughout. Natural fertility is medium. The root zone is deep and is easily penetrated by the roots. The available water capacity is high. Permeability is moderate.

Included with this soil in mapping are a few small areas of a soil that occurs on rolling mountaintops, generally above 3,000 feet in elevation, and is less than 40 inches deep over bedrock. Also included are areas of soils that do not have a dark surface layer and are less than 40 inches over soft shale bedrock and a few areas of a soil that contains many cobbles and boulders.

This soil has poor potential for farming and urban use. It is too steep and rough. In many places it is inaccessible except on foot. The entire acreage is wooded.

The capability subclass is VIIe. The woodland group is 2r.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of roadfill and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

By C. H. Jent, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Only 20,304 acres in the survey area was used for crops and pasture in 1974. Of this total, 12,185 acres was used for permanent pasture; 6,979 acres was used for row crops, mainly corn and other grains, burley tobacco, vegetables, and other row crops; and 2,836 acres was used for rotation hay and pasture.

Farming is competing with other land uses in the survey area. The acreage in crops and pasture has been decreasing as more and more land is used for urban development. In 1967 about 12,000 acres in the survey area was urban and built-up land. This figure has been increasing at the rate of about 2,000 acres per year. Much of this acreage has been well suited to crops and pasture. In general, the soils in the survey area that are well suited to crops and pasture are also well suited to urban development. Data on specific soils in this soil survey can be used in determining future land use priorities. Potential productive capacity of the soil for agricultural products should be weighed against the limitations and potential for nonfarm development.

Protecting the soils used for cultivated crops from damaging erosion is not difficult because most of this acreage consists of the nearly level to gently sloping Etowah, Hamblen, Sequatchie, and Whitwell soils on bottom lands and stream terraces.

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

Most slopes are so short that terracing is not practical in areas of Dunmore, Collegedale, Dewey, and Fullerton soils. On these soils, a cropping system that provides a substantial plant cover is required to control erosion unless minimum tillage is practiced. Minimizing tillage and leaving crop residue on the surface conserves moisture and reduces the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but they are difficult to use successfully on the eroded soils that have a clayey surface layer, for example, on Collegedale and Dewey soils. No-till for corn, which is common on an increasing acreage and is effective in reducing erosion on sloping land, can be adapted to most soils in the survey area.

Diversions reduce the length of slope and thus reduce runoff and the risk of erosion. They are effective on sites having steep or long slopes above soils on toe slopes.

Contouring and contour stripcropping are effective erosion control practices in the survey area. They are best adapted to soils that have fairly smooth uniform slopes, including many areas of the sloping Claiborne, Dewey, and Etowah soils.

Information on the design of erosion control practices for each kind of soil is contained in the Field Office Technical Guide available in the local office of the Soil Conservation Service.

Soil drainage is a minor management need on the acreage used for crops and pasture in the survey area.

Small areas of wet soils on flood plains are commonly included in areas of the moderately well drained Hamblen, Leadvale, and Monongahela soils. Artificial drainage is needed on some of these wetter sites.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the somewhat poorly drained soils that are intensively row cropped. Finding adequate outlets for tile drainage systems is difficult in many areas of Newark Variant and Newark soils.

Most soils on uplands are very strongly acid or strongly acid in their natural state. Unless previously limed, these soils require applications of ground limestone to raise the pH level sufficiently for good growth of crops that grow best on slightly acid to neutral soils. Available phosphorus and potash levels are naturally low in most of these soils.

The soils on flood plains, such as Hamblen, Newark, and Staser, range from moderately acid to mildly alkaline and are naturally higher in plant nutrients than the soils on uplands. Emory and Greendale soils, in narrow strips along drainageways, are medium acid or strongly acid.

On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The soil testing laboratory of the Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

A number of crops suited to the soils and climate of the survey area are not now commonly grown. Corn and type 31 tobacco are now the main row crops.

Wheat and soybeans are the main close-growing crops that could be grown but only on a limited acreage. Grass and legume seed could be produced from tall fescue, orchardgrass, annual lespedeza, sericea lespedeza, and red clover.

A small acreage of specialty crops—vegetables, fruits, and greenhouse and nursery plants—is now grown commercially in the survey area. A small acreage is also used for melons, strawberries, sweet corn, tomatoes, and peppers. Because there is a nearby large market as well as a large food processing and freezing plant, the potential is good for expanding the acreage to produce adapted vegetables and small fruits. Early and late tomatoes, okra, snap beans, lima beans, and many kinds of greens are some of the vegetable crops that are well adapted to the soils and climate.

In addition, a nearby large population center creates a demand and market for other specialty crops. The production of turfgrass sod is a possibility as is the production of ornamental shrubs, ground cover plants, flowers, and shade tree nursery stock.

Latest information and suggestions on growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other

characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have slight limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use. No class V soils are recognized in Anderson County.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. No class VIII soils are recognized in Anderson County.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is 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 very cold or very dry. No subclass *c* is recognized in Anderson County.

In class I there are no subclasses because the soils of this class have few limitations.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. Capability units are not assigned in this soil survey.

The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

Joseph H. Paugh, forester, Soil Conservation Service, helped prepare this section.

Anderson County was originally 100 percent wooded. Now, trees cover about 63 percent of the county.

Oak-hickory, the dominant type, makes up 74 percent of the woodland. Although oak and hickory are the most common in this type, yellow-poplar, black walnut, sugar maple, elm, and sweetgum are important associates.

Pine, oak-pine, and eastern redcedar types make up the other 26 percent of the woodland. Shortleaf pine, Virginia pine, and redcedar are the most common coniferous species. They are commonly associated with hardwoods, principally oak.

Wood products are of substantial economic importance to Anderson County. The low production per acre on many sites, however, has reduced this value far below its potential. Other values of wooded areas include wildlife habitat, recreation, natural beauty, erosion control, and watershed protection.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r. Letters t and s are not assigned to any soils in Anderson County.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production. Because of occasional littleleaf disease in Anderson County, on-site inspection is recommended before planting shortleaf pine. Littleleaf disease is most common on soils that have a plastic, clayey subsoil and on soils that are poorly drained.

recreation

Joseph H. Paugh, forester, Soil Conservation Service, helped prepare this section.

Anderson County has approximately 92 recreation facilities, 83 of which are publicly owned. These facilities occupy 9,100 acres. Nearly 1,400 acres of the recreation areas is water. Facilities for field sports, picnicking, fishing, and camping are the most abundant.

According to a recent appraisal of potentials for outdoor recreation development, Anderson County has high potential for developing picnic and sports areas. The potential for scenic area development is high, largely because of the picturesque mountains and high peaks in the northwestern part of the county.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains,

and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

wildlife habitat

The major kinds of wildlife in Anderson County are mostly associated with woodland. Deer populations are moderately low and fairly stable. Squirrel and rabbit populations are good to excellent. Numbers of raccoon are low. Populations of dove and quail are fair where cropland provides suitable habitat. Populations of waterfowl and other wetland species are low to moderate. Populations of songbirds and other nongame wildlife are fair.

About 158,656 acres, or 74 percent, of the county is suitable as woodland wildlife habitat. About 17,152 acres, or 8 percent, is suitable as openland habitat.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and millet.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are ragweed, goldenrod, beggarweed, pokeberry, and crotons.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are bush honeysuckle, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, ponds, and the Tennessee Valley Authority lakes.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, morning dove, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of earthfill and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed

soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, high shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

sanitary facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope,

and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches

of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or other restrictive layers. The performance of a system is affected by the depth of the root zone and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture (*3*). These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

physical and chemical properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

soil and water features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it

occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. Only saturated zones within a depth of about 6 feet are indicated. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 16, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*3*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*4*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Allen series

The Allen series consists of deep, well drained soils on benches and foot slopes below sandstone mountains. These soils formed in material washed or rolled down from soils underlain by sandstone and shale. Most areas are in Dutch Valley. The slope range is 10 to 25 percent.

Allen soils are commonly adjacent to Jefferson soils, which have a yellowish brown and strong brown subsoil.

Typical pedon of Allen loam, 10 to 25 percent slopes, in Dutch Valley, about 0.3 mile southeast of Pleasant Hill Church and 500 feet south of Dutch Valley Road:

Ap—0 to 6 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.
B1—6 to 9 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; many fine and medium roots; medium acid; clear smooth boundary.
B21t—9 to 14 inches; yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable; common fine roots; few patchy clay films on faces of peds; few fragments of sandstone; few fine black concretions; strongly acid; gradual smooth boundary.
B22t—14 to 20 inches; red (2.5YR 4/8) clay loam; common medium faint mottles of dark red (2.5YR 3/6); moderate medium subangular blocky structure; friable; few fine roots; few patchy clay films on faces of peds; few fragments of sandstone; very strongly acid; gradual smooth boundary.
B23t—20 to 42 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few patchy clay films on faces of peds; few medium sandstone and quartz pebbles; very strongly acid; gradual smooth boundary.
B24t—42 to 62 inches; dark red (2.5YR 3/6) clay loam; moderate medium angular blocky structure; friable; continuous clay films; few fragments of sandstone and of chert; very strongly acid.

Thickness of the solum and depth to bedrock exceed 5 feet. The soil is strongly or very strongly acid except for the surface layer where limed.

The A horizon is brown (10YR 4/3, 5/3), dark brown (7.5YR 4/4), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), or dark yellowish brown (10YR 4/4). It is loam or fine sandy loam. In severely eroded areas this horizon is yellowish brown (10YR 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or yellowish red (5YR 4/6, 4/8) loam or clay loam.

The B1 horizon is yellowish brown (10YR 5/4) or strong brown (7.5YR 5/6, 5/8). It is loam, fine sandy loam, or clay loam.

The B2t horizon is yellowish red (5YR 4/6, 4/8), reddish yellow (5YR 6/6), or red (2.5YR 4/6, 4/8). Below a depth of about 36 inches, it ranges to dark red (2.5YR 3/6). Mottles in shades of brown, yellow, and red range from few to common in the lower part. The texture is loam, clay loam, or sandy clay loam. Below 36 inches, it ranges to sandy clay or clay in some pedons.

Armuchee series

The Armuchee series consists of moderately deep, well drained soils on ridges. These soils formed in residuum of acid shale. The slope range is 5 to 60 percent.

Armuchee soils are geographically associated with Sequoia, Montevallo, Bland, Lehew, and Muskingum soils and are in similar positions on the landscape. Sequoia, Bland, and Muskingum soils have a solum thicker than 20 inches. The subsoil of Montevallo and Lehew soils is more than 35 percent by volume coarse fragments. Montevallo, Lehew, and Muskingum soils have a loamy subsoil.

Typical pedon of Armuchee silt loam, 20 to 45 percent slopes, on the crest of a low ridge about 1.0 mile south of Medford Station, 300 feet north of a gravel road, and 900 feet west of L and N Railroad:

A11—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many fine and medium roots; many fine pores; 10 percent by volume fragments of shale; very strongly acid; abrupt smooth boundary.
A12—1 inch to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; common fine and medium roots; 10 percent by volume fragments of shale; very strongly acid; abrupt smooth boundary.
A2—3 to 6 inches; brown (10YR 5/3) shaly silt loam; weak fine granular structure; friable; common fine and medium roots; common fine pores; 30 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
B1—6 to 9 inches; strong brown (7.5YR 5/6) shaly silty clay loam; weak fine granular and weak fine subangular blocky structure; friable; common fine roots; common fine pores; 30 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
B21t—9 to 13 inches; yellowish red (5YR 5/6) shaly silty clay; weak medium subangular blocky structure; firm; few fine roots; many thin clay films on faces of peds; about 30 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
B22t—13 to 18 inches; yellowish red (5YR 5/6) shaly silty clay; moderate medium subangular blocky structure; firm; few fine roots; many thin clay films on faces of peds; about 25 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
C—18 to 24 inches; strong brown (7.5YR 5/6) very shaly silty clay; massive to weak coarse platy structure; very firm; few fine roots; 60 percent by volume fragments of shale; very strongly acid.
Cr—24 to 40 inches; green, red, and yellow weakly consolidated shale; strong brown (7.5YR 5/6) silty clay between layers of shale in cracks; very strongly acid.

Solum thickness ranges from 8 to 20 inches. Depth to shale bedrock ranges from 20 to 36 inches. Except where limed, the soil is strongly or very strongly acid in all horizons. Fragments of soft shale make up 10 to 30 percent by volume of the A horizon, 15 to 35 percent of the B horizon, and 40 to 80 percent of the C horizon.

The A1 horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). The A2 or Ap horizon

is dark grayish brown (10YR 4/2), brown (10YR 5/3, 4/3), yellowish brown (10YR 5/4), and in the eroded areas, strong brown (7.5YR 5/6) or yellowish red (5YR 4/6, 5/6). The fine earth fraction is silt loam or silty clay loam.

The B horizon is yellowish brown (10YR 5/6, 5/8), strong brown (7.5YR 5/6), or yellowish red (5YR 5/6, 4/6, 4/8). It has yellowish, brownish, and reddish mottles in some pedons. The fine earth fraction is silty clay or silty clay loam.

The C horizon is strong brown (7.5YR 5/6) or yellowish brown (10YR 5/4, 5/6, 5/8). In some pedons it is mottled with shades of brown, red, yellow, or gray. The fine earth fraction is silty clay or silty clay loam.

Bland series

The Bland series consists of moderately deep, well drained soils on uplands. These soils formed in material weathered from purplish limestone. Most areas are on the upper north-facing slopes of East Fork Ridge, Lost Ridge, and Blue Bird Ridge. The slope range is about 10 to 50 percent.

Bland soils are adjacent to Armuchee and Muskingum soils. Muskingum and Armuchee soils formed in residuum of shale. In Armuchee soils the surface layer and subsoil combined are less than 20 inches thick. Muskingum soils have a loamy subsoil. Neither Armuchee nor Muskingum soils have reddish brown colors.

The Bland soils in Anderson County are mapped only with Rock outcrop.

Typical pedon of Bland silt loam in an area of Bland-Rock outcrop complex, 20 to 50 percent slopes, along a road about 950 feet north of Indian Gap Church and about 0.75 mile south of Andersonville:

A1—0 to 3 inches; dark reddish brown (5YR 3/2) silt loam; moderate fine granular structure; friable; many fine, medium, and coarse roots; few medium fragments of sandstone; neutral; abrupt smooth boundary.

B1—3 to 7 inches; reddish brown (5YR 4/3) silty clay; common granules of dark reddish brown (5YR 3/2) from the A1; moderate fine granular structure and moderate fine and medium subangular blocky; firm; many fine, medium, and coarse roots; few fragments of sandstone, neutral; clear smooth boundary.

B21t—7 to 17 inches; reddish brown (5YR 4/3) clay; strong medium and coarse angular blocky structure; very firm; common fine, medium, and coarse roots; few thin patchy clay films on faces of peds; medium acid; gradual smooth boundary.

B22t—17 to 27 inches; weak red (2.5YR 4/2) clay; strong medium angular blocky structure; very firm; few fine roots; thin continuous clay films; medium acid; gradual smooth boundary.

B23t—27 to 31 inches; reddish brown (5YR 4/3) silty clay; common fine mottles of light olive brown (2.5Y 5/4) and few fine mottles of dusky red (10R 3/3); moderate medium subangular blocky structure; very firm; few fine roots; common fine pores; thin continuous clay films on faces of peds; few fragments of chert; few fine black concretions; slightly acid; gradual smooth boundary.

C—31 to 36 inches; dark reddish brown (2.5YR 3/4) channery silty clay; many fine and medium mottles of light olive brown; massive in place; breaks into medium platy structure; firm; 25 percent highly weathered fragments of limestone; neutral.

R—36 inches; hard, dusky red limestone.

Thickness of the solum and depth to limestone range from 20 to 40 inches. The content of coarse fragments, mostly limestone, ranges from 0 to 15 percent in the A and B horizons and from 10 to 50 percent in the C horizon. The soil is strongly acid to neutral.

The A horizon is reddish brown (5YR 4/3, 5/3), dark reddish brown (5YR 3/2, 3/3), reddish gray (5YR 5/2), and dark reddish gray (5YR 4/2). It is silt loam or silty clay loam.

The B1 horizon is reddish brown (5YR 4/3), dark reddish brown (5YR 3/2, 3/3), weak red (2.5YR 4/2), and dusky red (2.5YR 3/2) silty clay.

The B2t horizon is reddish brown (5YR 4/3), dark reddish brown (5YR 3/3, 3/2), dark reddish gray (5YR 4/2), weak red (2.5YR 4/2), and dusky red (2.5YR 3/2) silty clay or clay.

The C horizon has the same range in color and texture as the B2t horizon, but in the C horizon the range includes dark reddish brown (2.5YR 3/4).

Bodine series

The Bodine series consists of deep, well drained, cherty soils (fig. 19) that formed in residuum of dolomite. Most areas are on steep wooded hillsides. A few are on narrow ridgetops. The slope range is 5 to 50 percent, but in most areas the gradient is between 15 and 45 percent.

Bodine soils are geographically closely associated with Fullerton and Claiborne soils and are in similar positions on the landscape. Fullerton soils have a yellowish red and red cherty clay subsoil and are not so cherty as Bodine soils. Claiborne soils have a dark surface layer and a reddish subsoil. They contain a few fragments of chert.

Typical pedon of Bodine cherty silt loam, 25 to 50 percent slopes, on the east side of Whittaker Hollow Road about 0.5 mile southeast of the junction of Whittaker Hollow Road and Island Ford Road:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) cherty silt loam; weak fine granular structure; many fine, medium, and coarse roots; 25 percent by volume fragments of chert; friable; strongly acid; clear smooth boundary.

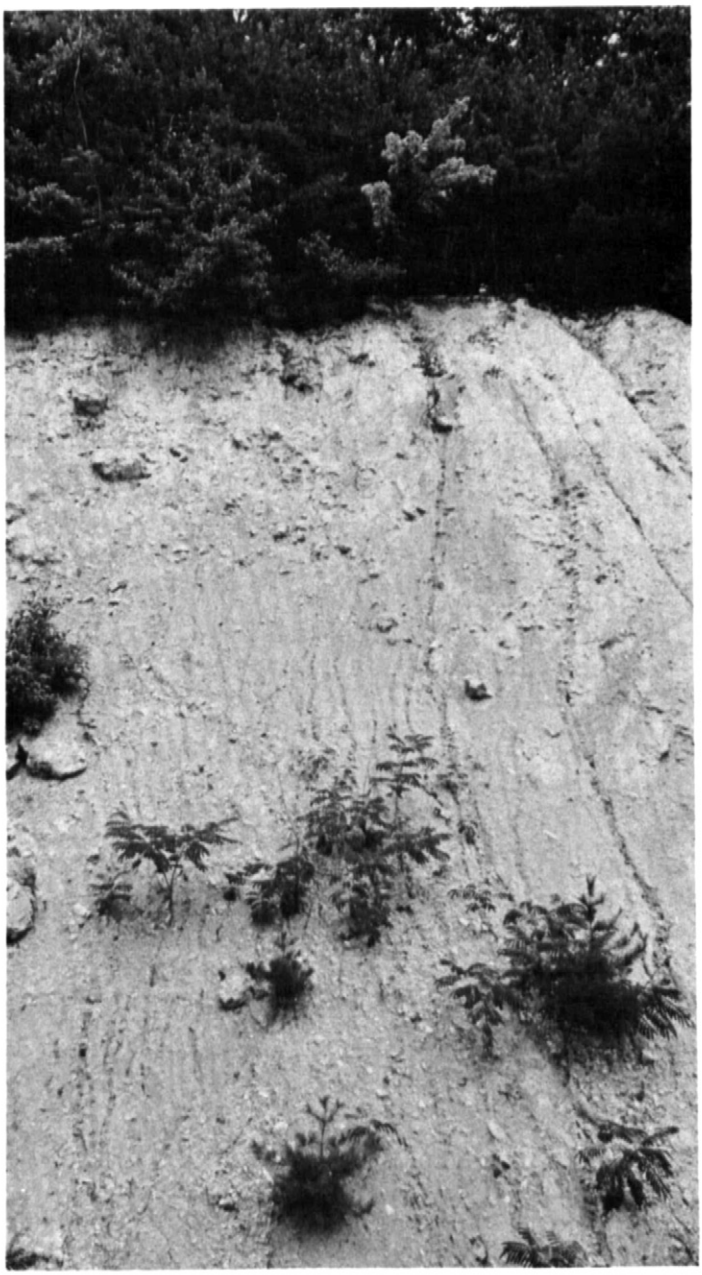


Figure 19.—Typical profile of a cherty Bodine soil.

A2—2 to 11 inches; light yellowish brown (10YR 6/4) cherty silt loam; weak fine granular structure; friable; many fine, medium, and coarse roots; 25 percent by volume fragments of chert; strongly acid; clear smooth boundary.

B1—11 to 15 inches; brownish yellow (10YR 6/6) cherty silt loam; weak medium subangular blocky and granular structure; many fine, medium, and coarse roots; friable; 35 percent by volume fragments of chert; strongly acid; clear smooth boundary.

B21t—15 to 29 inches; light yellowish brown (10YR 6/4) cherty silt loam; weak medium subangular blocky structure; few thin clay films on faces of peds; 40 percent by volume fragments of chert; strongly acid; clear wavy boundary.

B22t—29 to 43 inches; yellowish brown (10YR 5/6) very cherty silt loam; moderate medium and fine subangular blocky structure; few thin clay films on faces of peds; 45 percent by volume fragments of chert; friable; strongly acid; clear wavy boundary.

B23t—43 to 63 inches; brownish yellow (10YR 6/6) very cherty silt loam; moderate medium and fine subangular blocky structure; few thin clay films on faces of peds; 45 percent by volume fragments of chert; friable; strongly acid.

Thickness of the solum and depth to dolomite bedrock are more than 60 inches. The content of chert fragments ranges from 20 to 60 percent in the A horizon and from 35 to 60 percent in the B horizon. The soil is strongly acid to extremely acid except for the surface layer where limed.

The A1 horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). The A2 or Ap horizon is brown (10YR 4/3, 5/3), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), grayish brown (10YR 5/2), or yellowish brown (10YR 5/4). The fine earth fraction of the A horizon is silt loam, loam, or sandy loam.

The B1 horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6, 6/8), strong brown (7.5YR 5/6, 5/8), or reddish yellow (7.5YR 6/6, 6/8). The fine earth fraction is silt loam, loam, or sandy loam.

The B2t horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6, 6/8), strong brown (7.5YR 5/6, 5/8), or reddish yellow (7.5YR 6/6, 6/8). The number of brownish, yellowish, and reddish mottles ranges from none to many throughout this horizon. The fine earth fraction is silt loam, loam, silty clay loam, or clay loam. In some subhorizons in the lower part, it ranges to clay.

Calvin series

The Calvin series consists of moderately deep, well drained soils that formed in residuum of reddish shale. These soils are on hills and ridges. The slope range is 8 to 45 percent.

Calvin soils are geographically closely associated with Montevallo and Shouns soils. Montevallo soils, on adjacent hills and ridges, are 20 inches or less deep over shale bedrock. Shouns soils, on benches and foot slopes, are 5 feet or more deep over bedrock, and the upper 20 inches of their subsoil is less than 35 percent coarse fragments.

Typical pedon of Calvin shaly silt loam, 8 to 25 percent slopes, in a wooded site near the guard house

on Y-12 Road on the Atomic Energy Commission property:

A1—0 to 1 inch; dark brown (7.5YR 4/2) silt loam; moderate medium granular structure; very friable; many fine, medium, and coarse roots; 10 percent by volume fragments of shale; very strongly acid; abrupt smooth boundary.
A2—1 inch to 6 inches; reddish brown (5YR 5/4) shaly silt loam; weak medium and fine granular structure; very friable; many fine, medium, and coarse roots; 15 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
B2—6 to 22 inches; reddish brown (2.5YR 4/4) shaly silt loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; 35 percent by volume fragments of shale; very strongly acid; clear smooth boundary.
B3—22 to 27 inches; reddish brown (2.5YR 4/4) very shaly silt loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; 50 percent by volume fragments of shale; very strongly acid; abrupt wavy boundary.
C—27 to 29 inches; weak red (10R 4/4) very shaly silt loam; massive; friable; few fine, medium, and coarse roots; 80 percent by volume coarse fragments; very strongly acid; abrupt wavy boundary.
R—29 inches; reddish shale.

Solum thickness ranges from 20 to 35 inches. Depth to shale bedrock ranges from 20 to 40 inches. The soil is mainly strongly or very strongly acid throughout but ranges to medium acid. The content of shale fragments is 5 to 25 percent in the A horizon, 25 to 55 percent in the B horizon, and 40 to 80 percent in the C horizon.

The A2 or Ap horizon is dark brown (7.5YR 4/4, 4/2) and reddish brown (5YR 5/3, 4/3, 4/4, 5/4). Undisturbed pedons have a dark brown (7.5YR 4/2), dark reddish gray (5YR 4/2), or very dark grayish brown (10YR 3/2) A1 horizon. The fine earth fraction is silt loam or loam.

The B horizon is reddish brown (2.5YR 4/4), dark reddish brown (5YR 3/4; 2.5YR 3/4), weak red (10R 4/3, 4/4), and dusky red (2.5YR 3/2; 10R 3/2, 3/3, 3/4). The fine earth fraction is silt loam or silty clay loam.

The C horizon is weak red (10R 4/3, 4/4) and dusky red (2.5YR 3/2; 10R 3/2, 3/3, 3/4). The fine earth fraction is silt loam or loam.

Capshaw series

The Capshaw series consists of moderately well drained soils that formed in alluvium or in a thin layer of alluvium over a layer of clay derived from limestone. These soils are on gently sloping stream terraces, in slight depressions, and on broad nearly level uplands. The slope range is 2 to 5 percent.

Capshaw soils are geographically closely associated with Carbo and Collegedale soils. Carbo soils are in slightly higher positions than Capshaw soils. They are more than 60 percent clay in the B horizon. Collegedale soils are generally steeper and have a reddish clay subsoil.

Typical pedon of Capshaw silt loam, 2 to 5 percent slopes, in a pasture 0.6 mile southeast of Bethel interchange, I-75, and 600 feet west of I-75:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; many fine roots; neutral; clear smooth boundary.
B21t—6 to 12 inches; yellowish brown (10YR 5/8) silty clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few discontinuous clay films on faces of peds; common fine black concretions; medium acid; gradual smooth boundary.
B22t—12 to 20 inches; yellowish brown (10YR 5/8) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles and few fine distinct very dark grayish brown (2.5Y 3/2) mottles in the lower 2 inches; weak fine and medium subangular blocky structure; friable; few discontinuous clay films on faces of peds; common fine and medium black concretions; medium acid; gradual wavy boundary.
B23t—20 to 32 inches; light olive brown (2.5Y 5/4) clay; common fine distinct red (2.5YR 4/8) and few fine very dark grayish brown (2.5Y 3/2) mottles; moderate medium angular blocky structure; firm; continuous clay films on faces of peds; common fine and medium concretions; strongly acid; gradual wavy boundary.
B24t—32 to 45 inches; olive brown (2.5Y 4/4) clay; many medium faint yellowish brown (10YR 5/4) mottles and many medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium and coarse angular blocky structure; very firm; discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.
C—45 to 60 inches; mottled light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/6), and gray (N 6/0) clay; massive; firm; common medium and coarse black concretions; slightly acid.

Solum thickness ranges from 40 to 60 inches. Depth to bedrock ranges from 48 to 72 inches or more. Reaction is medium or strongly acid in the A and B horizons and ranges from medium to mildly alkaline in the C horizon. The surface layer is less acid in limed areas.

The A horizon is brown (10YR 5/3, 4/3) or dark yellowish brown (10YR 4/4). It is silt loam or loam.

The B horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light olive brown (2.5Y 5/4, 5/6), and olive brown (2.5Y 4/4). It is mottled with shades of brown, yellow, gray, or red in some pedons. Mottles with chroma of 2 or less are in subhorizons below the upper 10 inches of the B2t. The texture is silty clay loam, silty clay, or clay. Some pedons have a silt loam B1 horizon.

The C horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (2.5Y 6/4), grayish brown (2.5Y 5/2), or gray (N 6/0). Some pedons are mottled and do not have a dominant matrix color.

Carbo series

The Carbo series consists of well drained, moderately deep soils formed in residuum of limestone. The slope range is 3 to 12 percent.

Carbo soils are geographically associated with Capshaw and Collegedale soils and occupy similar positions on the landscape. Capshaw soils are 40 to 60 inches deep over bedrock. Collegedale soils have a yellowish red and red subsoil. They are more than 60 inches deep over bedrock.

Typical pedon of Carbo silty clay loam, 3 to 12 percent slopes, along Raccoon Valley Road about 300 feet east of U.S. Highway 25W:

Ap—0 to 6 inches; brown (10YR 4/3) silty clay loam; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

B21t—6 to 11 inches; yellowish brown (10YR 5/4) clay; common fine mottles of yellowish brown (10YR 5/6); many peds coated with a thin dark organic film; strong medium angular blocky structure; very firm; many fine roots; thick clay films on faces of peds; neutral; gradual smooth boundary.

B22t—11 to 20 inches; yellowish brown (10YR 5/6) clay; common medium faint strong brown (7.5YR 5/6) and brownish yellow (10YR 6/6) mottles; strong medium and coarse angular blocky structure; very firm; few fine roots; thick clay films on faces of peds; 10 percent by volume limestone fragments ranging up to 10 inches across; neutral; diffuse smooth boundary.

B3—20 to 25 inches; mottled yellowish brown (10YR 5/6), brownish yellow (10YR 6/6), and olive yellow (2.5Y 6/6) flaggy clay; moderate medium angular blocky structure; firm; 20 percent by volume limestone fragments up to 10 inches across; many fine black concretions; mildly alkaline.

R—25 inches; Chickamauga Limestone.

The solum thickness and depth to bedrock are dominantly between 20 and 40 inches. The soil is strongly acid to neutral in the A and B2t horizons and medium acid to mildly alkaline in the B3 horizon. The B3 and C horizons are not identifiable in all pedons. The content of coarse fragments, mostly limestone, ranges from 0 to 10 percent by volume in the A horizon and from 0 to 20 percent in the B horizon.

The A horizon is brown (10YR 5/3, 4/3), yellowish brown (10YR 5/4), or dark yellowish brown (10YR 4/4). It is 3 to 7 inches thick. Texture is silt loam or silty clay loam in most pedons but ranges to silty clay and clay.

The B2t horizon is yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or reddish yellow (5YR 6/6, 6/8). Some pedons are mottled with shades of yellow and brown. The clay content is 60 to 70 percent.

The B3 and C horizons are light olive brown (2.5Y 5/4, 5/6), olive brown (2.5Y 4/4), yellowish brown (10YR 5/4, 5/6, 5/8), and strong brown (7.5YR 5/6, 5/8). In many pedons these horizons are mottled in shades of yellow and brown to the extent that no dominant matrix color is evident. They are clay or flaggy clay.

Claiborne series

The Claiborne series consists of deep, well drained soils that formed in sediment deposited by water or in residuum of dolomite. These soils are on ridgetops, on hillsides, and at the base of slopes. The slope range is 5 to 45 percent, but in most areas the gradient is 12 to 30 percent.

Claiborne soils are adjacent to Fullerton and Bodine soils. Fullerton and Bodine soils are cherty. Fullerton soils have a yellowish red and red cherty clay subsoil. Bodine soils have a yellowish brown very cherty loamy subsoil.

Typical pedon of Claiborne silt loam, 12 to 25 percent slopes, about 700 feet west of U.S. Highway 25 and 1,600 feet southwest of the Blowing Springs school:

Ap—0 to 7 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; friable; many fine roots; 5 percent by volume fragments of chert; medium acid; clear wavy boundary.

B1—7 to 16 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure parting to weak medium granular; friable; many fine roots; 5 percent by volume fragments of chert; strongly acid; gradual smooth boundary.

B21t—16 to 24 inches; yellowish red (5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few thin patchy clay films on faces of peds; 5 percent by volume fragments of chert; few fine black concretions; strongly acid; gradual smooth boundary.

B22t—24 to 42 inches; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; many thin patchy clay films on faces of peds; 5 percent by volume fragments of chert; few fine black concretions; strongly acid; gradual smooth boundary.

B23t—42 to 62 inches; red (2.5YR 4/8) clay; moderate medium angular blocky structure; firm; thin continuous clay films; 10 percent by volume fragments of chert; few fine black concretions; strongly acid.

The solum is more than 60 inches thick. Depth to dolomite bedrock is more than 72 inches. The soil is strongly acid or very strongly acid throughout except for the surface layer where limed. The content of coarse

chert fragments ranges from 5 to 25 percent in each horizon. These fragments commonly increase in size and abundance with increasing depth.

The A horizon is dark brown (10YR 3/3, 7.5YR 3/2), dark yellowish brown (10YR 3/4), or very dark grayish brown (10YR 3/2). The fine earth fraction is silt loam or loam.

The B1 horizon is reddish brown (5YR 4/4), brown (7.5YR 4/4), or strong brown (7.5YR 5/6). The fine earth fraction is silt loam or loam.

The B2t horizon is reddish brown (5YR 4/4), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or red (2.5YR 4/6, 4/8). It is dark red (2.5YR 3/6) in the lower part of some pedons. The fine earth fraction of the B21t and B22t horizons is silty clay loam. In the B23t horizon, it is silty clay loam, silty clay, or clay.

Collegedale series

The Collegedale series consists of deep, well drained soils on uplands underlain by limestone. The slope range is 2 to 35 percent.

Collegedale soils are adjacent to Carbo and Gladeville soils. Carbo soils are less than 40 inches deep over bedrock and have a yellowish subsoil. Gladeville soils are less than 12 inches deep over bedrock and in many places are interrupted by limestone outcrop.

Typical pedon of Collegedale silt loam, 5 to 12 percent slopes, on the north side of Raccoon Valley Road about 200 feet east of U.S. Highway 25:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

B21t—5 to 18 inches; yellowish red (5YR 5/6) clay; strong medium subangular blocky structure; very firm; thin clay films on faces of peds; few roots; strongly acid; clear smooth boundary.

B22t—18 to 26 inches; yellowish red (5YR 5/6) clay; few fine and medium yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; very firm; clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—26 to 64 inches; mottled yellowish red (5YR 5/6), light yellowish brown (10YR 6/4), and yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; very firm; clay films on faces of peds; strongly acid.

Solum thickness and depth to bedrock range from 60 to 80 inches or more. The soil is strongly acid or very strongly acid throughout except for the surface layer where limed. The content of coarse fragments, mostly chert, ranges from 0 to 10 percent in each horizon.

The A horizon is brown (10YR 4/3; 7.5YR 5/4, 4/4) silt loam. In severely eroded areas, it is strong brown (7.5YR 5/6), red (2.5YR 4/6), or yellowish red (5YR 5/6, 4/6) silty clay loam or silty clay.

Some pedons have a B1 horizon. This horizon is yellowish red (5YR 5/6, 4/6), reddish brown (5YR 4/4), or strong brown (7.5YR 5/6) silty clay loam.

The B2t horizon is yellowish red (5YR 5/6, 5/8, 4/6, 4/8) or red (2.5YR 5/6, 4/6, 4/8) silty clay or clay. In many pedons it is mottled with shades of red, yellow, brown, olive, and gray in the lower part. The size and number of mottles generally increase with increasing depth. In some pedons the lower horizons are mottled to the extent that there is no dominant color.

Cynthiana series

The Cynthiana series consists of shallow, well drained soils on uplands. These soils formed in residuum of interbedded limestone and shale. The slope range is 10 to 35 percent.

Cynthiana soils are commonly adjacent to Collegedale soils, which in contrast are at a higher elevation, are deeper over bedrock, and have a yellowish red clay subsoil.

Typical pedon of Cynthiana flaggy silty clay loam, 10 to 35 percent slopes, about 900 feet southeast of the junction of U.S. Highway 441 and Cobb Hollow Road:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) flaggy silty clay loam; strong fine granular structure; friable; many fine, medium, and coarse roots; 15 percent by volume fragments of limestone and shale; neutral; abrupt smooth boundary.

B21t—1 to 5 inches; light olive brown (2.5Y 5/4) flaggy clay; strong medium angular blocky structure; very firm; many fine, medium, and coarse roots; thin clay films on faces of peds; 15 percent by volume fragments of limestone and shale; mildly alkaline; abrupt smooth boundary.

B22t—5 to 7 inches; dark yellowish brown (10YR 4/4) flaggy clay; moderate medium angular blocky structure; very firm; many fine, medium, and coarse roots; thin clay films on faces of peds; 15 percent by volume fragments of limestone and shale; mildly alkaline; abrupt smooth boundary.

B23t—7 to 12 inches; yellowish brown (10YR 5/4) flaggy clay; moderate medium angular blocky structure; very firm; common fine, medium, and coarse roots; thin patchy clay films on faces of peds; 15 percent fragments of limestone and soft fragments of shale; mildly alkaline; abrupt smooth boundary.

C—12 to 19 inches; dark brown (7.5YR 3/2) flaggy silty clay; massive; firm; common fine, medium, and coarse roots; 30 percent by volume fragments of limestone and soft fragments of shale; mildly alkaline; abrupt smooth boundary.

R—19 inches; thin layers of limestone separated by shale.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. Reaction ranges from slightly acid

to mildly alkaline. The volume of fragments of shale or limestone ranges from 0 to 30 percent in the A horizon and from 10 to 35 percent in the B and C horizon.

The A horizon is very dark grayish brown (10YR 3/2, 2.5Y 3/2), dark grayish brown (10YR 4/2, 2.5Y 4/2), brown (10YR 4/3), or dark yellowish brown (10YR 4/4). The fine earth fraction is silt loam or silty clay loam.

The B2t horizon is dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6), light olive brown (2.5Y 5/4, 5/6), olive brown (2.5Y 4/4), or olive (5Y 5/4, 5/6). The fine earth fraction is silty clay or clay.

The C horizon is similar in color and texture to the B2t horizon, but the range in color includes dark brown (7.5YR 3/2). Also, in some pedons the C horizon is mottled with shades of brown, olive, or gray.

Dewey series

The Dewey series consists of deep, well drained soils on uplands. These soils formed in a foot or two of alluvium and several feet of residuum over dolomite. The slope range is 5 to 25 percent.

Dewey soils are geographically closely associated with Dunmore soils and occupy similar positions on the landscape. Dunmore soils have a yellower hue and a higher value in the A horizon and upper part of the B horizon than Dewey soils.

Typical pedon of Dewey silt loam, 12 to 25 percent slopes, about 3/4 of a mile north of Raccoon Valley Road and 1/2 mile west of the Knox County line:

Ap—0 to 6 inches; dark brown (7.5YR 3/2) silt loam; few fine particles of dark red (2.5YR 3/6) clay; moderate fine granular structure; friable; many fine roots; neutral; clear smooth boundary.

B21t—6 to 17 inches; dark red (2.5YR 3/6) clay; moderate medium angular blocky structure; firm; common fine roots; few clay films on faces of peds; few fine fragments of chert; strongly acid; gradual smooth boundary.

B22t—17 to 34 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm; few fine roots; common clay films on faces of peds; 5 percent by volume fine weathered fragments of chert; few fine black concretions and stains; strongly acid; gradual smooth boundary.

B23t—34 to 45 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm; few fine roots; common clay films on faces of peds; few fragments of chert ranging up to 3 inches across; few fine black concretions; strongly acid; gradual smooth boundary.

B24t—45 to 62 inches; red (2.5YR 4/8) clay; common distinct mottles of yellowish brown (10YR 5/6); moderate medium angular blocky structure; firm; many clay films on faces of peds; few fragments of chert ranging up to 3 inches in diameter; strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. The soil is strongly acid throughout except for the surface layer where limed. The content of coarse fragments in the upper 40 inches of the profile ranges from 0 to 15 percent by volume. Below 40 inches it ranges from 0 to 25 percent.

The A horizon is dark brown (7.5YR 3/2, 4/4), dark reddish brown (5YR 3/3, 3/4; 2.5YR 3/4), and reddish brown (5YR 4/3, 4/4). In some severely eroded areas it is red or dark red (2.5YR 4/6, 3/6). The texture is mainly silt loam or silty clay loam. It ranges from silty clay loam to clay in severely eroded areas.

The B1, B21t, B22t, and B23t horizons are dark red (2.5YR 3/6) or red (2.5YR 4/6, 4/8). The B24t horizon is red (2.5YR 4/6, 4/8) or yellowish red (5YR 4/6, 4/8). The B23t and B24t horizons in some pedons are mottled in shades of yellow, brown, or red. The texture of the B horizon ranges from silty clay loam in the B1 to silty clay or clay in the B2t and B3 horizons.

Dunmore series

The Dunmore series consists of deep, well drained soils on hills and ridges. These soils formed in residuum of dolomite. The slope range is 5 to 25 percent.

Dunmore soils are adjacent to Dewey and Fullerton soils. Dewey soils have a redder hue and a lower value in the A horizon and upper part of the B horizon than Dunmore soils. Fullerton soils are 15 to 35 percent chert in each horizon.

Typical pedon of Dunmore silt loam, 5 to 12 percent slopes, about a mile northwest of Foust Cemetery and 1.4 miles southwest of Hilldale:

A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many fine roots; few fragments of chert; neutral; abrupt smooth boundary.

A2—2 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; many fine roots; 3 percent by volume fragments of chert; very strongly acid; clear smooth boundary.

B1—11 to 14 inches; yellowish red (5YR 5/8) silty clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; 5 percent by volume fragments of chert; very strongly acid; clear smooth boundary.

B21t—14 to 26 inches; yellowish red (5YR 4/8) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many clay films on faces of peds; 4 percent by volume fragments of chert; very strongly acid; gradual smooth boundary.

B22t—26 to 41 inches; red (2.5YR 4/8) clay; common prominent medium mottles of yellowish brown (10YR 5/8); strong medium angular blocky structure; very firm; few fine roots; many thick clay films on faces of peds; 4 percent by volume fragments of chert; very strongly acid; gradual smooth boundary.

B23t—41 to 62 inches; red (2.5YR 4/8) clay; common medium mottles of yellowish brown (10YR 5/8); some ped exteriors are dark red (2.5YR 3/6); strong medium angular blocky structure; very firm; many thick clay films on faces of peds; 10 percent by volume fragments of chert; very strongly acid.

Thickness of the solum and depth to dolomite bedrock are more than 60 inches. The soil is strongly or very strongly acid except for the surface layer where limed. The content of coarse fragments, mainly chert, ranges from 0 to 10 percent by volume in each horizon.

The A2 or Ap horizon is yellowish brown (10YR 5/4) or brown (10YR 4/3, 5/3). In severely eroded areas both horizons are strong brown (7.5YR 5/6) or yellowish red (5YR 5/6). Pedons in uneroded wooded areas have a thin A1 horizon of dark grayish brown (10YR 4/2) or brown (10YR 4/3). The A horizon is silt loam, loam, or silty clay loam.

The B1 horizon is strong brown (7.5YR 5/6) or yellowish red (5YR 4/6, 4/8, 5/6, 5/8). The B2t horizon is yellowish red (5YR 4/6, 4/8, 5/6, 5/8) or red (2.5YR 4/6, 4/8). Some pedons have peds with dark red (2.5YR 3/6) exteriors. Mottles in shades of yellow and brown are none to few in the upper part of the B horizon and range to common or many in the lower part. The B2t horizon is commonly clay but is silty clay in some pedons.

Ealy series

The Ealy series consists of deep, well drained, nearly level soils on bottom lands. These soils formed in alluvium washed from soils underlain by shale, sandstone, and siltstone. The slope range is 0 to 3 percent, but the gradient is commonly less than 2 percent.

Ealy soils are geographically closely associated with Sewanee and Welchland soils. Sewanee soils are on first bottoms and are moderately well drained. Welchland soils are on low terraces and have an argillic horizon.

Typical pedon of Ealy loam in an area of Welchland-Ealy complex, 0 to 5 percent slopes, about 1,300 feet southeast of Rosedale School and 20 feet north of New River on a nearly level flood plain:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine and medium roots; many very fine pores; few fine particles of coal; neutral; clear smooth boundary.

B21—8 to 18 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and medium roots; few fine particles of coal; strongly acid; gradual smooth boundary.

B22—18 to 28 inches; brown (10YR 4/3) loam; few fine faint mottles of strong brown (7.5YR 5/8), grayish brown (10YR 5/2), and light yellowish brown (10YR 6/4); weak medium subangular blocky structure parting to weak fine granular; very friable; common fine and medium roots; few fine particles of coal; strongly acid; clear smooth boundary.

C1—28 to 34 inches; dark grayish brown (10YR 4/2) loam; few fine faint mottles of grayish brown (10YR 5/2); massive; very friable; few fine and medium roots; common fine particles of coal; very strongly acid; gradual smooth boundary.

C2—34 to 60 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; few fine and medium roots; few fragments of sandstone, most of which are less than 3 inches in diameter; few fine particles of coal; very strongly acid.

Depth to bedrock is more than 60 inches. The soil is strongly acid except for the surface layer where limed. The content of coarse fragments ranges from 0 to 15 percent in each horizon.

The A horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2). It is loam or fine sandy loam.

The B2 horizon is brown (10YR 4/3, 5/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4). It is loam or fine sandy loam.

In the C horizon the color range includes dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) in addition to the colors in the B2 horizon. The C horizon is loam or fine sandy loam with thin layers of loamy fine sand and silt loam.

Emory series

The Emory series consists of deep, well drained soils along drainageways, in depressions, and on foot slopes. These soils formed in local alluvium washed or rolled from soils on nearby slopes. The slope range is 0 to 4 percent.

Emory soils are geographically closely associated with Claiborne soils. Claiborne soils, on adjacent uplands, have a yellowish red and red subsoil.

Typical pedon of Emory silt loam, 0 to 4 percent slopes, in a narrow drainageway in the X-10 area, 1/2 mile east of a checking station on Melton Valley Road:

Ap—0 to 9 inches; dark brown (7.5YR 3/2) silt loam; moderate fine granular structure; friable; many fine and medium roots; neutral; clear smooth boundary.

B1—9 to 21 inches; dark reddish brown (5YR 3/3) silt loam; moderate fine granular and weak fine subangular blocky structure; friable; many fine and medium roots; few 1/2- to 1-inch fragments of chert; medium acid; clear smooth boundary.

B2—21 to 30 inches; dark reddish brown (5YR 3/4) silt loam; weak fine subangular blocky and moderate fine granular structure; friable; few fine roots; few 1/2- to 1-inch fragments of chert; few fine black concretions; medium acid; clear smooth boundary.

B3—30 to 36 inches; reddish brown (5YR 4/4) silty clay loam; common fine mottles of yellowish red (5YR 4/

6); weak medium subangular blocky structure; friable; few 1/2- to 1-inch fragments of chert; few fine black concretions; medium acid; gradual smooth boundary.
B2tb—36 to 60 inches; yellowish red (5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few 1/2- to 1-inch fragments of chert; few fine black concretions; strongly acid.

Thickness of the local alluvium over the buried soil ranges from 20 to 36 inches. The soil is medium acid or strongly acid in all parts except for the surface layer where limed. Coarse fragments, mainly chert, make up less than 10 percent by volume of each horizon.

The Ap horizon is dark reddish brown (5YR 3/2, 3/3, 3/4) and dark brown (7.5YR 3/2) silt loam or silty clay loam.

The B2 horizon is dark reddish brown (5YR 3/2, 3/3, 3/4) or reddish brown (5YR 5/4, 4/4; 2.5YR 4/4). It is silt loam or silty clay loam. Many pedons have an A1b horizon of dark brown (7.5YR 4/4) or dark reddish brown (5YR 3/2, 3/3, 3/4) silt loam or silty clay loam. The B2tb horizon is strong brown (7.5YR 5/6, 5/8), reddish brown (5YR 4/4, 5/4), dark reddish brown (5YR 3/2, 3/3), yellowish red (5YR 4/6), or dark red (2.5YR 3/6). Texture is silty clay loam, clay loam, silty clay, or clay.

Etowah series

The Etowah series consists of deep, well drained soils that formed in alluvium or colluvium. These soils are on intermediate terraces along the larger streams and on benches in uplands. The slope range is 2 to 12 percent.

Etowah soils are adjacent to Monongahela and Holston soils. Monongahela soils have a fragipan. Holston soils have a brown surface layer and have hue of 10YR or 7.5YR in the subsoil.

Typical pedon of Etowah silt loam, 2 to 5 percent slopes, in Eagle Bend, about 50 feet from the entrance to rubber company on the south side of the road:

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; weak medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.
B1—6 to 15 inches; reddish brown (5YR 4/4) silty clay loam; few dark brown (10YR 3/3) silt loam particles from horizon above; weak medium subangular blocky structure parting to weak fine granular; friable; common fine roots; medium acid; clear smooth boundary.
B21t—15 to 23 inches; yellowish red (5YR 4/6) silty clay loam; worm or root channels are coated with dark brown (10YR 3/3); moderate medium subangular blocky structure; friable; few fine roots; few fine and very fine pores; common thin patchy clay films on faces of peds; strongly acid; diffuse smooth boundary.
B22t—23 to 35 inches; yellowish red (5YR 4/8) silty clay loam; few worm holes or root channels coated with dark brown (10YR 3/3); moderate medium subangular blocky structure; friable; few fine roots; few fine and very fine pores; common thin clay films on faces of peds; strongly acid; diffuse smooth boundary.
B23t—35 to 50 inches; red (2.5YR 4/8) silty clay loam; moderate medium angular blocky structure; friable; continuous clay films; very strongly acid; diffuse smooth boundary.
B24t—50 to 62 inches; red (2.5YR 4/8) clay loam; moderate medium angular blocky structure; friable; continuous clay films; very strongly acid; diffuse smooth boundary.

Thickness of the solum is more than 60 inches. The depth to bedrock is more than 72 inches. The soil is strongly or very strongly acid throughout except for the surface layer where limed. The content of coarse fragments, mainly chert, ranges from 0 to 15 percent by volume in each horizon.

The A horizon is dark brown (7.5YR 3/2; 10YR 3/3), dark yellowish brown (10YR 3/4), or dark reddish brown (5YR 3/2, 3/3, 3/4). It is silt loam or loam. In some severely eroded areas it is silty clay loam.

The B1 horizon is reddish brown (5YR 4/4; 2.5YR 4/4) or dark brown (7.5YR 4/4). It is silt loam, loam, or silty clay loam.

The B2t horizon is yellowish red (5YR 4/6, 4/8, 5/6) or red (2.5YR 4/6, 4/8, 5/6). It is silty clay loam or clay loam.

Fullerton series

The Fullerton series consists of deep, well drained cherty soils that formed in residuum of dolomite. These soils are on ridges and hills that generally have broad rolling tops and steep sides. The slope range is 5 to 45 percent.

Fullerton soils are adjacent to Bodine, Dunmore, and Claiborne soils. Bodine soils are more than 35 percent chert in the upper 20 inches of the subsoil. Dunmore soils are less than 15 percent chert in each horizon. The Claiborne soils have a dark brown surface layer and a loamy control section.

Typical pedon of Fullerton cherty silt loam, 5 to 12 percent slopes, about 4,100 feet south of the Clinch River and about 330 feet west of a bridge over Interstate 75:

Ap—0 to 7 inches; brown (10YR 4/3) cherty silt loam; weak medium granular structure; friable; common fine and very fine roots; 20 percent by volume fragments of chert; strongly acid; clear smooth boundary.
A3—7 to 12 inches; strong brown (7.5YR 5/6) cherty silt loam; weak medium granular structure; friable; many

fine and very fine roots; 20 percent by volume fragments of chert; very strongly acid; clear smooth boundary.

B1—12 to 19 inches; strong brown (7.5YR 5/6) cherty silt loam; weak fine subangular blocky structure parting to weak fine and medium granular; friable; common fine and very fine roots; 20 percent by volume fragments of chert; very strongly acid; gradual smooth boundary.

B21t—19 to 27 inches; yellowish red (5YR 5/8) cherty silty clay; moderate fine and medium subangular blocky structure; friable; few very fine roots; few thin patchy clay films on faces of peds; 20 percent by volume fragments of chert; very strongly acid; gradual smooth boundary.

B22t—27 to 52 inches; red (2.5YR 4/8) cherty clay; moderate medium and coarse subangular and angular blocky structure; firm; few fine roots; thick continuous clay films; 15 percent by volume fragments of chert; very strongly acid; diffuse smooth boundary.

B23t—52 to 64 inches; red (2.5YR 4/8) cherty clay; common reddish yellow (7.5YR 6/6) mottles; moderate medium angular blocky structure; firm to very firm; thick continuous clay films; 30 percent by volume fragments of chert; very strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. The soil is strongly or very strongly acid except where limed. Each horizon is 15 to 35 percent chert fragments.

The A horizon is brown (10YR 4/3, 5/3; 7.5YR 4/4, 5/4), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or strong brown (7.5YR 5/6). In some severely eroded areas it is yellowish red (5YR 4/6) or red (2.5YR 4/8). Texture is cherty silt loam, cherty loam, and cherty fine sandy loam. In severely eroded spots, it is cherty silty clay loam or finer.

The B1 horizon is yellowish red (5YR 5/6, 5/8) or strong brown (7.5YR 5/6, 5/8). It is cherty silt loam or cherty silty clay loam.

The B2t horizon is red (2.5YR 4/6, 4/8, 5/6, 5/8) or yellowish red (5YR 4/6, 4/8, 5/6, 5/8). It is mainly cherty silty clay or cherty clay but is cherty silty clay loam in the upper layer in some pedons.

Gilpin series

The Gilpin series consists of moderately deep, well drained soils on mountain uplands. These soils formed in residuum of shale and siltstone. The slope range is 5 to 60 percent.

Gilpin soils are adjacent to Muskingum and Petros soils. Muskingum soils do not have an argillic horizon. Petros soils are more than 35 percent coarse fragments in the subsoil.

Typical pedon of Gilpin silt loam in an area of Muskingum-Gilpin-Petros complex, 15 to 60 percent slopes, 20 feet north of the gravel road to Swisher's mines and about 5,800 feet west of Briceville:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; 5 percent by volume fragments of shale; friable; many fine roots; strongly acid; abrupt smooth boundary.

A2—1 inch to 6 inches; light yellowish brown (10YR 6/4) silt loam; weak medium granular structure; friable; many fine roots; strongly acid; 5 percent by volume fragments of shale; clear smooth boundary.

B1—6 to 10 inches; yellowish brown (10YR 5/8) silt loam; moderate medium subangular blocky structure; friable; many fine roots; 10 percent by volume fragments of shale; strongly acid; gradual smooth boundary.

B21t—10 to 23 inches; yellowish brown (10YR 5/8) shaly silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; 25 percent by volume fragments of shale; strongly acid; clear smooth boundary.

B22t—23 to 29 inches; yellowish brown (10YR 5/4) shaly silty clay loam; common distinct mottles of red (2.5YR 5/8); moderate medium subangular blocky structure; firm; common fine roots; thin patchy clay films on faces of peds; 25 percent by volume fragments of shale; strongly acid; gradual smooth boundary.

Cr—29 to 38 inches; reddish yellow (7.5YR 6/8), red (2.5YR 4/8), and light gray (10YR 7/2) weakly consolidated fragmented shale with thin seams of yellowish brown (10YR 5/4) silt loam between layers of shale and in cracks.

Thickness of the solum ranges from 20 to 36 inches. Depth to soft shale bedrock ranges from 20 to 40 inches. The content of coarse fragments, mainly shale, ranges from about 5 to 35 percent in the A and B horizon and from 30 to 90 percent in the C horizon. Not all pedons have a C horizon. The soil ranges from strongly acid to extremely acid except for the surface layer in limed areas.

The A1 horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), black (10YR 2/1), or dark grayish brown (10YR 4/2). The A2 horizon is brown (10YR 5/3), grayish brown (10YR 5/2), or light yellowish brown (10YR 6/4). The fine earth fraction is silt loam or loam.

The B2t horizon is yellowish brown (10YR 5/4, 5/6, 5/8), light olive brown (2.5Y 5/4), and strong brown (7.5YR 5/6, 5/8). The B22t has common to many mottles in shades of yellow, red, and brown. The fine earth fraction is silt loam, loam, or silty clay loam.

The Cr horizon is dominated by variously colored weakly consolidated shale. Between the layers of shale and in cracks is yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or light olive brown (2.5Y 5/4) silt loam or silty clay loam.

The Gilpin soils in this county are a taxadjunct to the Gilpin series because they contain slightly fewer weatherable minerals than defined in the range for the series, but this does not affect the use and management of these soil.

Gladeville series

The Gladeville series consists of dark colored, shallow soils of the uplands. These soils formed in material weathered mostly from the Chickamauga Limestone. Closely spaced limestone ledges extend a few inches above the surface. The slope range is 5 to about 20 percent.

Gladeville soils are adjacent to Carbo soils, which are more than 20 inches deep over bedrock.

The Gladeville soils in Anderson County are mapped only with Rock outcrop.

Typical pedon of Gladeville flaggy silty clay loam in an area of Gladeville-Rock outcrop complex, 5 to 20 percent slopes, about 4,600 feet northeast of Solway Bridge and about 330 feet south of Bethel Valley Road:

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) flaggy silty clay loam; strong fine and medium granular structure; friable; many roots; 35 percent by volume thin, flat limestone fragments that range from about 2 to 8 inches across; neutral; abrupt wavy boundary.

C—6 to 9 inches; brown (10YR 4/3) very flaggy clay; massive; very firm, sticky and plastic; 65 percent by volume thin, flat limestone fragments 2 to 10 inches across; mildly alkaline.

R—9 inches; limestone bedrock.

Depth to limestone bedrock ranges from 3 to 12 inches. The soil is neutral through moderately alkaline. The content of coarse fragments of limestone ranges from 35 to 65 percent by volume.

The A horizon is very dark grayish brown (10YR 3/2), dark brown (10YR 3/3; 7.5YR 3/2), or very dark gray (10YR 3/1). The fine earth fraction is silty clay loam, silty clay, or clay. This horizon extends to bedrock in many pedons.

The C horizon is brown (7.5YR 4/4; 10YR 4/3), and the fine earth fraction is silty clay loam, silty clay, or clay.

Greendale series

The Greendale series consists of deep, well drained soils formed in recent colluvium or alluvium. These soils are in narrow strips along intermittent streams, on foot slopes, and in saucer-shaped depressions. The slope range is about 1 to 6 percent.

Greendale soils are geographically closely associated with Fullerton soils, which are on rolling to steep uplands and have a thick yellowish red and red clay subsoil.

Typical pedon of Greendale silt loam, 1 to 6 percent slopes, along a lateral drain about 300 yards north of Island Home Church and 200 feet south of the Clinch River:

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

B2—7 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium and fine subangular blocky structure; friable; many fine, medium, and coarse roots; 10 percent by volume fragments of chert; medium acid; abrupt smooth boundary.

A1b—28 to 36 inches; dark brown (10YR 3/3) loam; weak medium and coarse granular structure; friable; common fine and medium roots; 5 percent by volume fragments of chert; medium acid; abrupt smooth boundary.

B21b—36 to 50 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; few fine roots; 10 percent by volume fragments of chert; medium acid; clear smooth boundary.

B22b—50 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; few fine faint mottles of pale brown (10YR 6/3) and light brownish gray (10YR 6/2); moderate medium subangular blocky structure; friable; 15 percent by volume fragments of chert; medium acid.

Thickness of the solum ranges from about 25 to 60 inches. Depth to bedrock is more than 5 feet. The soil is medium acid to strongly acid in all horizons except where limed. The content of coarse fragments, mostly chert, ranges from 5 to 30 percent by volume in each horizon.

The A horizon is brown (10YR 5/3, 4/3) or dark grayish brown (10YR 4/2). The fine earth fraction is silt loam, loam, and in a few pedons, sandy loam. In a few places, the A horizon is recent overwash of yellowish red (5YR 5/6, 4/6) or strong brown (7.5YR 5/6) silty clay loam.

The B2 horizon is dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6), or brown (10YR 4/3; 7.5YR 4/4). The fine earth fraction is most commonly silt loam or loam but is silty clay loam or clay loam in a few pedons.

The A1b is dark brown (10YR 3/3) or very dark grayish brown (10YR 3/2). The fine earth fraction is silt loam or loam.

The B2b horizon is yellowish brown (10YR 5/4, 5/6), strong brown (7.5YR 5/6), brown (7.5YR 4/4), or dark yellowish brown (10YR 4/4) with few to many mottles in shades of brown, yellow, red, or gray. The fine earth fraction is silt loam, loam, silty clay loam, or clay loam.

Grimsley series

The Grimsley series consists of deep, well drained soils. These soils formed in colluvium in coves and on

the lower slopes of steep mountains. They are underlain by sandstone and shale. The slope range is about 15 to 50 percent.

Grimsley soils are commonly adjacent to Jefferson soils, which have a coarse fragment content of less than 35 percent in the upper 20 inches of the subsoil.

Typical pedon of Grimsley stony loam, 15 to 50 percent slopes, along Mill Creek about 1.5 miles upstream from the confluence of Mill Creek and the New River:

A1—0 to 1 inch; dark grayish brown (10YR 4/2) stony loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 20 percent by volume fragments of sandstone that range from less than 1 inch to 2 feet or more across; strongly acid; abrupt smooth boundary.

A2—1 to 6 inches; light yellowish brown (10YR 6/4) stony loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 20 percent by volume fragments of sandstone that range from less than 1 inch to 2 feet or more across; strongly acid; clear smooth boundary.

B1—6 to 10 inches; yellowish brown (10YR 5/4) stony loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many fine, medium, and coarse roots; 45 percent by volume fragments of sandstone that range from less than 1 inch to 2 feet or more across; strongly acid; clear smooth boundary.

B2t—10 to 50 inches; strong brown (7.5YR 5/6) stony loam; weak medium subangular blocky structure; very friable; common fine, medium, and coarse roots; common thin patchy clay films on faces of peds; 45 percent by volume fragments of sandstone that range from less than 1 inch to 2 feet or more across; strongly acid; gradual wavy boundary.

C—50 to 58 inches; yellowish brown (10YR 5/6) very stony sandy loam; few fine, medium, and coarse roots; very friable; 50 percent by volume coarse fragments of sandstone that range from less than 1 inch to 2 feet or more across; strongly acid; abrupt wavy boundary.

R—58 inches; shale bedrock.

Thickness of the solum and depth to bedrock range from 40 to 60 inches. The soil is strongly acid or very strongly acid in each horizon. The content of fragments of sandstone and shale ranges from 15 to 50 percent by volume in the A horizon and from 35 to 55 percent by volume in the B and C horizons. The fragments range from 1/4 inch to 2 feet or more in diameter.

The A1 horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). The fine earth fraction is loam or sandy loam.

The A2 horizon is brown (10YR 4/3, 5/3), dark yellowish brown (10YR 4/4), light yellowish brown (10YR 6/4), or yellowish brown (10YR 5/4). The fine earth fraction is loam or sandy loam.

The B and C horizons are yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), brown (7.5YR 5/4, 4/4), or brownish yellow (10YR 6/6). The fine earth fraction is loam, clay loam, sandy clay loam, or sandy loam.

Hamblen series

The Hamblen series consists of deep, moderately well drained soils on first bottoms. These soils formed in recent alluvium. The slope range is 0 to 2 percent.

Hamblen soils are adjacent to the somewhat poorly drained Newark soils.

Typical pedon of Hamblen silt loam in Gamble Valley about 1 mile southeast of the junction of Highway 62 and the Oak Ridge Turnpike:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine roots; common fine pores; slightly acid; clear smooth boundary.

B1—8 to 14 inches; brown (10YR 5/3) silt loam; common fine distinct mottles of dark brown (7.5YR 4/4) and few fine distinct mottles of strong brown (7.5YR 5/8); weak fine granular structure; friable; many fine roots; few fine black concretions; slightly acid; gradual smooth boundary.

B2—14 to 22 inches; brown (10YR 5/3) silt loam; common medium distinct mottles of light brownish gray (2.5Y 6/2), few fine distinct mottles of strong brown (7.5YR 5/8), and common fine distinct mottles of dark brown (7.5YR 4/4); weak medium subangular blocky structure parting to weak fine granular; common fine roots; 3 percent by volume fragments of sandstone; few medium brownish concretions; slightly acid; gradual smooth boundary.

B3—22 to 34 inches; brown (10YR 5/3) silt loam; common fine and medium distinct mottles of light brownish gray and grayish brown (2.5Y 6/2, 5/2); weak medium subangular blocky structure parting to weak fine granular; few fine pores; 3 percent by volume fragments of sandstone, many fine and medium dark brown concretions; slightly acid; abrupt smooth boundary.

C—34 to 60 inches; yellowish brown (10YR 5/4) gravelly silt loam; many fine distinct mottles of light brownish gray (2.5Y 6/2) and common medium distinct mottles of dark brown (7.5YR 4/4); friable; few fine roots; 15 percent by volume fragments of sandstone; many fine and medium dark brown concretions; slightly acid.

Thickness of the solum ranges from 15 to 55 inches. Depth to bedrock is more than 40 inches. The soil ranges from medium acid through neutral. The content of coarse fragments ranges from 0 to 10 percent in the solum and from 5 to 35 percent in the C horizon.

The A horizon is brown (10YR 4/3, 5/3), dark grayish brown (10YR 4/2), or dark yellowish brown (10YR 4/4). It is silt loam or loam.

The B horizon is yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4), or brown (10YR 4/3, 5/3). It is mottled in shades of gray and brown. It is silt loam or loam. It is rarely silty clay loam.

The matrix colors of the C horizon are the same as those of the B horizon. Mottles are shades of brown, yellow, gray, or red. In many pedons, the horizon is so profusely mottled that there is no dominant matrix color. The fine earth fraction is silt loam or loam.

Holston series

The Holston series consists of deep, well drained soils. These soils are on old stream terraces along the larger streams. They formed in sediment washed from soils underlain by sandstone, shale, limestone, and dolomite. The slope range is 2 to 12 percent.

Holston soils are adjacent to Etowah soils. Etowah soils have a dark brown surface layer and a reddish subsoil.

Typical pedon of Holston loam, 5 to 12 percent slopes, in Eagle Bend about 300 feet southwest of the FMC Plant and 1,300 feet northwest of the Sprague Electric Company Plant:

Ap—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

B1—8 to 12 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; clear smooth boundary.

B21t—12 to 29 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—29 to 44 inches; strong brown (7.5YR 5/6) clay loam; few fine and medium distinct yellowish brown (10YR 5/6) and yellowish red (5YR 5/6) mottles; moderate medium angular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—44 to 61 inches; strong brown (7.5YR 5/6) clay loam; common medium and coarse distinct yellowish brown (10YR 5/6) and yellowish red (5YR 5/6) mottles; moderate medium angular blocky structure; friable; thin patchy clay films on faces of peds; strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. The soil is strongly acid or very strongly acid throughout except for the surface layer where limed. Coarse fragments make up 0 to 15 percent by volume of the A horizon through the B22t horizon and 0 to 40 percent of the underlying horizon.

The A horizon is brown (10YR 4/3, 5/3), pale brown (10YR 6/3), dark grayish brown (10YR 4/2), yellowish brown (10YR 5/4, 5/6), or light yellowish brown (10YR 6/4). It is loam or fine sandy loam.

The B1, B21t, and B22t are yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6, 6/8), and strong brown (7.5YR 5/6, 5/8). They are loam or clay loam.

The B23t horizon and in some pedons the B3 and C horizons are the same color and texture as the upper part of the B horizon and, in addition, are yellowish red (5YR 4/6, 4/8, 5/6, 5/8). Many pedons are mottled with shades of yellow, brown, red, and gray below a depth of about 30 inches. The fine earth fraction is loam or clay loam.

Jefferson series

The Jefferson series consists of deep, well drained soils on benches and foot slopes and in steep mountain coves. These soils are adjacent to steep ridges and mountain slopes. They formed in sediment washed from these slopes. They are underlain by shale or sandstone. The slope range is 5 to about 50 percent.

Jefferson soils are adjacent to Grimsley and Muskingum soils. Grimsley soils have a rock fragment content of more than 35 percent in the subsoil. Muskingum soils formed in shale residuum at higher elevations. They have a silt loam subsoil.

Typical pedon of Jefferson gravelly loam, 12 to 25 percent slopes, on the east side of Sassafras Mountain about 1 mile west of Low Gap on the Duncan Flat's quadrangle:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) gravelly loam; weak fine granular structure; friable; many fine roots; 15 percent by volume fragments of sandstone; strongly acid; abrupt smooth boundary.

A2—1 to 7 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine granular structure; friable; many fine roots; 20 percent by volume fragments of sandstone; strongly acid; clear smooth boundary.

A3—7 to 10 inches; light yellowish brown (10YR 6/4) gravelly loam; weak fine granular structure; friable; common fine roots; 20 percent by volume coarse fragments of sandstone; strongly acid; clear smooth boundary.

B1—10 to 19 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine and medium subangular blocky structure; friable; few fine roots; 20 percent by volume coarse fragments of sandstone; strongly acid; clear smooth boundary.

B2t—19 to 58 inches; strong brown (7.5YR 5/6) gravelly clay loam; moderate medium angular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; 25 percent by volume coarse fragments of sandstone; strongly acid; clear smooth boundary.

C—58 to 66 inches; strong brown (7.5YR 5/6) gravelly clay loam; common medium distinct mottles of yellowish brown; massive; friable; 25 percent by volume fragments of sandstone; strongly acid.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock exceeds 5 feet. The content of rock fragments is 5 to 25 percent to a depth of about 3 feet and 20 to 45 percent below 3 feet. Fragments are 1/4 inch to 8 inches across. The soil is strongly acid to very strongly acid except for the surface layer where limed.

The A1 horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or dark grayish brown (10YR 4/2). The fine earth fraction is loam or fine sandy loam.

The A2 horizon is pale brown (10YR 6/3), light yellowish brown (10YR 6/4), brown (10YR 5/3), yellowish brown (10YR 5/4, 5/6), or dark yellowish brown (10YR 4/4). The fine earth fraction is loam or fine sandy loam.

Not all pedons have an A3 horizon. Where present, it is light yellowish brown (10YR 6/4), pale brown (10YR 6/3), or brown (10YR 5/3). The fine earth fraction is loam or fine sandy loam.

The B horizon is yellowish brown (10YR 5/4, 5/6, 5/8) or strong brown (7.5YR 5/6, 5/8). The fine earth fraction is loam or clay loam.

The C horizon is similar in color and texture to the B horizon. In addition, it is mottled in shades of brown or gray in some pedons.

Leadvale series

The Leadvale series consists of moderately well drained soils that have a fragipan. These soils are on fans and benches at the base of hills underlain by shale. They formed in silty colluvium from material washed or rolled from soils underlain by shale and siltstone. The slope is dominantly less than 5 percent but ranges from 2 to 7 percent.

Leadvale soils are geographically closely associated with Armuchee and Montevallo soils, which are on hills and ridges and have a solum thinner than 20 inches. In addition, the argillic horizon of the Armuchee soils is clayey. The subsoil of the Montevallo soils is loamy and is more than 35 percent coarse fragments.

Typical pedon of Leadvale silt loam, 2 to 7 percent slopes, in Wolf Valley about 125 yards east of Greenway Community Center:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

B1—6 to 12 inches; brownish yellow (10YR 6/8) silt loam; weak medium subangular blocky structure parting to weak fine granular; very friable; very strongly acid; clear smooth boundary.

B21t—12 to 19 inches; yellowish brown (10YR 5/8) silt loam; weak fine subangular blocky structure; friable; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—19 to 27 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bx—27 to 42 inches; yellowish brown (10YR 5/8) silty clay loam; common medium faint mottles of light gray (10YR 7/1) and yellow (10YR 7/6); weak coarse prismatic structure; firm, brittle; thin patchy clay films on faces of peds; streaks of gray silty clay between prisms; 5 percent by volume fine angular fragments of siltstone and sandstone in lower part; very strongly acid; gradual smooth boundary.

B3—42 to 50 inches; mottled yellow (10YR 7/8), light gray (10YR 7/1), and light brownish gray (2.5Y 6/2) silty clay; moderate coarse subangular blocky structure; firm; very strongly acid; abrupt smooth boundary.

R—50 inches; shale bedrock.

Depth to the fragipan ranges from 16 to 38 inches. Depth to bedrock ranges from about 48 to 72 inches. Thickness of the solum ranges from 40 to 60 inches. The content of coarse fragments of shale and sandstone ranges from 0 to 10 percent in each horizon of the solum. The soil is strongly acid or very strongly acid except for the surface layer where limed.

The Ap or A2 horizon is brown (10YR 4/3, 5/3), pale brown (10YR 6/3), or dark grayish brown (10YR 4/2). Undisturbed pedons have a 1- to 2-inch very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or dark grayish brown (10YR 4/2) A1 horizon. The A horizon is mainly silt loam, but the range includes loam.

The B1 and B2t horizons are yellowish brown (10YR 5/6, 5/8), brownish yellow (10YR 6/6, 6/8), and in a few pedons strong brown (7.5YR 5/6, 5/8). Some pedons have faint brownish mottles. A 3- to 5-inch layer above the fragipan in some pedons has mottles of chroma of 2 or less. The texture is silt loam or silty clay loam.

The Bx horizon is yellowish brown (10YR 5/6, 5/8) or light yellowish brown (10YR 6/4; 2.5Y 6/4). It is mottled in shades of gray, yellow, and brown. The matrix has no dominant color in some pedons but is evenly mottled in the colors listed for the Bx horizon. It is silt loam or silty clay loam.

The B3 and C horizons, where present, have colors like those in the Bx horizon. The texture is silty clay loam, silty clay, or clay.

Lehew series

The Lehew series consists of steep, reddish, moderately deep soils on linear ridges. These soils formed in residuum of interbedded fine grained sandstone and shale. The slope range is 25 to 60 percent.

Lehew soils are geographically closely associated with Armuchee soils. Armuchee soils are at lower elevations,

have a clayey subsoil, and formed mainly in residuum of shale.

Typical pedon of Lehew loam, 25 to 60 percent slopes, 75 feet west of Moccasin Hollow Road and about 1/2 mile north of West Wolf Valley Road:

A1—0 to 2 inches; dark brown (7.5YR 3/2) loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; strongly acid; abrupt smooth boundary.
A2—2 to 7 inches; reddish brown (5YR 4/3) loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent by volume fragments of sandstone; very strongly acid; clear smooth boundary.
B1—7 to 11 inches; reddish brown (5YR 4/3) channery loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine, medium, and coarse roots; 30 percent by volume fragments of sandstone; very strongly acid; gradual smooth boundary.
B2—11 to 27 inches; reddish brown (2.5YR 4/4) very channery fine sandy loam; weak medium subangular blocky structure; friable; few coarse and medium roots; many fine roots; 40 percent by volume fragments of sandstone; very strongly acid; gradual smooth boundary.
C—27 to 36 inches; reddish brown (5YR 4/3) very channery fine sandy loam; very friable; few fine roots; 60 percent by volume fragments of sandstone; very strongly acid; abrupt smooth boundary.
R—36 inches; hard sandstone bedrock.

Thickness of the solum ranges from 15 to 30 inches. Depth to bedrock ranges from 20 to 40 inches. The content of rock fragments, mainly sandstone, ranges from 0 to 25 percent in the A horizon, from 30 to 60 percent in the B horizon, and from 40 to 90 percent in the C horizon. Fragments range from 1 to 6 inches in size. The soil is strongly acid or very strongly acid.

The A1 horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or dark brown (7.5YR 3/2). The A2 horizon is reddish brown (5YR 5/3, 4/3) and is rarely dark yellowish brown (10YR 4/4). The fine earth fraction is loam or fine sandy loam.

The B horizon is reddish brown (2.5YR 4/4, 5/4; 5YR 4/3, 4/4), red (2.5YR 4/6), and dark reddish brown (2.5YR 3/4). The fine earth fraction is fine sandy loam or loam.

The C horizon is reddish brown (5YR 4/3, 4/4; 2.5YR 4/4) or dark reddish brown (2.5YR 3/4). The fine earth fraction is sandy loam, fine sandy loam, or loam.

Lily series

The Lily series consists of well drained, moderately deep soils formed in material weathered from sandstone. These soils are on broad upland benches in the mountainous part of the county. The slope range is 3 to 10 percent.

Lily soils are geographically associated with Muskingum and Gilpin soils, both of which formed in residuum of shale. Muskingum soils, on steep mountainsides, have a silt loam subsoil. In places, the Gilpin soils are on steep mountainsides. In other places, they are on positions similar to those of Lily soils. They have a finer textured subsoil and contain more shale fragments.

Typical pedon of Lily loam, 3 to 10 percent slopes, south of Braden Flats approximately 1,400 feet southeast of Brown Cemetery:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; few fine bodies of yellowish brown (10YR 5/6) former subsoil material; weak fine granular structure; very friable; many fine roots; very strongly acid; abrupt smooth boundary.
B1—7 to 13 inches; yellowish brown (10YR 5/6) loam; weak medium subangular and weak fine granular structure; friable; common fine roots; few fine pores; very strongly acid; clear smooth boundary.
B21t—13 to 17 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; few fine pores; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.
B22t—17 to 26 inches; yellowish brown (10YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.
B3—26 to 33 inches; yellowish brown (10YR 5/6) loam; common fine and medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/8) mottles; weak medium and fine subangular blocky structure; friable; 10 percent by volume fragments of sandstone; very strongly acid; gradual smooth boundary.
C—33 to 39 inches; yellowish brown (10YR 5/6) channery fine sandy loam; massive; friable; 35 percent by volume fragments of sandstone; very strongly acid.
R—39 inches; sandstone bedrock.

Thickness of the solum and depth to sandstone bedrock range from 20 to 40 inches. The content of coarse fragments, mainly sandstone, ranges from 0 to 10 percent by volume in the A and B2t horizons and from 0 to 35 percent in the B3 and C horizons. The soil is strongly acid to extremely acid in all horizons except for the surface layer where limed.

The Ap horizon is dark grayish brown (10YR 4/2), pale brown (10YR 6/3), brown (10YR 4/3, 5/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4). Some pedons have an A1 horizon that is dark

brown (10YR 4/3, 3/3; 7.5YR 3/2) or very dark grayish brown (10YR 3/2). This horizon is mainly loam but ranges to fine sandy loam.

The B1 and B2t horizons are yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), dark yellowish brown (10YR 4/4), or brown (7.5YR 4/4). The lower part of the B2t horizon commonly has mottles in shades of red, brown, or yellow. The B1 horizon is loam, fine sandy loam, or sandy loam. The B2t horizon is loam, clay loam, or sandy clay loam.

The B3 and C horizons are yellowish brown (10YR 5/4, 5/6, 5/8) or brownish yellow (10YR 6/6, 6/8). Mottles are in shades of red, brown, or yellow. The fine earth fraction is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam.

Minvale series

The Minvale series consists of deep, well drained soils at the base of slopes. These soils formed on benches and foot slopes in sediment washed and rolled from soils underlain by dolomite. The slope range is 3 to 15 percent.

Minvale soils are geographically closely associated with Fullerton and Bodine soils, both of which formed on adjacent uplands. Fullerton soils have a clayey subsoil. Bodine soils are more than 35 percent chert in the control section.

Typical pedon of Minvale silt loam, 3 to 15 percent slopes, on the east side of Walker Springs Road about 3/4 mile north of Bethel Valley Road:

A1—0 to 2 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine, medium, and coarse roots; 10 percent by volume fragments of chert; medium acid; clear smooth boundary.

A2—2 to 7 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; moderate fine, medium, and coarse roots; 10 percent by volume fragments of chert; medium acid; clear smooth boundary.

B1—7 to 13 inches; reddish yellow (7.5YR 6/6) cherty silt loam; weak fine subangular blocky structure parting to weak medium granular; friable; common fine, medium, and coarse roots; 15 percent by volume fragments of chert; very strongly acid; clear smooth boundary.

B21t—13 to 23 inches; yellowish red (5YR 5/6) cherty silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few patchy clay films on faces of peds; 20 percent by volume fragments of chert; very strongly acid; gradual smooth boundary.

B22t—23 to 32 inches; yellowish red (5YR 5/8) cherty silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common patchy clay films on faces of peds; 20 percent by volume fragments of chert; very strongly acid; gradual wavy boundary.

B23t—32 to 62 inches; red (2.5YR 4/6) cherty clay; common fine and medium prominent mottles of brownish yellow (10YR 6/6) and light yellowish brown (2.5Y 6/4); strong medium angular blocky structure; firm; few fine roots; continuous clay films on faces of peds; 20 percent by volume coarse fragments of chert; very strongly acid.

Thickness of the solum is more than 60 inches. Depth to bedrock is more than 6 feet. The volume of coarse chert fragments ranges from 10 to 35 percent in the A horizon and from 15 to 35 percent in the B horizon.

The A1 horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2). The A2 or Ap horizon is brown (10YR 5/3, 4/3; 7.5YR 4/4), yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4), or light yellowish brown (10YR 6/4). The A horizon is silt loam, cherty silt loam, loam, or cherty loam.

The B horizon is yellowish red (5YR 5/6, 5/8, 4/6, 4/8), reddish brown (5YR 4/4; 2.5YR 4/4), red (2.5YR 4/6, 4/8), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6). The B1 horizon is also reddish yellow (7.5YR 6/6). The B1 and B21t horizons are cherty silt loam, cherty silty clay loam, and cherty loam. The B22t and B23t horizons are cherty silty clay loam, cherty silty clay, and cherty clay. Mottles in shades of yellow, red, and brown are common in the lower part of the B2t horizon.

Monongahela series

The Monongahela series consists of moderately well drained soils on stream terraces. These soils formed in sediment washed from soils underlain by sandstone, shale, and limestone. The slope range is 2 to 5 percent.

Monongahela soils are adjacent to Hamblen soils but in higher positions. Hamblen soils are on first bottoms, are moderately well drained, and have a cambic B horizon.

Typical pedon of Monongahela loam, 2 to 5 percent slopes, north of Bull Run Creek and across Highway 25 from the Telephone Exchange:

Ap—0 to 5 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

B1—5 to 8 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

B21t—8 to 18 inches; yellowish brown (10YR 5/8) silt loam; few distinct mottles of strong brown (7.5YR 5/8); moderate medium subangular blocky structure; friable; few fine roots; few thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—18 to 22 inches; yellowish brown (10YR 5/8) silt loam; few distinct mottles of strong brown (7.5YR 5/

8); weak medium subangular blocky structure; firm; few fine roots; few thin patchy clay films on faces of peds; few fine black concretions; strongly acid; abrupt smooth boundary.

Bx—22 to 38 inches; yellowish brown (10YR 5/8) silt loam; many faint and distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); weak coarse prismatic structure; firm and brittle, friable when crushed; strongly acid; gradual smooth boundary.

C—38 to 62 inches; mottled light brownish gray (10YR 6/2); light yellowish brown (10YR 6/4), yellowish brown (10YR 5/8), and strong brown (7.5YR 5/8) clay loam; massive; firm; 10 percent by volume fragments of chert mostly less than 1 inch in diameter; strongly acid.

Thickness of the solum ranges from 40 to 72 inches. Depth to the fragipan ranges from 18 to 28 inches. Reaction ranges from strongly acid to very strongly acid except for the surface layer where limed. The volume of coarse fragments ranges from 0 to 10 percent in the horizons above the fragipan, from 0 to 15 percent in the pan, and from 10 to 25 percent in the C horizon.

The Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3, 5/3). It is loam or fine sandy loam.

The B1 and B2t horizons are light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6), or yellowish brown (10YR 5/6, 5/8). In some pedons, the B2t horizon is mottled in shades of brown. The texture is silt loam, silty clay loam, or clay loam.

The Bx horizon is light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4, 5/6, 5/8), or olive yellow (2.5Y 6/6). It is mottled in shades of brown and gray. It is silt loam, loam, silty clay loam, or clay loam. It is firm or very firm and brittle but is friable when crushed.

The C horizon is similar to the Bx in color. The fine earth fraction is silt loam, loam, silty clay loam, or clay loam.

Montevallo series

The Montevallo series consists of shallow, well drained upland soils that formed in material weathered from acid shale. These soils are on low hills and ridges. The slope range is 5 to 40 percent.

Montevallo soils are geographically closely associated with Armuchee soils and are in similar positions on the landscape. Armuchee soils have a clayey subsoil and contain fewer fragments of shale.

Typical pedon of Montevallo shaly silt loam, 20 to 40 percent slopes, about 4,400 feet south of Medford Station and 1,000 feet west of L & N Railroad:

A1—0 to 1 inch; black (10YR 2/1) shaly silt loam; weak fine granular structure; friable; common fine, medium, and coarse roots; 15 percent by volume fragments of shale; strongly acid; abrupt smooth boundary.

A2—1 to 7 inches; yellowish brown (10YR 5/4) shaly silt loam; weak fine granular structure; friable; common fine, medium, and coarse roots; 25 percent by volume fragments of shale; strongly acid; clear smooth boundary.

B1—7 to 11 inches; light yellowish brown (10YR 6/4) very shaly silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine pores; 50 percent by volume fragments of shale; strongly acid; clear smooth boundary.

B2—11 to 14 inches; brownish yellow (10YR 6/6) very shaly silt loam; weak fine subangular blocky structure; friable; few fine roots; few very fine pores; 60 percent by volume fragments of shale; very strongly acid; clear smooth boundary.

B3—14 to 18 inches; light yellowish brown (10YR 6/4) very shaly silt loam; weak fine subangular blocky structure; friable; few fine roots; few very fine pores; 65 percent by volume fragments of shale; very strongly acid; abrupt smooth boundary.

Cr—18 to 48 inches; brownish and reddish, weakly consolidated shale with thin coatings of brown (10YR 5/3) soil material between layers of shale and in cracks.

Thickness of the solum and depth to weakly consolidated shale range from 10 to 20 inches. Depth to hard rock is more than 48 inches. The rock can be ripped by heavy machinery to 20 feet or more in most places. The soil is strongly or very strongly acid except for the surface layer where limed. The volume of shale fragments ranges from 15 to 40 percent in the A horizon and from 35 to 90 percent in the B horizon.

The A1 horizon is black (10YR 2/1), very dark gray (10YR 3/1), and dark gray (10YR 4/1). It is shaly silt loam and shaly loam. The A2 and Ap horizons are brown (10YR 4/3, 5/3), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), dark grayish brown (10YR 4/2), and grayish brown (10YR 5/2). They are shaly silt loam and shaly loam.

The B horizon is yellowish red (5YR 4/6, 5/6), reddish yellow (7.5YR 6/6), brown (10YR 4/3, 5/3), light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), yellowish brown (10YR 5/4, 5/6), and brownish yellow (10YR 6/6). The fine earth fraction is silt loam, loam, or silty clay loam.

The Cr horizon is weakly layered shale with thin coatings of brown soil material between the layers of shale and in cracks.

Muskingum series

The Muskingum series consists of moderately deep, well drained soils on steep mountainsides and on long linear steep ridges in the valley. These soils formed in material weathered from shale, sandstone, and siltstone. The slope range is about 20 to 65 percent.

Muskingum soils are associated with Armuchee, Gilpin, Grimsley, Jefferson, Lehew, Petros, and Ramsey soils.

Muskingum, Armuchee, Gilpin, Lehew, Petros, and Ramsey soils are in similar positions. Grimsley and Jefferson soils are in coves and are more than 40 inches deep over bedrock. Armuchee, Gilpin, and Jefferson soils have more clay in the upper part of the subsoil than Muskingum soils. Grimsley and Lehew soils are more than 35 percent coarse fragments in the upper part of the subsoil. Petros and Ramsey soils are less than 20 inches deep over bedrock.

Typical pedon of Muskingum silt loam in an area of Muskingum-Petros complex, 15 to 60 percent slopes, 1,200 feet northwest of Duncan Flats and 1,000 feet northeast of Low Gap:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many fine and medium roots; 10 percent by volume fragments of shale; strongly acid; abrupt smooth boundary.

A2—2 to 5 inches; light yellowish brown (10YR 6/4) silt loam; weak fine granular structure; friable; many fine roots; 10 percent by volume fragments of shale; strongly acid; abrupt smooth boundary.

B1—5 to 8 inches; yellowish brown (10YR 5/6) shaly silt loam; weak medium subangular blocky structure; friable; common fine roots; 15 percent by volume fragments of shale; strongly acid; clear smooth boundary.

B2—8 to 21 inches; yellowish brown (10YR 5/6) shaly silt loam; moderate medium subangular blocky structure; friable; many fine roots; common fine pores; 20 percent by volume fragments of shale; strongly acid; gradual smooth boundary.

B3—21 to 26 inches; yellowish brown (10YR 5/6) shaly silt loam; weak medium subangular blocky structure; friable; few fine roots; 30 percent by volume fragments of shale; strongly acid; gradual wavy boundary.

Cr—26 to 36 inches; 85 percent weakly consolidated shale that can be dug with a spade; yellowish brown (10YR 5/4) silt loam between the layers of shale and in cracks.

R—36 inches; shale bedrock that can be moved with heavy machinery.

Solum thickness ranges from 16 to 36 inches. Depth to rippable bedrock is 20 to 40 inches. The soil is strongly acid or very strongly acid in all horizons. The content of fragments of shale, siltstone, and sandstone is 5 to 15 percent by volume in the A horizon and 10 to 30 percent in the B horizon.

The A1 horizon is very dark grayish brown (10YR 3/2), dark brown (10YR 4/3), or dark grayish brown (10YR 4/2). The A2 horizon is brown (10YR 5/3), light yellowish brown (10YR 6/4), or yellowish brown (10YR 5/4). The A horizon is silt loam or loam.

The B horizon is dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6, 5/8), or strong brown (7.5YR 5/6). The fine earth fraction is silt loam or loam.

The Cr horizon is 80 to 90 percent weakly bedded, variously colored shale, siltstone, or sandstone that can be dug with a spade; yellowish brown or brown silt loam occupies spaces between some layers of rock and fills some cracks.

Newark series

The Newark series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in recent alluvium. The slope range is 0 to 2 percent.

Newark soils are adjacent to the moderately well drained Hamblen soils.

Typical pedon of Newark silt loam about 900 feet north of Bear Creek Road and about 4,200 feet northeast of the Roane County Line:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; few fine distinct mottles of dark brown (7.5YR 4/4) and few fine faint mottles of very pale brown (10YR 7/3); weak fine granular structure; friable; many fine and medium roots; few fine pores; medium acid; clear smooth boundary.

B21—8 to 13 inches; brown (10YR 5/3) silt loam; common medium faint mottles of light yellowish brown (10YR 6/4), very pale brown (10YR 7/3), and light gray (10YR 7/2) and few medium distinct mottles of dark brown (7.5YR 4/4); weak fine granular structure; friable; many fine and medium roots; few fine pores; common fine black concretions; medium acid; clear smooth boundary.

B22g—13 to 21 inches; light gray (10YR 7/2) silt loam; common fine distinct mottles of strong brown (7.5YR 5/8); weak medium subangular blocky structure parting to weak coarse granular; friable; common fine roots; few fine pores; few fine fragments of shale; few fine brown concretions; medium acid; gradual smooth boundary.

B23g—21 to 30 inches; mottled light gray (10YR 7/2), strong brown (7.5YR 5/6), yellowish red (5YR 4/8), and light yellowish brown (2.5Y 6/4) silt loam; weak medium subangular blocky structure parting to weak coarse granular; friable; few fine roots; common fine pores; few fine fragments of shale; few fine brown concretions; medium acid; clear smooth boundary.

Cg—30 to 61 inches; gray (N 6/0) silt loam; few medium prominent mottles of dark brown (7.5YR 4/4) and strong brown (7.5YR 5/8); massive; friable; few fine pores; few fine and medium fragments of shale; slightly acid; clear wavy boundary.

Thickness of the solum is 20 to 40 inches. Depth to bedrock is more than 60 inches. The volume of coarse fragments ranges from 0 to 5 percent in the solum and from 0 to 35 percent in the C horizon. Reaction ranges from medium acid to mildly alkaline in each horizon.

The A horizon is brown (10YR 5/3, 4/3), dark grayish brown (10YR 4/2; 2.5Y 4/2), and grayish brown (2.5Y 5/2) silt loam, loam, or silty clay loam.

The B21 horizon is brown (10YR 5/3, 4/3), dark grayish brown (10YR 4/2), or yellowish brown (10YR 5/4). It is mottled in shades of brown and gray. The B2g horizon is brown (10YR 5/3), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (2.5Y 6/2), or light gray (10YR 7/2). Mottles in shades of yellow, brown, red, and gray range from few to many in the B horizon. In some pedons, mottling is so profuse that there is no dominant matrix color. Texture of the B horizon is silt loam or silty clay loam.

The C horizon is brown (10YR 4/3, 5/3), grayish brown (10YR 5/2; 2.5Y 5/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), light brownish gray (2.5Y 6/2), and gray (N 6/0). Mottles are in shades of brown, red, yellow, and gray. In many pedons, there is no dominant matrix color. The fine earth fraction is silt loam or silty clay loam.

Newark Variant

The Newark Variant consists of deep, somewhat poorly drained soils that formed in alluvium. The alluvium washed from soils formed in residuum of shale, limestone, and sandstone. These nearly level soils are on low terraces. The slope range is 0 to 3 percent.

The Newark Variant is geographically closely associated with Hamblen, Newark, Whitwell, and Monongahela soils. Hamblen and Newark soils are on lower lying bottom lands and do not have an argillic horizon. Monongahela soils are on stream terraces at a slightly higher elevation and have a fragipan. Whitwell soils are at similar elevations on stream terraces but are moderately well drained.

Typical pedon of Newark Variant loam, 0 to 3 percent slopes, 5.5 miles southeast of the Clinton courthouse on Highway 25W to Bull Run Creek Bridge, 2,300 feet northeast of bridge, and 800 feet southeast of Bull Run Valley Drive:

Ap1—0 to 7 inches; grayish brown (10YR 5/2) loam; few fine distinct mottles of strong brown (7.5YR 5/6); weak fine granular structure; friable; many fine roots; 3 percent by volume pebbles of sandstone and quartzite less than 1/2 inch across; neutral; abrupt smooth boundary.

Ap2—7 to 11 inches; grayish brown (10YR 5/2) loam; common fine distinct mottles of reddish brown (5YR 4/4) and few fine and medium faint mottles of light brownish gray (10YR 6/2); weak fine granular structure; friable; common fine roots; 3 percent by volume pebbles of sandstone and quartzite less than 1/2 inch across; mildly alkaline; abrupt smooth boundary.

B1—11 to 23 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct mottles of yellowish brown (10YR 5/8) and gray (10YR 5/1); coatings on the surface of some peds; weak fine subangular blocky structure; friable; few fine roots; 3 percent by volume pebbles of sandstone and quartzite less than 1 inch across; moderately alkaline; gradual smooth boundary.

B21t—23 to 45 inches; light gray (10YR 7/2) silty clay loam; many medium distinct mottles of yellowish brown (10YR 5/8); weak medium subangular blocky structure; friable; few thin discontinuous gray (10YR 5/1) clay films on faces of peds; few fine roots; 5 percent by volume pebbles of sandstone and quartzite less than 1 inch across; few black concrétions; moderately alkaline; gradual smooth boundary.

B22t—45 to 52 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and light gray (10YR 7/2) silty clay loam; weak medium subangular blocky structure; friable; common thin discontinuous gray (10YR 5/1) clay films on faces of peds; 5 percent by volume pebbles of sandstone and quartzite less than 1 inch across; few fine roots; many black concretions; moderately alkaline; abrupt smooth boundary.

B3—52 to 62 inches; mottled light gray (10YR 7/2), light brownish gray (10YR 6/2), and yellowish brown (10YR 5/6) gravelly silty clay loam; weak medium subangular blocky structure; friable; 25 percent by volume rounded pebbles of sandstone and quartzite less than 3 inches across; few black concretions; moderately alkaline.

Solum thickness is dominantly 40 to 60 inches but ranges from 40 to 72 inches or more. Reaction ranges from medium acid to moderately alkaline. The volume of coarse fragments, less than 3 inches across, ranges from 0 to 10 percent in the A and B2 horizons and from 0 to 35 percent in the B3 horizon.

The A horizon is grayish brown (10YR 5/2; 2.5Y 5/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), and brown (10YR 4/3, 5/3) mottled with shades of gray and brown. It is silt loam or loam.

The B1 horizon is yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6), light brownish gray (10YR 6/2), or light olive brown (2.5Y 5/6). It is silt loam or loam.

The B2t horizon is light brownish gray (10YR 6/2; 2.5Y 6/2) or light gray (10YR 7/2) profusely mottled with shades of gray, brown, and yellow. Fifty to sixty percent of the matrix is gray silty clay loam or silt loam. In some pedons, 40 percent or less of the matrix is brittle.

The B3 horizon is mottled with shades of gray, brown, and yellow, or it is dominantly gray. The fine earth fraction is silty clay loam, clay loam, or silt loam. It is rarely loam.

Petros series

The Petros series consists of shallow, excessively drained soils on steep mountains, mainly on points and narrow ridgetops. These soils formed in residuum of shale and siltstone. The slope range is about 15 to 60 percent.

Petros soils are geographically closely associated with Muskingum and Gilpin soils, both of which are 20 to 40 inches deep over bedrock and are less than 35 percent coarse fragments in the upper 20 inches of the subsoil.

Typical pedon of Petros shaly silt loam in an area of Muskingum-Petros complex, 15 to 60 percent slopes, at the point of a narrow mountain ridge about 2 miles east of Fraterville:

O—1 inch to 0; very dark gray (10YR 3/1) partially decomposed organic mat of pine needles and hardwood leaves.

A1—0 to 1 inch; very dark gray (10YR 3/1) shaly silt loam; weak fine granular structure; very friable; many medium and coarse roots; 20 percent by volume fragments of shale; strongly acid; abrupt smooth boundary.

A2—1 to 7 inches; brown (10YR 5/3) shaly silt loam; moderate medium granular structure; friable; many fine and medium roots; 20 percent by volume fragments of shale 1/2 inch to 3 inches long; strongly acid; clear wavy boundary.

B21—7 to 13 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak medium subangular blocky structure; friable; many medium and coarse roots; 40 percent by volume fragments of shale and siltstone 1 to 4 inches long; strongly acid; gradual smooth boundary.

B22—13 to 18 inches; yellowish brown (10YR 5/6) very shaly silt loam; moderate medium and fine subangular blocky structure; friable; 45 percent by volume fragments of shale and siltstone 1 to 4 inches long; many fine and medium roots; strongly acid; gradual wavy boundary.

Cr—18 to 25 inches; laminated shale and siltstone; can be removed with hand tools; a few narrow, discontinuous cracks less than 1/4 inch wide filled with yellowish brown (10YR 5/6) silt loam; films or coatings of soil material on faces of a few fragments of rock.

R—25 inches; moderately hard shale rock; can be moved with heavy machinery.

Thickness of the solum and depth to soft shale range from 10 to 20 inches. The soil is strongly acid or very strongly acid in each horizon. The volume of rock fragments up to 6 inches long ranges from 15 to 35 percent in the A horizon and from 35 percent to 80 percent in the B horizon.

The A1 horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3, 4/3). It is shaly silt loam or shaly loam.

The A2 horizon is brown (10YR 5/3), dark brown (10YR 4/3), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4). It is shaly silt loam or shaly loam.

The B horizon is yellowish brown (10YR 5/4, 5/6), brown (7.5YR 5/4; 10YR 5/3), strong brown (7.5YR 5/6), or dark yellowish brown (10YR 4/4). The fine earth fraction is silt loam or silty clay loam.

Ramsey series

The Ramsey series consists of shallow loamy soils mainly on Walden's Ridge. These soils formed in residuum of sandstone. The slope range is 25 to 65 percent.

Ramsey soils are geographically closely associated with Muskingum and Grimsley soils. Muskingum soils are in similar positions, have a silt loam subsoil, and are 20 to 40 inches deep over bedrock. Grimsley soils are mainly in coves, are more than 35 percent coarse fragments in the upper 20 inches of the subsoil, and are 40 to 60 inches deep over bedrock.

Typical pedon of Ramsey sandy loam in an area of Ramsey-Rock outcrop complex, 25 to 65 percent slopes, on the northwest side of Walden's Ridge, about 150 feet below the top of the ridge, 20 feet above an old road, and 4,300 feet east of Briceville School:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent by volume fragments of sandstone; strongly acid; abrupt smooth boundary.

A2—1 to 4 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent by volume fragments of sandstone; strongly acid; gradual smooth boundary.

B2—4 to 9 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure parting to weak fine granular; very friable; common fine, medium, and coarse roots; 15 percent by volume fragments of sandstone; strongly acid; gradual smooth boundary.

C—9 to 14 inches; yellowish brown (10YR 5/4) channery sandy loam; massive; very friable; common fine, medium, and coarse roots; 20 percent by volume coarse fragments of sandstone; strongly acid; abrupt smooth boundary.

R—14 inches; sandstone bedrock.

Thickness of the solum and depth to sandstone bedrock range from 7 to 20 inches. The soil is strongly or very strongly acid. The volume of sandstone fragments, 1 to 6 inches long, ranges from 5 to 35 percent in each horizon.

The A1 horizon is very dark grayish brown (10YR 3/2), dark brown (10YR 3/3, 4/3), or dark grayish brown (10YR 4/2). The A2 horizon is brown (10YR 5/3), yellowish brown (10YR 5/4), or pale brown (10YR 6/3). The fine earth fraction of the A horizon is loam, sandy loam, or fine sandy loam.

The B horizon is yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4), light yellowish brown

(10YR 6/4), strong brown (7.5YR 5/6), and pale brown (10YR 6/3). The fine earth fraction is loam or sandy loam.

The C horizon is similar to the B horizon in color and texture, but it does not have strong brown (7.5YR 5/6) colors. In some pedons it is single grain.

Sensabaugh series

The Sensabaugh series consists of deep, well drained gravelly soils. These soils formed in local alluvium dominantly washed from Lehew and Muskingum soils. They are in narrow strips along drainageways, on low benches, and on foot slopes. The slope range is dominantly 1 to 5 percent.

The Sensabaugh soils are geographically closely associated with Lehew soils, which formed in residuum on steep ridges.

Typical pedon of Sensabaugh gravelly loam, 1 to 5 percent slopes, along Brushy Creek 1 mile northeast of Deep Springs Church and 1,100 feet southeast of Brushy Valley Road:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine granular structure; very friable; many fine roots; 15 percent by volume fragments of sandstone; slightly acid; clear smooth boundary.

B1—8 to 14 inches; brown (10YR 4/3) gravelly loam; weak fine granular and subangular blocky structure; very friable; many fine roots; 15 percent by volume fragments of sandstone; slightly acid; clear smooth boundary.

B2—14 to 21 inches; brown (7.5YR 4/4) gravelly loam; weak fine and medium subangular blocky and granular structure; very friable; many fine roots; common fine pores; 15 percent by volume fragments of sandstone; slightly acid; clear smooth boundary.

B3—21 to 33 inches; brown (10YR 4/3) gravelly loam; weak fine and medium subangular blocky and granular structure; friable; few fine roots; 30 percent by volume fragments of sandstone; common fine black concretions; slightly acid; diffuse smooth boundary.

C—33 to 60 inches; brown (10YR 4/3) gravelly loam; common fine mottles of pale brown (10YR 6/3) and few fine mottles of strong brown (7.5YR 5/8); massive; friable; few fine roots; 30 percent by volume fragments of sandstone; common fine black concretions; slightly acid.

Solum thickness ranges from 24 to 55 inches. The soil is medium to slightly acid throughout. The volume of fragments of sandstone and shale, 1 to 4 inches in diameter, ranges from 10 to 25 percent in the A horizon, from 15 to 35 percent in the B horizon, and from 15 to 60 percent in the C horizon.

The A horizon is dark yellowish brown (10YR 4/4), brown (10YR 4/3), dark brown (7.5YR 3/2), and reddish brown (5YR 4/3). The fine earth fraction is silt loam, loam, or fine sandy loam.

The B horizon is brown (7.5YR 4/4; 10YR 4/3), yellowish brown (10YR 5/4, 5/6), dark yellowish brown (10YR 4/4), strong brown (7.5YR 5/6), or reddish brown (5YR 4/3, 4/4). The fine earth fraction is loam, fine sandy loam, clay loam, silt loam, or silty clay loam.

The C horizon has colors and textures like those in the B horizon, but in many pedons it is mottled with shades of brown and gray.

Sequatchie series

The Sequatchie series consists of deep, well drained, loamy soils that formed in alluvium on low stream terraces. The slope is dominantly less than 3 percent, but ranges to as much as 5 percent.

Sequatchie soils are geographically closely associated with Staser and Whitwell soils. Staser soils are on bottom lands and have a mollic epipedon 24 inches or more thick. Whitwell soils are on low terraces and are moderately well drained.

Typical pedon of Sequatchie loam, 0 to 5 percent slopes, on the Colby farm about 0.37 mile southwest of Rosedale School and about 800 feet south of Colby's residence:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable; many fine roots; few sandstone pebbles less than 2 inches in diameter; medium acid; abrupt smooth boundary.

B1—8 to 12 inches; brown (10YR 4/3) silt loam; weak medium and fine subangular blocky structure; friable; many fine roots; few sandstone pebbles less than 2 inches in diameter; strongly acid; clear smooth boundary.

B21t—12 to 19 inches; brown (7.5YR 4/4) silt loam; weak medium and fine subangular blocky structure; friable; few fine roots; thin discontinuous clay films; few sandstone pebbles less than 2 inches in diameter; strongly acid; clear smooth boundary.

B22t—19 to 35 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous clay films; few sandstone pebbles less than 2 inches in diameter; very strongly acid; gradual smooth boundary.

B3—35 to 44 inches; yellowish brown (10YR 5/6) loam; few fine faint brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few sandstone pebbles less than 3 inches in diameter; few brown concretions; very strongly acid; gradual smooth boundary.

C—44 to 60 inches; yellowish brown (10YR 5/6) loam; common fine mottles of light olive brown (2.5Y 5/4);

massive; friable; 5 percent by volume sandstone pebbles less than 3 inches in diameter; few black and brown concretions; strongly acid.

Thickness of the solum ranges from 32 to 55 inches. Depth to bedrock is more than 5 feet. The soil is strongly acid or very strongly acid except for the surface layer where limed. The volume of coarse fragments ranges from 0 to 15 percent in the A and B horizons and from 5 to 30 percent in the C horizon. The fragments are rounded and are mostly less than 3 inches across.

The A horizon is dark yellowish brown (10YR 3/4), dark brown (10YR 3/3; 7.5YR 3/2), or very dark grayish brown (10YR 3/2). It is loam, silt loam, or fine sandy loam.

The B1 horizon is brown (10YR 4/3; 7.5YR 4/4) or strong brown (7.5YR 5/6, 5/8). It is loam, silt loam, or fine sandy loam.

The B2t horizon is brown (7.5YR 4/4; 10YR 4/3) or yellowish brown (10YR 5/4, 5/6). Mottles in shades of brown, yellow, red, or gray range from none to common in the lower part. The B2t horizon is loam, silt loam, or clay loam.

The B3 horizon is strong brown (7.5YR 5/6, 5/8), yellowish brown (10YR 5/4, 5/6), or brown (7.5YR 4/4). Mottles in shades of brown, yellow, red, or gray range from none to common. The B3 horizon is loam, clay loam, fine sandy loam, or sandy loam.

The C horizon is strong brown (7.5YR 5/6), brown (7.5YR 5/4), or yellowish brown (10YR 5/6). In some pedons, it is mottled in shades of gray, brown, or yellow. The fine earth fraction is loam, sandy loam, or fine sandy loam. Some pedons contain thin discontinuous layers of loamy sand.

Sequoia series

The Sequoia series consists of moderately deep, well drained soils formed in residuum of acid shale. These soils are on rolling and hilly uplands. The slope is dominantly 5 to 12 percent but ranges from 5 to 25 percent.

Sequoia soils are geographically closely associated with Armuchee, Montevallo, and Hamblen soils. In the Armuchee soils the combined thickness of the A and B horizons is less than 20 inches. Montevallo soils are less than 20 inches deep over bedrock. Hamblen soils are on flood plains. They have a fine loamy subsoil.

Typical pedon of Sequoia silt loam, 12 to 25 percent slopes, in a pasture 1 mile southeast of Bull Run Steam Plant and 1,500 feet north of Bull Run Creek:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular structure; friable; many fine, medium, and coarse roots; strongly acid; abrupt smooth boundary.

B1—5 to 16 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium granular and subangular blocky structure; friable; many fine and medium roots; common fine black and brown concretions; very strongly acid; clear smooth boundary.

B21t—16 to 25 inches; strong brown (7.5YR 5/6) silty clay; common fine distinct yellowish red (5YR 4/8) and brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay films; few fragments of shale; many fine and medium black and brown concretions; very strongly acid; gradual smooth boundary.

B22t—25 to 33 inches; yellowish red (5YR 5/8) silty clay; common fine to coarse distinct red (2.5YR 4/6) and brownish yellow (10YR 6/6) mottles; moderate medium angular and subangular blocky structure; firm; thin continuous clay films; 5 percent by volume soft fragments of shale; common fine and medium black and brown concretions; very strongly acid; clear smooth boundary.

B3—33 to 38 inches; yellowish red (5YR 5/8) shaly silty clay; many fine to coarse distinct red (2.5YR 4/8) and yellowish brown (10YR 5/6) mottles; weak fine and medium angular blocky structure; firm; 20 percent by volume fragments of shale; very strongly acid; clear wavy boundary.

Cr—38 to 62 inches; soft reddish, brownish, and green acid shale with seams of yellowish red (5YR 5/8) silt loam on and between layers of shale and on fragments.

Thickness of the solum and depth to soft shale range from 20 to 40 inches. The soil is strongly or very strongly acid except for the surface layer where recently limed. The volume of coarse fragments of soft shale ranges from 0 to 5 percent in the A horizon and from 0 to 25 percent in the B horizon.

The A horizon is brown (10YR 4/3, 5/3) or yellowish brown (10YR 5/4) and in some eroded spots strong brown (7.5YR 5/6, 5/8) or yellowish red (5YR 5/8). It is dominantly silt loam but is silty clay loam or silty clay in severely eroded areas.

The B1 horizon is yellowish brown (10YR 5/4, 5/6, 5/8), dark yellowish brown (10YR 4/4), and strong brown (7.5YR 5/6). The fine earth fraction is silt loam or silty clay loam.

The B2t horizon is yellowish red (5YR 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or red (2.5YR 5/6, 5/8). In some pedons it is mottled in shades of yellow, brown, or red. The fine earth fraction is silty clay loam or silty clay.

In the B3 horizon the color range includes yellowish brown (10YR 5/6, 5/8) and the colors in the B2t horizon. In some pedons, this horizon is mottled with shades of yellow, brown, red, or gray. The fine earth fraction is silty clay loam or silty clay.

The Cr horizon is soft acid shale with reddish and yellowish silty soil material between layers of shale, on fragments, and in cracks.

Sewanee series

The Sewanee series consists of moderately well drained soils on nearly level bottom lands. These soils formed in alluvium washed from soils underlain by shale, sandstone, and siltstone. The slope is commonly less than 1 percent but ranges from 0 to 2 percent.

Sewanee soils are adjacent to the well drained Ealy soils.

Typical pedon of Sewanee silt loam in an area of Sewanee-Ealy complex, 0 to 3 percent slopes, about 1 mile southeast of Rosedale and 200 feet south of Highway 116 on the New River flood plain:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine and medium roots; neutral; abrupt smooth boundary.

B21—6 to 17 inches; brown (10YR 4/3) silt loam; common fine faint mottles of grayish brown (10YR 5/2); weak fine granular structure; friable; strongly acid; clear smooth boundary.

B22—17 to 30 inches; brown (10YR 5/3) silt loam; common fine and medium distinct mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/8) and common fine and medium faint mottles of yellowish brown (10YR 5/8); weak fine subangular blocky structure parting to weak fine granular; friable; few fine roots; strongly acid; gradual smooth boundary.

C—30 to 54 inches; light brownish gray (2.5Y 6/2) silt loam; many fine and medium distinct mottles of grayish brown (10YR 5/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8); massive; friable; strongly acid.

R—54 inches; hard sandstone bedrock.

Solum thickness ranges from 25 to 40 inches. Depth to bedrock ranges from 40 to 60 inches or more. The volume of sandstone fragments ranges from 0 to 15 percent in the A and B horizons and from 0 to 30 percent in the C horizon. The soil is strongly acid or very strongly acid except for the surface where limed.

The A horizon is brown (10YR 4/3, 5/3) or dark grayish brown (10YR 4/2). Texture is loam, silt loam, or fine sandy loam.

The B horizon is brown (10YR 4/3, 5/3; 7.5YR 4/4) or yellowish brown (10YR 5/4). It has grayish mottles within a depth of 24 inches. The lower part of the B horizon is brown mottled with shades of gray and yellow, or it is dominantly gray mottled with shades of brown and yellow. It is loam, silt loam, or fine sandy loam.

The C horizon is light brownish gray (10YR 6/2; 2.5Y 6/2), grayish brown (10YR 5/2; 2.5Y 5/2), or pale brown (10YR 6/3). It is mottled in shades of brown, gray, and yellow. The fine earth fraction is loam, silt loam, or fine sandy loam.

Shouns series

The Shouns series consists of deep, well drained soils that formed in sediment washed dominantly from soils underlain by shale and sandstone. These soils are at the base of slopes on benches and on foot slopes. The slope range is 5 to 25 percent, but the gradient is dominantly between 5 and 20 percent.

Shouns soils are adjacent to Calvin and Lehew soils, which formed in residuum, are 20 to 40 inches deep over bedrock, and are more than 35 percent coarse fragments in the upper 20 inches of the subsoil.

Typical pedon of Shouns silt loam, 5 to 12 percent slopes, in Brushy Valley about 1.3 miles southwest of the confluence of Andy Branch and Hind's Creek:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; 5 percent by volume fragments of sandstone and shale, most of which are less than 1 inch across; neutral; clear smooth boundary.

B1—6 to 16 inches; strong brown (7.5YR 5/6) silt loam; moderate medium angular and subangular blocky structure; friable; few fine roots; 5 percent by volume fragments of sandstone and shale; strongly acid; gradual smooth boundary.

B2t—16 to 47 inches; red (2.5YR 4/6) silty clay loam; common coarse prominent mottles of yellowish brown (10YR 5/6); moderate medium angular blocky structure; friable; thick continuous clay films; 5 percent by volume fragments of sandstone and shale; strongly acid; gradual smooth boundary.

B3—47 to 60 inches; red (2.5YR 4/8), shaly silty clay loam; moderate medium angular blocky structure; firm; few thin patchy clay films on faces of peds; 20 percent by volume fragments of sandstone and shale; strongly acid; gradual smooth boundary.

Thickness of solum ranges from 45 to 80 inches. Depth to shale bedrock exceeds 5 feet. The soil is medium acid or strongly acid except for the surface layer where limed. The volume of coarse fragments of sandstone and shale ranges from 0 to 15 percent in the A and B2 horizons and from 5 to 25 percent in the B3 horizon.

The Ap and A2 horizons are brown (10YR 4/3; 7.5YR 4/4), dark yellowish brown (10YR 4/4), strong brown (7.5YR 5/6), or reddish brown (5YR 4/4). The texture is silt loam or loam.

The B1 horizon is strong brown (7.5YR 5/6) or yellowish brown (10YR 5/4, 5/6).

The B2t and B3 horizons are yellowish red (5YR 4/6, 4/8, 5/6, 5/8), reddish brown (5YR 4/4; 2.5YR 4/4), or red (2.5YR 4/6, 4/8). The texture is silty clay loam or clay loam. The B3 horizon is shaly in some pedons.

Some pedons have a IIC horizon that ranges from yellowish brown (10YR 5/8) to red (2.5YR 4/8) and from loam to clay.

Staser series

The Staser series consists of deep, well drained loamy soils on first bottoms. These soils formed in sediment washed from soils underlain by dolomite, limestone, shale, and sandstone. The slope range is 0 to 2 percent.

Staser soils are geographically closely associated with Hamblen and Sequatchie soils. Hamblen soils occupy similar but slightly lower positions and are moderately well drained. Sequatchie soils are on low terraces a few feet higher in elevation than Staser soils. They have an argillic horizon.

Typical pedon of Staser loam on the flood plain along the Clinch River, 400 feet south of Highway 61 below the Clinch Moore bridge on the east side of Clinton:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; many fine and very fine roots; neutral; gradual smooth boundary.

A12—8 to 25 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; many fine roots; common fine pores; neutral; gradual smooth boundary.

B1—25 to 32 inches; dark yellowish brown (10YR 3/4) silt loam; weak fine granular structure; friable; common fine roots; common fine and very fine pores; neutral; gradual smooth boundary.

B2—32 to 60 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; friable; few fine roots; neutral.

Thickness of the mollic epipedon ranges from 24 to 40 inches. Depth to bedrock is more than 60 inches. The content of coarse fragments in the upper 40 inches ranges from 0 to 15 percent. Below 40 inches, the content of coarse fragments ranges from 0 to as much as 40 percent. Reaction in each horizon ranges from medium acid through neutral.

The A horizon is dark brown (10YR 3/3; 7.5YR 3/2), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). It is loam, silt loam, or fine sandy loam.

The B horizon is dark yellowish brown (10YR 3/4, 4/4), brown (10YR 4/3; 7.5YR 4/4), or yellowish brown (10YR 5/4). In some pedons, the lower part is mottled in shades of brown, yellow, and gray. The B horizon is loam, silt loam, or fine sandy loam.

Tasso series

The Tasso series consists of moderately well drained and well drained soils that have a weak or discontinuous fragipan. These soils are on benches and fans at the base of hills and ridges underlain by dolomite. The slope range is 2 to 7 percent.

Tasso soils are adjacent to Fullerton soils, which are at higher elevations and have a red cherty clay subsoil.

Typical pedon of Tasso silt loam, 2 to 7 percent slopes, about 1/2 mile east of the Roane County line and 1 mile north of Bethel Valley Road on ERDA property:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine, medium, and coarse roots; 5 percent by volume coarse fragments of chert; strongly acid; abrupt smooth boundary.

B1—7 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine, medium, and coarse roots; 5 percent by volume fragments of chert; strongly acid; clear smooth boundary.

B21t—11 to 22 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct mottles of strong brown (7.5YR 5/8) in lower part; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; few thin discontinuous clay films; 5 percent by volume fragments of chert; few fine black concretions; strongly acid; clear smooth boundary.

B22t&Bx—22 to 36 inches; about half of the mass is Bt and the rest is Bx. The Bx occurs as discontinuous segments up to 3 feet long. The Bt part is yellowish brown (10YR 5/6) silt loam; few fine distinct mottles of strong brown (7.5YR 5/8); moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; few thin discontinuous clay films; 5 percent by volume coarse fragments of chert; few fine black concretions. The Bx part is yellowish brown (10YR 5/4) cherty silt loam; many medium distinct mottles of light gray (10YR 7/2) and pale brown (10YR 6/3); weak coarse prismatic structure; firm and brittle; few fine roots in cracks; few clay films; 25 percent by volume coarse fragments of chert; few fine black concretions; strongly acid; gradual smooth boundary.

IIB23t—36 to 50 inches; yellowish red (5YR 5/8) cherty silty clay loam; common coarse distinct mottles of pale brown (10YR 6/3); weak medium angular blocky structure; friable; few thin clay films on faces of peds; 20 percent by volume coarse fragments of chert; few fine black concretions; very strongly acid; gradual smooth boundary.

IIB24t—50 to 72 inches; yellowish red (5YR 5/8) cherty clay; common medium distinct mottles of yellowish brown (10YR 5/4); moderate medium angular blocky structure; firm; common thin clay films on faces of peds; 20 percent by volume fragments of chert; common fine black concretions; very strongly acid.

Thickness of the solum and depth to bedrock exceed 60 inches. The volume of coarse fragments, mainly chert, ranges from 2 to 15 percent in the A, B1, and B21t horizons and from 2 to 25 percent in the B22t&Bx horizon and the IIB horizon.

The Ap or A2 horizon is brown (10YR 4/3, 5/3), pale brown (10YR 6/3), or yellowish brown (10YR 5/4) silt loam or loam.

The B1 and B21t horizons are yellowish brown (10YR 5/4, 5/6, 5/8), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6), or strong brown (7.5YR 5/6, 5/8). They are silt loam or silty clay loam.

The B22t&Bx horizon is yellowish brown (10YR 5/4, 5/6, 5/8) and rarely strong brown (7.5YR 5/6). It is mottled in shades of gray, brown, yellow, and red. It is silt loam, silty clay loam, or clay loam. About 40 to 60 percent of the volume of this horizon has properties of a fragipan.

The IIBt horizon is yellowish red (5YR 4/6, 4/8, 5/6, 5/8) or strong brown (7.5YR 5/6, 5/8). The fine earth fraction is silty clay loam or clay.

Upshur Variant

The Upshur Variant consists of moderately deep, well drained, reddish soils formed in shale residuum. These soils are on hilly uplands. The slope range is 10 to 25 percent.

Upshur Variant soils are geographically closely associated with Fullerton, Collegedale, and Sequoia soils. Fullerton and Collegedale soils formed in residuum of dolomite and limestone and are more than 60 inches deep over bedrock. In addition, the Fullerton soils are cherty. Sequoia soils are strongly acid or very strongly acid in all horizons and do not have the reddish brown colors that are typical of the Upshur Variant.

Typical pedon of Upshur Variant silty clay loam, 12 to 25 percent slopes, severely eroded, on ERDA property about 0.25 mile north of Bethel Valley Road and about 300 feet east of Weir Road, under power lines:

Ap—0 to 4 inches; reddish brown (5YR 4/3) silty clay loam; weak fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

B21t—4 to 7 inches; reddish brown (2.5YR 4/4) silty clay; strong medium angular and subangular blocky structure; firm; plastic; common fine roots; many thin patchy clay films on faces of peds; neutral; clear smooth boundary.

B22t—7 to 16 inches; dark reddish brown (2.5YR 3/4) clay; strong medium angular blocky structure; very firm; very plastic; few fine roots; continuous clay films; mildly alkaline; gradual smooth boundary.

B23t—16 to 29 inches; reddish brown (2.5YR 4/4) shaly clay; strong medium and coarse subangular blocky structure parting to platy; firm, plastic; few fine roots; continuous clay films; 25 percent by volume fragments of shale; mildly alkaline; clear wavy boundary.

B3—29 to 33 inches; reddish brown (5YR 4/3) very shaly silty clay; weak medium platy structure; firm, plastic; 50 percent by volume fragments of shale; mildly alkaline.

Cr—33 to 45 inches; calcareous shale that can be dug with a spade.

Thickness of the solum and depth to soft shale range from 20 to 40 inches. Reaction ranges from strongly acid to neutral in the A horizon and from medium acid to mildly alkaline in the B horizon. The volume of coarse fragments of shale ranges from 0 to 15 percent in the A horizon, from 0 to 35 percent in the B2t horizon, from 10 to 60 percent in the B3 horizon, and from 35 to 60 percent in the C horizon, which occurs in some pedons. The shale fragments are dominantly 1 inch to 3 inches but range from 1 inch to 6 inches.

The A horizon is dark brown (10YR 4/3) or reddish brown (5YR 4/3, 4/4). It is silt loam, silty clay loam, or silty clay.

In the B2t horizon the range in color is centered on reddish brown (2.5YR 4/4). The range includes reddish brown (2.5YR 4/4; 5YR 4/4) and dark reddish brown (2.5YR 3/4). The fine earth fraction is silty clay or clay. Some pedons have a B1 horizon with colors similar to those in the B2t horizon. The texture is mainly silty clay or clay, but the range includes silty clay loam and in a few places silt loam.

The B3 horizon is weak red (10R 4/3, 4/4), dusky red (10R 3/2, 3/3, 3/4; 2.5YR 3/2), reddish brown (2.5YR 4/4; 5YR 4/4), and dark reddish brown (2.5YR 3/4). The fine earth fraction is clay, silty clay, or silty clay loam.

The Cr horizon is soft shale that can be dug with a spade. The volume of fine earth is 5 to 15 percent.

Waynesboro series

The Waynesboro series consists of deep, well drained soils that formed in old alluvium washed from soils underlain by dolomite, shale, limestone, and sandstone. These soils are mostly on high stream terraces near the Clinch River. The slope range is 10 to 25 percent.

Waynesboro soils are geographically closely associated with Holston and Etowah soils. Holston soils are on similar positions on the landscape. The subsoil is in shades of yellow and brown, and the upper 20 inches is less than 35 percent clay. Etowah soils are on stream terraces but are lower on the landscape than Waynesboro soils. The upper 20 inches of their subsoil is less than 35 percent clay.

Typical pedon of Waynesboro loam, 10 to 25 percent slopes, in Eagle Bend, 3/4 mile south of Highway 61, on the west side of the road:

Ap—0 to 6 inches; brown (10YR 4/3) loam; moderate fine granular structure; friable; many fine, medium, and coarse roots; strongly acid; clear smooth boundary.

B1—6 to 14 inches; yellowish red (5YR 4/6) clay loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; strongly acid; gradual smooth boundary.

B21t—14 to 22 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; common fine roots; few thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.
B22t—22 to 58 inches; dark red (2.5YR 3/6) clay; moderate medium angular blocky structure; firm; few fine roots; thin continuous clay films; strongly acid; diffuse smooth boundary.
B23t—58 to 72 inches; dark red (2.5YR 3/6) clay; few fine prominent mottles of yellowish brown (10YR 5/8); strong medium angular blocky structure; firm; many thin patchy clay films on faces of peds; 10 percent by volume fragments of chert and sandstone, most of which are less than 1/2 inch across; strongly acid.

Thickness of the solum and depth to bedrock are more than 60 inches. The soil is strongly acid or very strongly acid except for the surface layer where limed. The volume of coarse fragments ranges from 0 to 15 percent in all horizons.

The Ap and A2 horizons are brown (10YR 4/3, 5/3; 7.5YR 4/4), dark yellowish brown (10YR 4/4), dark grayish brown (10YR 4/2), or yellowish brown (10YR 5/4). The A3 horizon, which occurs in some pedons, is yellowish brown (10YR 5/4, 5/6, 5/8), dark yellowish brown (10YR 4/4), or strong brown (7.5YR 5/6). The A horizon is loam, silt loam, or in a few places fine sandy loam.

The B1 horizon is strong brown (7.5YR 5/6, 5/8), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), reddish brown (5YR 4/4), or yellowish brown (10YR 5/4, 5/6). It is loam, clay loam, or silty clay loam.

The B2t horizon is yellowish red (5YR 4/6, 4/8, 5/6, 5/8), red (2.5YR 4/6, 4/8), or dark red (2.5YR 3/6, 10R 3/6). The lower part has few to common mottles in shades of brown, yellow, or red. The B2t horizon is clay loam, sandy clay, or clay.

Welchland series

The Welchland series consists of deep, well drained cobbly soils on low terraces along the larger intermountain streams. These soils formed in old alluvium washed from soils underlain by shale, sandstone, and siltstone. The slope range is 2 to 5 percent.

Welchland soils are geographically closely associated with Ealy and Sewanee soils, both of which are on first bottoms. These soils do not have an argillic horizon. Sewanee soils are moderately well drained.

The Welchland soils in Anderson County are mapped only with Ealy soils.

Typical pedon of Welchland cobbly loam in an area of Welchland-Ealy complex, 0 to 5 percent slopes, about 50 feet north of New River and 2 miles northeast of Fork Mountain Baptist Church:

Ap—0 to 9 inches; dark brown (10YR 3/3) cobbly loam; weak medium granular structure; very friable; many fine and medium roots; 20 percent by volume cobbles and pebbles of sandstone and quartzite 1 to 7 inches in diameter; strongly acid; clear smooth boundary.
B1—9 to 13 inches; dark yellowish brown (10YR 4/4) cobbly loam; weak medium subangular blocky structure; friable; common fine and medium roots; 25 percent by volume cobbles and pebbles of sandstone and quartzite 1 to 7 inches in diameter; strongly acid; clear smooth boundary.
B2t—13 to 27 inches; yellowish brown (10YR 5/6) cobbly loam; weak medium subangular blocky structure; friable; few thin discontinuous clay films on faces of peds; 30 percent by volume cobbles and pebbles of sandstone and quartzite 1 to 7 inches in diameter; strongly acid; gradual smooth boundary.
B3—27 to 38 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak fine subangular blocky structure; very friable; 40 percent by volume cobbles and pebbles of sandstone and quartzite 1 to 7 inches in diameter; strongly acid; gradual smooth boundary.
C—38 to 60 inches; brown (10YR 4/3) very cobbly sandy loam; massive; very friable; 40 percent by volume cobbles and pebbles of sandstone and quartzite 1 to 7 inches in diameter; strongly acid.

Solum thickness ranges from 30 to 60 inches. Depth to bedrock ranges from 6 to 10 feet or more. The volume of fragments of sandstone and quartzite ranges from 15 to 35 percent in the A and B2t horizons and from 35 to 60 percent in the B3 and C horizons. The fragments are mostly 1 inch to 10 inches in diameter. The soil is strongly acid or very strongly acid except for the surface layer where limed.

The A horizon is dark brown (10YR 3/3; 7.5YR 3/2), dark yellowish brown (10YR 3/4), or very dark grayish brown (10YR 3/2). The fine earth fraction is loam or sandy loam.

The B1 and B2t horizons are dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6), brown (7.5YR 4/4, 5/4), and strong brown (7.5YR 5/6). In addition, the B1 horizon is brown (10YR 4/3) in some pedons. The fine earth fraction is clay loam, sandy clay loam, sandy loam, and loam.

The B3 and C horizons have the same colors as those in the B1 and B2t horizons. The fine earth fraction is loam, sandy loam, or loamy sand.

Whitwell series

The Whitwell series consists of deep, moderately well drained soils on low terraces. These soils formed in old alluvium along the larger streams. The slope range is 1 to 3 percent.

Whitwell soils are geographically closely associated with the well drained Staser and Sequatchie soils. Staser

soils are on first bottoms. Sequatchie soils are on low terraces.

Typical pedon of Whitwell loam, 1 to 3 percent slopes, approximately 290 feet northeast of the old Highway 25W bridge across Bull Run Creek:

Ap—0 to 8 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

B1—8 to 14 inches; brown (10YR 4/3) silt loam; common fine faint mottles of pale brown (10YR 6/3); weak medium subangular blocky structure; friable; common fine roots; medium acid; clear smooth boundary.

B21t—14 to 25 inches; strong brown (7.5YR 5/6) silt loam; many fine and medium faint mottles of pale brown (10YR 6/3); weak medium subangular blocky structure; friable; few fine roots; few thin clay films on faces of peds; few fine black and brown concretions; strongly acid; gradual smooth boundary.

B22t—25 to 30 inches; yellowish brown (10YR 5/4) silt loam; many fine and medium distinct mottles of light brownish gray (10YR 6/2); moderate medium subangular blocky structure; friable; few thin clay films on faces of peds; many fine black and brown concretions; strongly acid; gradual smooth boundary.

B3—30 to 36 inches; mottled strong brown (7.5YR 5/6), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) silt loam; moderate medium subangular blocky structure; friable; few thin clay films on faces of peds; many fine black and brown concretions; very strongly acid; clear smooth boundary.

C1—36 to 48 inches; mottled light brownish gray (10YR 6/2) and pale brown (10YR 6/3) silt loam; massive; firm; many black and brown concretions; strongly acid; clear smooth boundary.

C2—48 to 60 inches; yellowish brown (10YR 5/4) silt loam; many faint and distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; firm; many black and brown concretions; strongly acid; gradual smooth boundary.

Solum thickness ranges from 30 to 60 inches. Depth to bedrock is more than 5 feet. The soil is strongly or very strongly acid except for the surface layer where limed. The content of coarse fragments in each horizon ranges from 0 to 15 percent.

The A horizon is brown (10YR 4/3; 7.5YR 4/4) or strong brown (7.5YR 5/6). It is loam, silt loam, or sandy loam.

The B horizon is brown (7.5YR 4/4; 10YR 4/3), strong brown (7.5YR 5/6), or yellowish brown (10YR 5/4, 5/6). Mottles in chroma of 2 or less begin about 10 inches below the upper boundary. The B3 horizon is mottled in shades of gray, yellow, and brown. In some pedons there is no dominant color. The B horizon is clay loam, loam, silt loam, or silty clay loam.

The C horizon ranges from dominantly gray to yellowish brown mottled with gray. It is loam, silt loam, sandy loam, or clay loam.

Zenith series

The Zenith series consists of deep, well drained soils of the high mountains. These soils formed in material washed from soils underlain by shale, sandstone, and siltstone. They are on north- and east-facing slopes and in deep coves. Most areas are above 2,800 feet in elevation. The slope range is 20 to 65 percent, but in most areas the gradient is between 30 and 65 percent.

Zenith soils are adjacent to Muskingum and Petros soils, which do not have a dark surface layer. Muskingum soils are 20 to 40 inches deep over bedrock and have a silt loam subsoil. Petros soils are less than 20 inches deep over shale bedrock. Their subsoil is more than 35 percent coarse fragments.

Typical pedon of Zenith loam, 20 to 65 percent slopes, on the north side of Fork Mountain, about 1/2 mile east of Cold Gap at an elevation of approximately 2,900 feet:

A11—0 to 2 inches; very dark gray (10YR 3/1) loam; moderate fine granular structure; very friable; many fine and medium roots; many fine and medium pores; 10 percent by volume fragments of sandstone and shale 1 inch to 5 inches across; strongly acid; abrupt smooth boundary.

A12—2 to 8 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; very friable; many fine and medium roots; common fine and medium pores; 10 percent by volume fragments of sandstone and shale 1 inch to 5 inches across; strongly acid; clear smooth boundary.

B1—8 to 12 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; common medium pores; 15 percent by volume fragments of sandstone and shale less than 2 inches across; strongly acid; clear smooth boundary.

B21—12 to 20 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common fine and medium pores; 15 percent by volume fragments of shale and sandstone ranging from less than 1 inch to 3 inches across; strongly acid; clear smooth boundary.

B22—20 to 28 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; few fine and medium roots and pores; 15 percent by volume fragments of sandstone and shale 1 inch to 3 inches across; strongly acid; clear smooth boundary.

B3—28 to 35 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; few fine roots; few fine and medium pores; 20 percent by volume fragments of

sandstone and shale 1 inch to 4 inches across; very strongly acid; clear smooth boundary.

C—35 to 42 inches; yellowish brown (10YR 5/4) gravelly clay loam; massive; friable; 30 percent by volume fragments of sandstone and shale 1 inch to 8 inches across; very strongly acid.

R—42 inches; hard shale bedrock.

Depth to bedrock ranges from 40 to 70 inches. The soil is strongly acid or very strongly acid in all horizons. The volume of fragments of sandstone, shale, and siltstone ranges from 10 to 30 percent in the A horizon, from 15 to 35 percent in the B horizon, and from 1 to 35 percent in the C horizon.

The A horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), or dark brown (10YR 3/3; 7.5YR 3/2). The fine earth fraction is silt loam or loam.

The B horizon is brown (7.5YR 4/4, 5/4; 10YR 4/3), yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or dark yellowish brown (10YR 4/4). The fine earth fraction is loam, clay loam, or silty clay loam.

The C horizon is yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6, 5/8), or yellowish red (5YR 4/6). The fine earth fraction is silty clay loam or clay loam.

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(3) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

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glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Low	0 to 4
Moderate	4 to 6
High	More than 6

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock. Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

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

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

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

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow

infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil and support little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three-dimensional and large enough to

permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, differences in slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Oak Ridge, Tenn.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	47.0	28.8	37.9	70	3	17	5.19	3.19	6.97	9	3.2
February---	50.6	30.2	40.4	72	5	33	5.06	2.94	6.78	9	2.9
March------	58.7	36.8	47.8	80	17	104	6.24	3.95	8.30	10	1.6
April------	70.3	46.1	58.3	87	27	256	4.42	2.76	5.92	8	.0
May--------	78.4	54.5	66.5	91	36	512	4.04	2.29	5.47	8	.0
June-------	84.6	62.2	73.5	95	46	705	4.32	2.37	5.90	8	.0
July-------	87.2	66.1	76.7	97	54	828	5.12	2.76	7.03	8	.0
August-----	86.7	65.5	76.1	97	53	809	3.60	1.82	5.05	7	.0
September--	81.4	59.0	70.2	95	41	606	3.68	1.90	5.12	6	.0
October----	71.0	46.9	59.0	86	27	290	2.89	1.33	4.20	6	.0
November---	58.1	36.4	47.2	78	18	37	4.31	2.55	5.87	7	.3
December---	49.0	30.9	39.9	71	8	31	5.96	3.41	8.04	9	2.2
Year-----	68.6	47.0	57.8	99	0	4,228	54.83	46.45	62.86	95	10.2

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-75 at Oak Ridge, Tenn.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 2	April 13	April 24
2 years in 10 later than--	March 25	April 7	April 20
5 years in 10 later than--	March 11	March 28	April 11
First freezing temperature in fall:			
1 year in 10 earlier than--	October 30	October 25	October 17
2 years in 10 earlier than--	November 5	October 29	October 22
5 years in 10 earlier than--	November 15	November 6	October 30

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-75 at Oak Ridge, Tenn.]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	216	207	185
8 years in 10	227	212	190
5 years in 10	248	222	201
2 years in 10	268	233	212
1 year in 10	279	238	218

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

Map symbol	Soil name	Acres	Percent
AeD	Allen loam, 10 to 25 percent slopes	326	0.2
AmC	Armuchee silt loam, 5 to 12 percent slopes	2,313	1.1
AmD	Armuchee silt loam, 12 to 20 percent slopes	3,079	1.4
AmE	Armuchee silt loam, 20 to 45 percent slopes	3,987	1.9
ArD3	Armuchee shaly silty clay loam, 12 to 20 percent slopes, severely eroded	2,357	1.1
ArE3	Armuchee shaly silty clay loam, 20 to 45 percent slopes, severely eroded	994	0.5
AuE	Armuchee-Muskingum complex, 25 to 60 percent slopes	13,543	6.3
BaE	Bland-Rock outcrop complex, 20 to 50 percent slopes	685	0.3
BoC	Bodine cherty silt loam, 5 to 12 percent slopes	411	0.2
BoD	Bodine cherty silt loam, 12 to 25 percent slopes	1,773	0.8
BoE	Bodine cherty silt loam, 25 to 50 percent slopes	4,488	2.1
CaD	Calvin shaly silt loam, 8 to 25 percent slopes	425	0.2
CaE	Calvin shaly silt loam, 25 to 45 percent slopes	373	0.2
CbB	Capshaw silt loam, 2 to 5 percent slopes	416	0.2
CeC	Carbo silty clay loam, 3 to 12 percent slopes	867	0.4
CnC	Claiborne silt loam, 5 to 12 percent slopes	827	0.4
CnD	Claiborne silt loam, 12 to 25 percent slopes	3,138	1.5
CnE	Claiborne silt loam, 25 to 45 percent slopes	2,909	1.4
CoB	Collegedale silt loam, 2 to 5 percent slopes	322	0.1
CoC	Collegedale silt loam, 5 to 12 percent slopes	3,253	1.5
CoD	Collegedale silt loam, 12 to 25 percent slopes	1,714	0.8
CpC3	Collegedale clay, 5 to 12 percent slopes, severely eroded	2,434	1.1
CpD3	Collegedale clay, 12 to 25 percent slopes, severely eroded	685	0.3
CrC	Collegedale-Rock outcrop complex, 5 to 20 percent slopes	2,673	1.2
CrE	Collegedale-Rock outcrop complex, 20 to 35 percent slopes	4,219	2.0
CyD	Cynthiana flaggy silty clay loam, 10 to 35 percent slopes	593	0.3
DeC	Dewey silt loam, 5 to 12 percent slopes	1,038	0.5
DeD	Dewey silt loam, 12 to 25 percent slopes	958	0.4
DgD3	Dewey silty clay loam, 12 to 25 percent slopes, severely eroded	396	0.2
DuC	Dunmore silt loam, 5 to 12 percent slopes	971	0.5
DuD	Dunmore silt loam, 12 to 25 percent slopes	970	0.5
Em	Emory silt loam, 0 to 4 percent slopes	431	0.2
EtB	Etowah silt loam, 2 to 5 percent slopes	424	0.2
EtC	Etowah silt loam, 5 to 12 percent slopes	934	0.4
FuC	Fullerton cherty silt loam, 5 to 12 percent slopes	5,683	2.6
FuD	Fullerton cherty silt loam, 12 to 25 percent slopes	15,102	7.0
FuE	Fullerton cherty silt loam, 25 to 45 percent slopes	12,612	5.9
GaC	Gilpin silt loam, 5 to 20 percent slopes	414	0.2
GdC	Gladeville-Rock outcrop complex, 5 to 20 percent slopes	1,790	0.8
GeB	Greendale silt loam, 1 to 6 percent slopes	422	0.2
GrE	Grimsley stony loam, 15 to 50 percent slopes	3,150	1.5
Ha	Hamblen silt loam	4,190	2.0
HoB	Holston loam, 2 to 5 percent slopes	186	0.1
HoC	Holston loam, 5 to 12 percent slopes	417	0.2
JeC	Jefferson loam, 5 to 12 percent slopes	467	0.2
JeD	Jefferson loam, 12 to 25 percent slopes	350	0.2
JgC	Jefferson gravelly loam, 5 to 12 percent slopes	805	0.4
JgD	Jefferson gravelly loam, 12 to 25 percent slopes	723	0.3
JgE	Jefferson gravelly loam, 25 to 45 percent slopes	683	0.3
JmE	Jefferson-Grimsley complex, 20 to 50 percent slopes	6,639	3.1
JSE	Jefferson soils, 20 to 50 percent slopes	11,327	5.3
LeB	Leadvale silt loam, 2 to 7 percent slopes	992	0.5
LhE	Lehew loam, 25 to 60 percent slopes	8,677	4.0
LyC	Lily loam, 3 to 10 percent slopes	932	0.4
MaC	Minvale silt loam, 3 to 15 percent slopes	675	0.3
McC	Minvale cherty silt loam, 3 to 15 percent slopes	580	0.3
MhB	Monongahela loam, 2 to 5 percent slopes	990	0.5
MoC	Montevallo shaly silt loam, 5 to 12 percent slopes	507	0.2
MoD	Montevallo shaly silt loam, 12 to 20 percent slopes	2,573	1.2
MoE	Montevallo shaly silt loam, 20 to 40 percent slopes	2,996	1.4
MpE	Muskingum-Gilpin-Petros complex, 15 to 60 percent slopes	27,069	12.6
MrE	Muskingum-Petros complex, 15 to 60 percent slopes	7,487	3.5
Ne	Newark silt loam	1,267	0.6
Nv	Newark Variant loam, 0 to 3 percent slopes	901	0.4
Pt	Pits, Quarries	147	0.1
RaE	Ramsey-Rock outcrop complex, 25 to 65 percent slopes	3,503	1.6
SaB	Sensabaugh gravelly loam, 1 to 5 percent slopes	253	0.1
ScB	Sequatchie loam, 0 to 5 percent slopes	858	0.4
SdC	Sequoia silt loam, 5 to 12 percent slopes	824	0.4
SdD	Sequoia silt loam, 12 to 25 percent slopes	429	0.2
Se	Sewanee-Ealy complex, 0 to 3 percent slopes	1,399	0.7
ShC	Shouns silt loam, 5 to 12 percent slopes	1,515	0.7

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

Map symbol	Soil name	Acres	Percent
ShD	Shouns silt loam, 12 to 25 percent slopes	618	0.3
St	Staser loam	1,347	0.6
TaB	Tasso silt loam, 2 to 7 percent slopes	701	0.3
UDC	Udorthents, rolling	535	0.2
UDE	Udorthents, steep	12,747	5.9
UhD	Upshur Variant silt loam, 10 to 25 percent slopes	350	0.2
UpD3	Upshur Variant silty clay loam, 12 to 25 percent slopes, severely eroded	492	0.2
Ur	Urban land	809	0.4
WaD	Waynesboro loam, 10 to 25 percent slopes	624	0.3
WeB	Welchland-Ealy complex, 0 to 5 percent slopes	418	0.2
Wh	Whitwell loam, 1 to 3 percent slopes	482	0.2
ZeE	Zenith loam, 20 to 65 percent slopes	817	0.4
	Total	214,400	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Yields are estimated to the nearest 5 bushels, 100 pounds, 0.5 ton, and 0.5 AUM]

Soil name and map symbol	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
	Bu	Lb	Bu	Bu	Ton	AUM*
AeD---------- Allen	75	2,000	50	25	2.0	6.0
AmC---------- Armuchee	---	---	---	---	1.5	4.5
AmD---------- Armuchee	---	---	---	---	1.5	4.0
AmE---------- Armuchee	---	---	---	---	---	---
ArD3---------- Armuchee	---	---	---	---	1.0	3.0
ArE3---------- Armuchee	---	---	---	---	---	---
AuE---------- Armuchee-Muskingum	---	---	---	---	---	---
BaE---------- Bland-Rock outcrop	---	---	---	---	---	---
BoC---------- Bodine	---	---	---	---	1.5	4.0
BoD---------- Bodine	---	---	---	---	1.5	4.0
BoE---------- Bodine	---	---	---	---	---	---
CaD---------- Calvin	---	---	---	---	1.5	4.5
CaE---------- Calvin	---	---	---	---	---	---
CbB---------- Capshaw	70	1,800	45	30	2.0	6.0
CeC---------- Carbo	---	---	---	---	1.5	4.5
CnC---------- Claiborne	90	2,300	50	35	2.5	7.0
CnD---------- Claiborne	80	2,200	45	---	2.0	6.5
CnE---------- Claiborne	---	---	---	---	---	5.5
CoB---------- Collegedale	70	1,850	48	---	2.0	5.5
CoC---------- Collegedale	60	1,700	45	---	1.5	5.0
CoD---------- Collegedale	---	---	40	---	1.5	4.5
CpC3---------- Collegedale	---	---	30	---	1.0	3.5

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
	Bu	Lb	Bu	Bu	Ton	AUM*
CpD3---------- Collegedale	---	---	---	---	1.0	3.0
CrC, CrE---------- Collegedale-Rock outcrop	---	---	---	---	---	---
CyD---------- Cynthiana	---	---	---	---	---	---
DeC---------- Dewey	75	1,900	50	30	2.5	7.0
DeD---------- Dewey	65	1,800	45	---	2.0	6.5
DgD3---------- Dewey	---	---	40	---	1.5	5.0
DuC---------- Dunmore	75	1,900	50	30	2.5	7.0
DuD---------- Dunmore	65	1,800	45	---	2.0	6.5
Em---------- Emory	115	2,300	50	45	3.0	7.5
EtB---------- Etowah	110	2,400	55	45	3.0	7.5
EtC---------- Etowah	100	2,300	50	40	2.5	7.0
FuC---------- Fullerton	65	1,900	50	20	2.0	5.5
FuD---------- Fullerton	60	1,700	45	---	1.5	5.0
FuE---------- Fullerton	---	---	---	---	---	4.5
GaC---------- Gilpin	80	1,800	45	25	2.0	5.5
GdC---------- Gladeville-Rock outcrop	---	---	---	---	---	---
GeB---------- Greendale	110	2,300	50	45	3.0	7.5
GrE---------- Grimsley	---	---	---	---	---	---
Ha---------- Hamblen	100	---	---	40	2.5	7.5
HoB---------- Holston	90	2,300	45	35	2.0	6.5
HoC---------- Holston	85	2,200	45	30	2.0	6.0
JeC---------- Jefferson	80	2,200	45	30	2.0	6.0
JeD---------- Jefferson	75	2,000	40	---	2.0	6.0
JgC---------- Jefferson	70	2,000	35	25	2.0	5.5

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
	Bu	Lb	Bu	Bu	Ton	AUM*
JgD---- Jefferson	65	1,800	30	---	1.5	5.0
JgE---- Jefferson	---	---	---	---	---	---
JmE---- Jefferson-Grimsley	---	---	---	---	---	---
JSE---- Jefferson	---	---	---	---	---	---
LeB---- Leadvale	80	1,800	50	30	2.0	6.0
LhE---- Lehew	---	---	---	---	---	---
LyC---- Lily	85	2,200	45	35	2.5	6.5
MaC---- Minvale	80	2,200	45	30	2.5	6.5
McC---- Minvale	70	1,900	40	25	2.0	6.0
MhB---- Monongahela	85	1,900	45	35	2.5	6.5
MoC---- Montevallo	---	---	---	---	1.5	4.5
MoD---- Montevallo	---	---	---	---	1.0	3.5
MoE---- Montevallo	---	---	---	---	---	---
MpE---- Muskingum-Gilpin-Petros	---	---	---	---	---	---
MrE---- Muskingum-Petros	---	---	---	---	---	---
Ne---- Newark	85	---	---	35	2.5	7.0
Nv---- Newark Variant	85	---	---	35	2.5	6.5
Pt. Pits						
RaE---- Ramsey-Rock outcrop	---	---	---	---	---	---
SaB---- Sensabaugh	85	2,200	45	35	2.5	7.0
ScB---- Sequatchie	110	2,300	50	40	3.0	7.5
SdC---- Sequoia	60	1,700	45	20	2.0	5.5
SdD---- Sequoia	---	---	---	---	1.5	4.5

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Tobacco	Wheat	Soybeans	Grass-legume hay	Pasture
	Bu	Lb	Bu	Bu	Ton	AUM*
Se---------- Sewanee-Ealy	90	---	---	40	2.5	7.0
ShC---------- Shouns	85	2,300	50	35	2.5	7.0
ShD---------- Shouns	75	2,100	45	30	2.0	6.5
St**---------- Staser	120	2,300	50	45	3.0	7.5
TaB---------- Tasso	80	1,800	45	30	2.0	6.5
UDC, UDE. Udorthents						
UhD---------- Upshur Variant	---	---	---	---	1.0	4.0
UpD3---------- Upshur Variant	---	---	---	---	---	3.0
Ur. Urban land						
WaD---------- Waynesboro	75	1,900	45	30	2.0	6.0
WeB---------- Welchland-Ealy	70	1,600	40	25	2.0	6.0
Wh---------- Whitwell	90	1,700	40	35	2.5	7.0
ZeE---------- Zenith	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** Yields are for areas protected from flooding.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
AeD---------- Allen	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	87	Yellow-poplar, loblolly pine, shortleaf pine.
						Shortleaf pine------	72	
AmC, AmD---------- Armuchee	4d	Slight	Slight	Moderate	Slight	Shortleaf pine------	60	Loblolly pine, Virginia pine.
						Virginia pine-------	60	
						Loblolly pine-------	70	
						White oak-----------	60	
						Southern red oak----	60	
AmE---------- Armuchee	4d	Moderate	Moderate	Moderate	Slight	Shortleaf pine------	60	Loblolly pine, Virginia pine.
						Virginia pine-------	60	
						Loblolly pine-------	70	
						White oak-----------	60	
						Southern red oak----	60	
ArD3---------- Armuchee	4d	Slight	Slight	Moderate	Slight	Shortleaf pine------	60	Loblolly pine, Virginia pine.
						Virginia pine-------	60	
						Loblolly pine-------	70	
						White oak-----------	60	
						Southern red oak----	60	
ArE3---------- Armuchee	4d	Moderate	Moderate	Moderate	Slight	Shortleaf pine------	60	Loblolly pine, Virginia pine.
						Virginia pine-------	60	
						Loblolly pine-------	70	
						White oak-----------	60	
						Southern red oak----	60	
AuE*: Armuchee----------	4d	Moderate	Moderate	Moderate	Slight	Shortleaf pine------	60	Loblolly pine, Virginia pine.
						Virginia pine-------	60	
						Loblolly pine-------	70	
						White oak-----------	60	
						Southern red oak----	60	
Muskingum---------	3r	Moderate	Moderate	Slight	Slight	Northern red oak----	68	Eastern white pine, Virginia pine, shortleaf pine.
						Virginia pine-------	65	
						Eastern white pine--	75	
						Shortleaf pine------	70	
BaE*: Bland----------	3c	Severe	Severe	Moderate	Moderate	Northern red oak----	70	Eastern white pine, Virginia pine.
						Yellow-poplar-------	75	
						Virginia pine-------	70	
Rock outcrop.								
BoC, BoD, BoE------ Bodine	4f	Moderate	Moderate	Severe	Slight	Virginia pine-------	50	Virginia pine, eastern redcedar.
						Chestnut oak--------	55	
						Scarlet oak---------	55	
CaD---------- Calvin	3f	Slight	Moderate	Severe	Slight	Northern red oak----	67	Eastern white pine, Virginia pine.
CaE---------- Calvin	3f	Moderate	Moderate	Severe	Slight	Northern red oak----	67	Eastern white pine, Virginia pine.
CbB---------- Capshaw	3o	Slight	Slight	Slight	Slight	Loblolly pine-------	80	Loblolly pine, shortleaf pine.
						Yellow-poplar-------	90	
						Northern red oak----	70	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
CeC---- Carbo	3c	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Eastern white pine, Virginia pine.
						Yellow-poplar-------	75	
						Virginia pine-------	70	
CnC, CnD---- Claiborne	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, black walnut, shortleaf pine, loblolly pine.
						Shortleaf pine------	66	
						White oak----------	70	
						Northern red oak----	70	
						Black oak----------	70	
CnE---- Claiborne	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, black walnut, loblolly pine, shortleaf pine.
						Shortleaf pine------	66	
						White oak----------	70	
						Northern red oak----	70	
						Black oak----------	70	
CoB, CoC, CoD---- Collegedale	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, loblolly pine, shortleaf pine.
						Southern red oak----	70	
						White oak----------	70	
						Shortleaf pine------	70	
						Virginia pine-------	70	
						Loblolly pine-------	80	
CpC3, CpD3---- Collegedale	4c	Moderate	Moderate	Severe	Slight	Loblolly pine-------	70	Loblolly pine.
						Virginia pine-------	60	
						Eastern redcedar----	40	
CrC*:								
Collegedale-------	4x	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, loblolly pine, shortleaf pine.
						Southern red oak----	70	
						White oak----------	70	
						Shortleaf pine------	70	
						Virginia pine-------	70	
						Loblolly pine-------	80	
Rock outcrop.								
CrE*:								
Collegedale-------	4x	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, loblolly pine, shortleaf pine.
						Southern red oak----	70	
						White oak----------	70	
						Shortleaf pine------	70	
						Virginia pine-------	70	
						Loblolly pine-------	80	
Rock outcrop.								
CyD---- Cynthiana	4d	Severe	Severe	Severe	Moderate	Eastern redcedar----	42	Eastern redcedar, Virginia pine.
DeC, DeD---- Dewey	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, black walnut, loblolly pine, eastern white pine.
						White oak----------	70	
						Southern red oak----	70	
						Shortleaf pine------	73	
						Virginia pine-------	70	
						Loblolly pine-------	78	
DgD3---- Dewey	4c	Moderate	Moderate	Moderate	Slight	Loblolly pine-------	70	Loblolly pine, eastern redcedar, eastern white pine.
						Virginia pine-------	60	
						Eastern redcedar----	40	
						Eastern white pine--	70	
DuC, DuD---- Dunmore	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, black walnut, loblolly pine, shortleaf pine, eastern white pine.
						White oak----------	70	
						Southern red oak----	70	
						Shortleaf pine------	70	
						Eastern white pine--	80	
						Virginia pine-------	70	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
Em---------- Emory	2o	Slight	Slight	Slight	Slight	Yellow-poplar--------- Northern red oak---- Loblolly pine------- Black walnut-------- White ash---------- Black cherry--------	104 80 90 --- --- ---	Yellow-poplar, black walnut, loblolly pine.
EtB, EtC---------- Etowah	2o	Slight	Slight	Slight	Slight	Yellow-poplar--------- Southern red oak---- Loblolly pine------- Shortleaf pine------ Black walnut--------	90 80 90 80 ---	Yellow-poplar, black walnut.
FuC, FuD---------- Fullerton	3o	Slight	Slight	Slight	Slight	Yellow-poplar--------- White oak---------- Southern red oak---- Loblolly pine------- Shortleaf pine------ Virginia pine------- Eastern redcedar----	90 70 70 74 67 68 50	Shortleaf pine, loblolly pine, Virginia pine, eastern white pine.
FuE---------- Fullerton	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar--------- White oak---------- Southern red oak---- Loblolly pine------- Shortleaf pine------ Virginia pine------- Eastern redcedar----	90 70 70 74 67 68 50	Shortleaf pine, loblolly pine, Virginia pine, eastern white pine.
GaC---------- Gilpin	3o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar---------	73 95	Eastern white pine, Virginia pine, yellow-poplar.
GdC*: Gladeville--------	5x	Moderate	Moderate	Severe	Severe	Eastern redcedar----	35	
Rock outcrop.								
GeB---------- Greendale	2o	Slight	Slight	Slight	Slight	Yellow-poplar--------- Northern red oak---- Shortleaf pine------ Loblolly pine------- Black walnut-------- Black cherry-------- Sugar maple--------- White ash----------	100 80 80 90 --- --- --- ---	Yellow-poplar, black walnut, loblolly pine, shortleaf pine.
GrE---------- Grimsley	3x	Moderate	Severe	Slight	Slight	Yellow-poplar--------- Southern red oak---- Shortleaf pine------ White oak----------	90 70 70 70	Yellow-poplar, loblolly pine, shortleaf pine.
Ha---------- Hamblen	2w	Slight	Moderate	Slight	Slight	Yellow-poplar--------- Northern red oak---- Loblolly pine-------	100 80 90	Loblolly pine, yellow-poplar.
HoB, HoC---------- Holston	3o	Slight	Slight	Slight	Slight	Yellow-poplar--------- Northern red oak---- Shortleaf pine------ Loblolly pine------- Virginia pine-------	86 78 69 85 73	Loblolly pine, shortleaf pine, Virginia pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
JeC--Jefferson	3o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Shortleaf pine Virginia pine Loblolly pine	70 101 68 70 77	Yellow-poplar, eastern white pine, loblolly pine, Virginia pine, shortleaf pine.
JeD--Jefferson	3r	Slight	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine Loblolly pine	62 65 70 80	Eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
JgC--Jefferson	3o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Shortleaf pine Virginia pine Loblolly pine	70 101 68 70 77	Yellow-poplar, eastern white pine, loblolly pine, Virginia pine, shortleaf pine.
JgD--Jefferson	3r	Slight	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine Loblolly pine	62 65 70 80	Eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
JgE--Jefferson	3r	Moderate	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine Loblolly pine	62 65 70 80	Eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
JmE*:								
Jefferson	3r	Moderate	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine Loblolly pine	62 65 70 80	Eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
Grimsley	3x	Moderate	Severe	Slight	Slight	Yellow-poplar Southern red oak Shortleaf pine White oak	90 70 70 70	Yellow-poplar, loblolly pine, shortleaf pine.
JSE*--Jefferson	3r	Moderate	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine Loblolly pine	62 65 70 80	Eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
LeB--Leadvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar White oak Loblolly pine Shortleaf pine Virginia pine	90 70 80 70 70	Loblolly pine, shortleaf pine, Virginia pine.
LhE--Lehew	4r	Moderate	Severe	Moderate	Slight	Northern red oak Virginia pine	58 50	Eastern white pine, Virginia pine.
LyC--Lily	4o	Slight	Slight	Slight	Slight	Shortleaf pine Virginia pine	63 65	Loblolly pine, shortleaf pine, Virginia pine.
MaC, McC--Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar Shortleaf pine Loblolly pine Virginia pine White oak Black walnut	90 70 80 70 60 ---	Yellow-poplar, black walnut, shortleaf pine, loblolly pine.
MhB--Monongahela	3w	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine Loblolly pine	70 85 72 77 82	Eastern white pine, loblolly pine, Virginia pine, yellow-poplar.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
MoC, MoD---------- Montevallo	4d	Moderate	Slight	Moderate	Moderate	Loblolly pine-------	70	Loblolly pine,
						Shortleaf pine------	60	shortleaf pine,
						Virginia pine-------	60	Virginia pine,
								eastern white pine.
MoE---------- Montevallo	5d	Severe	Moderate	Moderate	Moderate	Loblolly pine-------	60	Loblolly pine,
						Shortleaf pine------	50	Virginia pine.
						Virginia pine-------	50	
MpE*:								
Muskingum---------	3r	Moderate	Moderate	Slight	Slight	Northern red oak----	68	Eastern white pine,
						Virginia pine-------	65	Virginia pine,
						Eastern white pine--	75	shortleaf pine.
						Shortleaf pine------	70	
Gilpin----------	3r	Severe	Moderate	Moderate	Slight	Northern red oak----	70	Virginia pine,
						Yellow-poplar-------	90	eastern white pine,
								yellow-poplar.
Petros----------	5f	Moderate	Moderate	Severe	Severe	Virginia pine-------	50	Virginia pine.
						Southern red oak----	55	
						Chestnut oak--------	55	
						Black oak-----------	55	
						Loblolly pine-------	60	
MrE*:								
Muskingum---------	3r	Moderate	Moderate	Slight	Slight	Northern red oak----	68	Eastern white pine,
						Virginia pine-------	65	Virginia pine,
						Eastern white pine--	75	shortleaf pine.
						Shortleaf pine------	70	
Petros----------	5f	Moderate	Moderate	Severe	Severe	Virginia pine-------	50	Virginia pine.
						Southern red oak----	55	
						Chestnut oak--------	55	
						Black oak-----------	55	
						Loblolly pine-------	60	
Ne---------- Newark	2w	Slight	Moderate	Slight	Moderate	Pin oak-------------	99	Sweetgum, loblolly
						Eastern cottonwood--	94	pine, American
						Northern red oak----	85	sycamore, eastern
						Yellow-poplar-------	95	white pine, yellow-
						Sweetgum------------	88	poplar.
Nv---------- Newark Variant	2w	Slight	Moderate	Slight	Slight	Sweetgum------------	90	Sweetgum, loblolly
						Yellow-poplar-------	95	pine, yellow-poplar.
						Water oak-----------	90	
						Red maple-----------	---	
RaE*:								
Ramsey----------	4x	Severe	Severe	Severe	Severe	White oak-----------	61	Virginia pine,
						Shortleaf pine------	59	shortleaf pine,
						Virginia pine-------	66	eastern white pine,
						Loblolly pine-------	73	loblolly pine.
						Eastern white pine--	70	
Rock outcrop.								
SaB---------- Sensabaugh	2o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black
						White oak-----------	80	walnut, loblolly
						Shortleaf pine------	80	pine.
						Virginia pine-------	75	
ScB---------- Sequatchie	2o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black
						White oak-----------	80	walnut, loblolly pine.
						Loblolly pine-------	90	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
SdC, SdD---------- Sequoia	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Loblolly pine, shortleaf pine, Virginia pine.
						Loblolly pine-------	83	
						Shortleaf pine------	63	
						Virginia pine-------	71	
Se*:								
Sewanee----------	2w	Slight	Moderate	Slight	Slight	Loblolly pine-------	85	Loblolly pine, yellow-poplar, eastern white pine.
						Yellow-poplar-------	100	
						Southern red oak----	80	
						Shortleaf pine------	80	
						Sweetgum------------	90	
						Eastern white pine--	90	
Ealy----------	2o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black walnut, loblolly pine, eastern white pine.
						Northern red oak----	80	
						Shortleaf pine------	80	
						Virginia pine-------	75	
						Eastern white pine--	90	
						American sycamore---	90	
ShC, ShD---------- Shouns	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, shortleaf pine, loblolly pine, eastern white pine, black walnut.
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
						Black walnut--------	---	
						Northern red oak----	80	
St---------- Staser	2o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black walnut, loblolly pine.
						White oak-----------	80	
						Loblolly pine-------	90	
						Black walnut--------	---	
TaB---------- Tasso	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Loblolly pine, shortleaf pine, Virginia pine.
						White oak-----------	70	
						Shortleaf pine------	70	
						Virginia pine-------	70	
UhD, UpD3---------- Upshur Variant	4c	Moderate	Moderate	Moderate	Slight	Shortleaf pine------	---	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine-------	---	
						Eastern white pine--	---	
						Eastern redcedar----	---	
						Northern red oak----	---	
WaD---------- Waynesboro	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar, black walnut, loblolly pine, Virginia pine, shortleaf pine.
						White oak-----------	75	
						Loblolly pine-------	80	
						Shortleaf pine------	70	
						Virginia pine-------	75	
WeB*:								
Welchland---------	3x	Slight	Moderate	Moderate	Slight	Yellow-poplar-------	90	Loblolly pine, shortleaf pine.
						White oak-----------	70	
						Loblolly pine-------	80	
						Shortleaf pine------	70	
						Virginia pine-------	70	
Ealy----------	2o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black walnut, loblolly pine, eastern white pine.
						Northern red oak----	80	
						Shortleaf pine------	80	
						Virginia pine-------	75	
						Eastern white pine--	90	
						American sycamore---	90	
Wh---------- Whitwell	2w	Slight	Moderate	Moderate	Slight	Yellow-poplar-------	95	Loblolly pine, eastern white pine, sweetgum.
						Northern red oak----	75	
						Sweetgum------------	90	
						Loblolly pine-------	90	
						Eastern white pine--	90	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
ZeE---------- Zenith	2r	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	100	Yellow-poplar, black walnut, northern red oak, eastern white pine.
						Northern red oak----	80	
						White oak----------	80	

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

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AeD Allen	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
AmC Armuchee	Moderate: slope, percs slowly.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.
AmD Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
AmE Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
ArD3 Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
ArE3 Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
AuE*: Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BaE*: Bland Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BoC Bodine	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight.
BoD Bodine	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.
BoE Bodine	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
CaD Calvin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CaE Calvin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CbB Capshaw	Moderate: wetness, percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
CeC Carbo	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Severe: slope.	Slight.
CnC Claiborne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
CnD---- Claiborne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CnE---- Claiborne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoB---- Collegedale	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight.
CoC---- Collegedale	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
CoD---- Collegedale	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CpC3---- Collegedale	Severe: too clayey.	Severe: too clayey.	Severe: too clayey, slope.	Severe: too clayey.
CpD3---- Collegedale	Severe: too clayey, slope.	Severe: too clayey, slope.	Severe: too clayey, slope.	Severe: too clayey.
CrC*: Collegedale----	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Rock outcrop.				
CrE*: Collegedale----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
CyD---- Cynthiana	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, depth to rock, too clayey.	Severe: too clayey.
DeC---- Dewey	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
DeD---- Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
DgD3---- Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.
DuC---- Dunmore	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
DuD---- Dunmore	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
Em---- Emory	Severe: floods.	Slight----	Moderate: floods.	Slight.
EtB---- Etowah	Slight----	Slight----	Moderate: slope.	Slight.
EtC---- Etowah	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
FuC--- Fullerton	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
FuD--- Fullerton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
FuE--- Fullerton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
GaC--- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
GdC*: Gladeville---	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones.
Rock outcrop.				
GeB--- Greendale	Severe: floods.	Slight---	Moderate: slope, small stones.	Slight.
GrE--- Grimsley	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
Ha--- Hamblen	Severe: floods.	Moderate: floods, wetness.	Moderate: wetness.	Slight.
HoB--- Holston	Slight---	Slight---	Moderate: slope.	Slight.
HoC--- Holston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
JeC--- Jefferson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
JeD--- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
JgC--- Jefferson	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
JgD--- Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
JgE--- Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
JmE*: Jefferson---	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Grimsley---	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
JSE* Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
LeB Leadvale	Moderate: wetness.	Moderate: wetness.	Moderate: slope, percs slowly, wetness.	Slight.
LhE Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
LyC Lily	Slight	Slight	Severe: slope.	Slight.
MaC, McC Minvale	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MhB Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight.
MoC Montevallo	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
MoD Montevallo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: erodes easily.
MoE Montevallo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, erodes easily.
MpE*: Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Petros	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
MrE*: Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Petros	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Ne Newark	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
Nv Newark Variant	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: wetness, floods.	Moderate: wetness, floods.
Pt*. Pits				

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
RaE*:				
Ramsey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
SaB---------- Sensabaugh	Severe: floods.	Slight----------	Severe: small stones.	Slight.
ScB---------- Sequatchie	Severe: floods.	Slight----------	Moderate: floods.	Slight.
SdC---------- Sequoia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
SdD---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Se*:				
Sewanee	Severe: floods.	Moderate: wetness.	Moderate: floods, wetness.	Slight.
Ealy	Severe: floods.	Slight----------	Moderate: floods.	Slight.
ShC---------- Shouns	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ShD---------- Shouns	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
St---------- Staser	Severe: floods.	Slight----------	Moderate: floods.	Slight.
TaB---------- Tasso	Slight----------	Slight----------	Moderate: slope.	Slight.
UDC*, UDE*. Udorthents				
UhD---------- Upshur Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
UpD3---------- Upshur Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.
Ur*. Urban land				
WaD---------- Waynesboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
WeB*:				
Welchland	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Ealy	Severe: floods.	Slight----------	Moderate: floods.	Slight.
Wh---------- Whitwell	Severe: floods.	Slight----------	Moderate: slope, floods.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
ZeE---------- Zenith	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

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

TABLE 8.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AeD---- Allen	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
AmC---- Armuchee	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AmD---- Armuchee	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AmE---- Armuchee	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
ArD3---- Armuchee	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ArE3---- Armuchee	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
AuE*:										
Armuchee----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Muskingum----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
BaE*:										
Bland----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
BoC---- Bodine	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BoD---- Bodine	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BoE---- Bodine	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
CaD---- Calvin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CaE---- Calvin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CbB---- Capshaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeC---- Carbo	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnC, CnD---- Claiborne	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnE---- Claiborne	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CoB---- Collegedale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CoC---- Collegedale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoD---- Collegedale	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CpC3---- Collegedale	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CpD3---- Collegedale	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CrC*: Collegedale----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
CrE*: Collegedale----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
CyD---- Cynthiana	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
DeC---- Dewey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DeD---- Dewey	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DgD3---- Dewey	Very poor.	Very poor.	Fair	Good	Good	Very poor.	Very poor.	Poor	Poor	Very poor.
DuC---- Dunmore	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DuD---- Dunmore	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Em---- Emory	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EtB---- Etowah	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EtC---- Etowah	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FuC---- Fullerton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FuD---- Fullerton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FuE---- Fullerton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GaC---- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GdC*: Gladeville----	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GdC*: Rock outcrop.										
GeB---- Greendale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrE---- Grimsley	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ha---- Hamblen	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HoB---- Holston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HoC---- Holston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
JeC---- Jefferson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
JeD---- Jefferson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
JgC---- Jefferson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
JgD---- Jefferson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
JgE---- Jefferson	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
JmE*: Jefferson---	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Grimsley---	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
JSE*---- Jefferson	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
LeB---- Leadvale	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LhE---- Lehew	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
LyC---- Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC, McC---- Minvale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MhB---- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoC, MoD---- Montevallo	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
MoE---- Montevallo	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MpE*:										
Muskingum	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Petros	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
MrE*:										
Muskingum	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Petros	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Ne Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Nv Newark Variant	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Pt*. Pits										
RaE*:										
Ramsey	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										
SaB Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ScB Sequatchie	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SdC Sequoia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SdD Sequoia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Se*:										
Sewanee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ealy	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ShC Shouns	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ShD Shouns	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
St Staser	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaB Tasso	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UDC*, UDE*. Udorthents										
UhD, UpD3 Upshur Variant	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ur*. Urban land										
WaD---------- Waynesboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB*: Welchland----------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ealy----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Wh---------- Whitwell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ZeE---------- Zenith	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

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

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AeD Allen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AmC Armuchee	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: slope.	Severe: low strength.
AmD, AmE, ArD3, ArE3 Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
AuE*: Armuchee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BaE*: Bland	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Rock outcrop.					
BoC Bodine	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
BoD, BoE Bodine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CaD, CaE Calvin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CbB Capshaw	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
CeC Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength.
CnC Claiborne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.
CnD, CnE Claiborne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
CoB Collegedale	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
CoC Collegedale	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CoD---------- Collegedale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
CpC3---------- Collegedale	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
CpD3---------- Collegedale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
CrC*: Collegedale------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
Rock outcrop.					
CrE*: Collegedale------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Rock outcrop.					
CyD---------- Cynthiana	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope, low strength.
DeC---------- Dewey	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.
DeD, DgD3--------- Dewey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
DuC---------- Dunmore	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: slope, low strength.
DuD---------- Dunmore	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Em---------- Emory	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
EtB---------- Etowah	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: low strength.
EtC---------- Etowah	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
FuC---------- Fullerton	Moderate: too clayey, small stones, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
FuD, FuE---------- Fullerton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GaC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
GdC*:					
Gladeville	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Rock outcrop.					
GeB---- Greendale	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
GrE---- Grimsley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ha---- Hamblen	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
HoB---- Holston	Slight----	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
HoC---- Holston	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
JeC---- Jefferson	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
JeD---- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
JgC---- Jefferson	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
JgD, JgE---- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
JmE*:					
Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Grimsley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
JSE*---- Jefferson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LeB---- Leadvale	Moderate: wetness.	Slight----	Moderate: wetness.	Moderate: slope.	Moderate: low strength.
LhE---- Lehew	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
LyC---- Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
MaC, McC---- Minvale	Severe: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
MhB---- Monongahela	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
MoC---------- Montevallo	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
MoD, MoE---------- Montevallo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
MpE*:					
Muskingum--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Petros----------	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
MrE*:					
Muskingum--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Petros----------	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Ne---------- Newark	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.
Nv---------- Newark Variant	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, low strength.
Pt*. Pits					
RaE*:					
Ramsey----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.					
SaB---------- Sensabaugh	Moderate: wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
ScB---------- Sequatchie	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
SdC---------- Sequoia	Moderate: too clayey, depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Severe: slope.	Severe: low strength.
SdD---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Se*:					
Sewanee----------	Severe: floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Se*:					
Ealy	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
ShC Shouns	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
ShD Shouns	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
St Staser	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.
TaB Tasso	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, shrink-swell.
UDC*, UDE*. Udorthents					
UhD, UpD3 Upshur Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Ur*. Urban land					
WaD Waynesboro	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WeB*:					
Welchland	Moderate: small stones.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Ealy	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Wh Whitwell	Moderate: floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
ZeE Zenith	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

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

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AeD Allen	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
AmC Armuchee	Severe: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: area reclaim, too clayey, thin layer.
AmD, AmE, ArD3, ArE3 Armuchee	Severe: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: area reclaim, too clayey, slope.
AuE*: Armuchee	Severe: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: area reclaim, too clayey, slope.
Muskingum	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim.
BaE*: Bland	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Rock outcrop.					
BoC Bodine	Moderate: slope.	Severe: seepage, slope, small stones.	Severe: seepage.	Severe: seepage.	Poor: small stones.
BoD Bodine	Severe: slope.	Severe: seepage, slope, small stones.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, small stones.
BoE Bodine	Severe: slope.	Severe: seepage, slope, small stones.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
CaD Calvin	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, thin layer.
CaE Calvin	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, thin layer.
CbB Capshaw	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, wetness, depth to rock.	Moderate: wetness.	Poor: too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CeC---------- Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: too clayey, area reclaim, thin layer.
CnC---------- Claiborne	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
CnD---------- Claiborne	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
CnE---------- Claiborne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
CoB---------- Collegedale	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey.
CoC---------- Collegedale	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
CoD---------- Collegedale	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
CpC3---------- Collegedale	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
CpD3---------- Collegedale	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
CrC*: Collegedale--------	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Rock outcrop.					
CrE*: Collegedale--------	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.
Rock outcrop.					
CyD---------- Cynthiana	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, too clayey.
DeC---------- Dewey	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
DeD---------- Dewey	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Fair: too clayey, slope.
DgD3---------- Dewey	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Fair: too clayey, slope.
DuC---------- Dunmore	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
DuD---------- Dunmore	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Em Emory	Severe: floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Good.
EtB Etowah	Slight	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
EtC Etowah	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: too clayey.
FuC Fullerton	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: small stones, slope, too clayey.
FuD Fullerton	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
FuE Fullerton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
GaC Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
GdC*: Gladeville	Severe: depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, small stones, too clayey.
Rock outcrop.					
GeB Greendale	Severe: floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Good.
GrE Grimsley	Severe: slope.	Severe: slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope, large stones.
Ha Hamblen	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
HoB Holston	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
HoC Holston	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
JeC Jefferson	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
JeD Jefferson	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
JgC Jefferson	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
JgD---------- Jefferson	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
JgE---------- Jefferson	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
JmE*: Jefferson----------	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Grimsley----------	Severe: slope.	Severe: slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope, large stones.
JSE*---------- Jefferson	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
LeB---------- Leadvale	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: wetness.	Fair: too clayey, wetness.
LhE---------- Lehew	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, small stones, area reclaim.
LyC---------- Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, thin layer.
MaC, McC---------- Minvale	Moderate: slope.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
MhB---------- Monongahela	Severe: percs slowly, wetness.	Moderate: slope, seepage.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
MoC---------- Montevallo	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.
MoD, MoE---------- Montevallo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
MpE*: Muskingum----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Gilpin----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Petros----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MrE*:					
Muskingum	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Petros	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
Ne	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Nv	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Pt*.					
Pits					
RaE*:					
Ramsey	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
SaB	Moderate: floods, wetness.	Severe: seepage, floods.	Severe: seepage, wetness.	Severe: seepage.	Fair: small stones.
ScB	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods.	Good.
SdC	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope.	Poor: thin layer, too clayey, area reclaim.
SdD	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: area reclaim, thin layer, too clayey.
Se*:					
Sewanee	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
Ealy	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
ShC	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
ShD	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
St	Severe: floods.	Severe: seepage, floods.	Severe: floods.	Severe: floods.	Good.
TaB	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UDC*, UDE*. Udorthents					
UhD, UpD3---------- Upshur Variant	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey, area reclaim.
Ur*. Urban land					
WaD---------- Waynesboro	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
WeB*: Welchland----------	Moderate: floods.	Severe: seepage.	Severe: seepage, small stones.	Severe: seepage.	Poor: small stones.
Ealy----------	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Wh---------- Whitwell	Severe: floods, wetness.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
ZeE---------- Zenith	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

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

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AeD Allen	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
AmC Armuchee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
AmD, AmE, ArD3, ArE3 Armuchee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
AuE*: Armuchee	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Muskingum	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
BaE*: Bland	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Rock outcrop.				
BoC Bodine	Fair: low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: slope, small stones.
BoD Bodine	Fair: slope, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: slope, small stones.
BoE Bodine	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: slope, small stones.
CaD Calvin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CaE Calvin	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CbB Capshaw	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
CeC Carbo	Poor: low strength, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CnC Claiborne	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
CnD Claiborne	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CnE---------- Claiborne	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CoB, CoC---------- Collegedale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CoD---------- Collegedale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CpC3---------- Collegedale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CpD3---------- Collegedale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CrC*: Collegedale----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
CrE*: Collegedale----------	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CyD---------- Cynthiana	Poor: low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, too clayey.
DeC---------- Dewey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
DeD, DgD3---------- Dewey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
DuC---------- Dunmore	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
DuD---------- Dunmore	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
Em---------- Emory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EtB---------- Etowah	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
EtC---------- Etowah	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
FuC---------- Fullerton	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FuD---------- Fullerton	Fair: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FuE---------- Fullerton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GaC---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, thin layer, small stones.
GdC*: Gladeville----------	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, small stones, too clayey.
Rock outcrop.				
GeB---------- Greendale	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
GrE---------- Grimsley	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones, slope.
Ha---------- Hamblen	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HoB---------- Holston	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
HoC---------- Holston	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
JeC---------- Jefferson	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
JeD---------- Jefferson	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
JgC---------- Jefferson	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
JgD---------- Jefferson	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
JgE---------- Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
JmE*: Jefferson----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Grimsley----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
JSE* Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
LeB Leadvale	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
LhE Lehew	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
LyC Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
MaC, McC Minvale	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
MhB Monongahela	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MoC Montevallo	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
MoD Montevallo	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
MoE Montevallo	Poor: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
MpE*: Muskingum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Petros	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, thin layer.
MrE*: Muskingum	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Petros	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, thin layer.
Ne Newark	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: wetness.
Nv Newark Variant	Fair: low strength, wetness.	Improbable; excess fines.	Improbable: excess fines.	Fair. wetness.
Pt*. Pits				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RaE*:				
Ramsey	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, area reclaim, thin layer.
Rock outcrop.				
SaB Sensabaugh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
ScB Sequatchie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
SdC Sequoia	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
SdD Sequoia	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Se*:				
Sewanee	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ealy	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
ShC Shouns	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
ShD Shouns	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
St Staser	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
TaB Tasso	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
UDC*, UDE*. Udorthents				
UhD, UpD3 Upshur Variant	Poor: slope, low strength, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Ur*. Urban land				
WaD Waynesboro	Fair: slope, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
WeB*:				
Welchland	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ealy	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wh Whitwell	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ZeE---------- Zenith	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

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

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AeD---------- Allen	Moderate: seepage.	Slight---------	Not needed-----	Slope----------	Slope----------	Slope.
AmC, AmD, AmE, ArD3, ArE3------- Armuchee	Moderate: slope, depth to rock.	Severe: thin layer, hard to pack.	Not needed-----	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
AuE*: Armuchee---------	Severe: slope.	Severe: thin layer, hard to pack.	Not needed-----	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Muskingum--------	Severe: slope.	Severe: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
BaE*: Bland----------	Severe: slope.	Severe: hard to pack, wetness.	Not needed-----	Erodes easily, percs slowly, slope.	Depth to rock, slope, erodes easily.	Slope, erodes easily, rooting depth.
Rock outcrop.						
BoC, BoD, BoE----- Bodine	Severe: seepage.	Moderate: seepage, large stones.	Not needed-----	Droughty, slope, large stones.	Slope, small stones, large stones.	Slope, large stones, droughty.
CaD, CaE---------- Calvin	Severe: seepage, slope.	Severe: piping.	Not needed-----	Droughty, slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock, droughty.
CbB---------- Capshaw	Moderate: depth to rock.	Severe: hard to pack.	Percs slowly---	Percs slowly, wetness.	Erodes easily--	Erodes easily.
CeC---------- Carbo	Moderate: depth to rock.	Severe: hard to pack.	Not needed-----	Erodes easily, slope, percs slowly.	Depth to rock, slope, erodes easily.	Slope, erodes easily, rooting depth.
CnC, CnD, CnE----- Claiborne	Moderate: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
CoB---------- Collegedale	Slight---------	Severe: hard to pack.	Not needed-----	Percs slowly---	Percs slowly---	Erodes easily.
CoC, CoD---------- Collegedale	Slight---------	Severe: hard to pack.	Not needed-----	Percs slowly, slope.	Percs slowly, slope.	Erodes easily, slope.
CpC3, CpD3-------- Collegedale	Slight---------	Severe: hard to pack.	Not needed-----	Slow intake, percs slowly, slope.	Percs slowly, slope.	Slope.
CrC*, CrE*: Collegedale------	Slight---------	Severe: hard to pack.	Not needed-----	Percs slowly, slope.	Percs slowly, slope.	Erodes easily, slope.
Rock outcrop.						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
CyD---------- Cynthiana	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Not needed-----	Rooting depth, slow intake, slope.	Depth to rock, slope.	Slope, rooting depth.
DeC, DeD, DgD3---- Dewey	Moderate: seepage.	Severe: hard to pack.	Not needed-----	Slope----------	Slope----------	Slope.
DuC, DuD---------- Dunmore	Moderate: seepage.	Severe: hard to pack.	Not needed-----	Slope----------	Slope----------	Slope.
Em---------- Emory	Moderate: seepage.	Severe: piping.	Not needed-----	Floods---------	Favorable------	Erodes easily.
EtB---------- Etowah	Moderate: seepage.	Moderate: piping.	Not needed-----	Favorable------	Favorable------	Favorable.
EtC---------- Etowah	Moderate: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
FuC, FuD, FuE----- Fullerton	Moderate: seepage.	Severe: hard to pack.	Not needed-----	Slope----------	Slope----------	Slope.
GaC---------- Gilpin	Moderate: seepage, depth to rock.	Moderate: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
GdC*: Gladeville-------	Severe: depth to rock.	Severe: thin layer.	Not needed-----	Droughty, rooting depth.	Depth to rock, small stones, slope.	Droughty, rooting depth, slope.
Rock outcrop.						
GeB---------- Greendale	Moderate: seepage.	Moderate: piping,	Not needed-----	Favorable------	Favorable------	Favorable.
GrE---------- Grimsley	Severe: seepage, slope.	Moderate: thin layer, large stones.	Not needed-----	Droughty, slope, large stones.	Slope, large stones.	Slope, large stones, droughty.
Ha---------- Hamblen	Moderate: seepage.	Severe: piping.	Floods---------	Floods---------	Floods---------	Wetness.
HoB---------- Holston	Moderate: seepage.	Moderate: piping.	Not needed-----	Favorable------	Favorable------	Favorable.
HoC---------- Holston	Moderate: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
JeC, JeD, JgC, JgD, JgE--------- Jefferson	Severe: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
JmE*: Jefferson--------	Severe: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
Grimsley---------	Severe: seepage, slope.	Moderate: thin layer, large stones.	Not needed-----	Droughty, slope, large stones.	Slope, large stones.	Slope, large stones, droughty.
JSE*---------- Jefferson	Severe: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
LeB---------- Leadvale	Moderate: seepage.	Moderate: piping. wetness.	Percs slowly, slope.	Wetness, percs slowly.	Wetness, erodes easily.	Erodes easily, rooting depth.
LhE---------- Lehew	Severe: seepage, slope.	Severe: thin layer.	Not needed-----	Droughty, seepage, slope.	Depth to rock, slope.	Droughty, depth to rock, slope.
LyC---------- Lily	Severe: seepage.	Severe: piping.	Not needed-----	Depth to rock, slope.	Depth to rock	Depth to rock.
MaC, McC---------- Minvale	Moderate: seepage.	Moderate: piping.	Not needed-----	Slope----------	Slope----------	Slope.
MhB---------- Monongahela	Moderate: seepage.	Severe: piping.	Slope, percs slowly.	Slope, rooting depth, erodes easily.	Percs slowly, rooting depth.	Slope, percs slowly, erodes easily.
MoC, MoD, MoE----- Montevallo	Severe: depth to rock, slope.	Severe: piping, thin layer.	Not needed-----	Droughty, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, droughty, depth to rock.
MpE*: Muskingum--------	Severe: slope.	Severe: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Slope, erodes easily, depth to rock.
Gilpin----------	Severe: slope.	Moderate: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Petros----------	Severe: slope, depth to rock.	Severe: thin layer.	Not needed-----	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
MrE*: Muskingum--------	Severe: slope.	Severe: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Slope, erodes easily, depth to rock.
Petros----------	Severe: slope, depth to rock.	Severe: thin layer.	Not needed-----	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Ne---------- Newark	Moderate: seepage.	Severe: piping, wetness.	Floods---------	Wetness, erodes easily, floods.	Erodes easily, wetness.	Wetness, erodes easily.
Nv---------- Newark Variant	Moderate: seepage.	Severe: piping.	Floods---------	Wetness, floods, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
Pt*. Pits						
RaE*: Ramsey----------	Severe: seepage, depth to rock.	Severe: piping.	Not needed-----	Slope, depth to rock.	Slope, depth to rock.	Depth to rock, slope.
Rock outcrop.						
SaB---------- Sensabaugh	Severe: seepage.	Slight---------	Not needed-----	Slope----------	Large stones---	Large stones.
ScB---------- Sequatchie	Moderate: seepage.	Severe: piping.	Not needed-----	Floods---------	Favorable------	Favorable.
SdC, SdD---------- Sequoia	Moderate: depth to rock.	Severe: hard to pack.	Not needed-----	Percs slowly, depth to rock, slope.	Erodes easily, slope, depth to rock.	Erodes easily, slope, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Se*:						
Sewanee	Moderate: seepage, depth to rock.	Severe: piping.	Floods	Floods, wetness.	Wetness	Favorable.
Ealy	Severe: seepage.	Severe: piping.	Not needed	Floods	Favorable	Favorable.
ShC Shouns	Moderate: seepage.	Moderate: piping.	Not needed	Slope	Slope	Slope.
ShD Shouns	Moderate: seepage.	Moderate: piping.	Not needed	Slope	Slope	Slope.
St Staser	Moderate: seepage.	Moderate: piping.	Not needed	Floods	Favorable	Favorable.
TaB Tasso	Moderate: seepage.	Severe: piping.	Not needed	Slope	Favorable	Favorable.
UDC*, UDE*. Udorthents						
UhD, UpD3 Upshur Variant	Moderate: depth to rock.	Moderate: thin layer, hard to pack.	Not needed	Percs slowly, rooting depth, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, depth to rock.
Ur*. Urban land						
WaD Waynesboro	Moderate: seepage.	Severe: hard to pack.	Not needed	Slope	Slope	Slope.
WeB*:						
Welchland	Severe: seepage.	Severe: piping.	Not needed	Large stones	Large stones	Large stones.
Ealy	Severe: seepage.	Severe: piping.	Floods	Floods	Favorable	Favorable.
Wh Whitwell	Moderate: seepage.	Moderate: piping.	Floods	Floods	Favorable	Favorable.
ZeE Zenith	Severe: slope, seepage.	Moderate: thin layer, piping.	Not needed	Slope	Slope, small stones.	Slope.

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

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AeD---------- Allen	0-9	Loam----------	ML, CL-ML, SM, SM-SC	A-4	0-5	90-100	75-100	65-98	40-80	<26	NP-7
	9-42	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7	0-10	85-100	75-100	65-98	50-80	22-43	5-19
	42-62	Clay loam, sandy clay loam, clay.	CL-ML, CL, SC, SM-SC	A-4, A-6, A-7	0-10	85-100	70-95	60-95	45-80	22-48	6-22
AmC, AmD, AmE---- Armuchee	0-6	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0-2	85-100	80-95	75-90	70-85	25-39	5-15
	6-18	Shaly silty clay, shaly silty clay loam.	MH, ML, CL, CH	A-6, A-7	0-2	65-85	60-80	55-80	50-70	45-70	17-35
	18-24	Very shaly silty clay, very shaly silty clay loam.	GC, CL, CH	A-2, A-6, A-7	0-5	35-75	25-70	20-65	15-55	32-55	12-30
	24-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
ArD3, ArE3------- Armuchee	0-6	Shaly silty clay loam.	CL, ML, CL-ML	A-4, A-6	0-2	70-80	65-75	60-70	50-65	25-39	5-15
	6-14	Shaly silty clay, shaly silty clay loam.	MH, ML, CL, CH	A-6, A-7	0-2	65-85	60-80	55-80	50-70	45-70	17-35
	14-20	Very shaly silty clay, very shaly silty clay loam.	GC, CL, CH	A-2, A-6, A-7	0-5	35-75	25-70	20-65	15-55	32-55	12-30
	20-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
AuE*:											
Armuchee--------	0-6	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0-2	85-100	80-95	75-90	70-85	25-39	5-15
	6-18	Shaly silty clay, shaly silty clay loam.	MH, ML, CL, CH	A-6, A-7	0-2	65-85	60-80	55-80	50-70	45-70	17-35
	18-24	Very shaly silty clay, very shaly silty clay loam.	GC, CL, CH	A-2, A-6, A-7	0-5	35-75	25-70	20-65	15-55	32-55	12-30
	24-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Muskingum-------	0-5	Silt loam--------	ML, CL, SM, SC	A-2, A-4	0-10	75-100	70-95	50-90	30-80	20-35	2-10
	5-26	Silt loam, channery silt loam, channery loam.	GM, SM, ML, CL	A-4	0-15	70-90	55-85	50-80	40-75	20-35	2-10
	26-36	Very channery silt loam, very channery loam, channery loam.	GM, SM, ML, GC-GM	A-1, A-2, A-4	0-15	20-80	10-65	10-65	10-60	20-35	2-10
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BaE*:											
Bland-----------	0-3	Silt loam--------	CL, CH	A-7	0-5	90-95	85-95	75-95	60-95	50-60	25-35
	3-31	Silty clay, clay	MH, CH	A-7	0-5	90-95	85-95	75-95	65-90	65-75	35-45
	31-36	Channery silty clay loam, shaly clay.	MH, CH, GC, GM	A-2, A-7	10-30	40-80	30-70	25-70	20-65	65-75	35-45
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
BoC, BoD, BoE---- Bodine	0-11	Cherty silt loam	ML, CL-ML, GM, GM-GC	A-4, A-2, A-1	5-25	30-90	20-75	20-67	20-62	<30	NP-7
	11-63	Cherty silt loam, cherty silty clay loam, stony silt loam.	GM-GC, GC	A-1, A-2, A-4, A-6	20-45	30-70	20-65	20-55	15-45	20-38	3-15

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CaD, CaE---------	0-6	Shaly silt loam	ML, CL, CL-ML	A-4	0-15	70-95	70-90	65-90	55-75	<30	NP-8
Calvin	6-22	Shaly silt loam, channery loam, very shaly clay loam.	ML, SM	A-2, A-4, A-6	0-15	70-95	55-90	40-90	30-75	22-38	NP-11
	22-29	Shaly silt loam, very shaly silt loam, very channery loam.	GM, SM, SC, GC	A-2, A-1, A-4, A-6	0-20	35-75	30-65	15-60	15-40	23-39	3-13
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CbB---------------	0-6	Silt loam---------	ML, CL, CL-ML	A-4	0	90-100	85-100	80-95	75-85	16-30	3-10
Capshaw	6-20	Silty clay loam, silty clay, silt loam.	ML, CL	A-6, A-7, A-4	0	90-100	85-100	80-95	75-85	30-45	10-20
	20-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	90-100	85-100	80-95	75-90	40-60	20-33
CeC---------------	0-6	Silty clay loam	CH, CL	A-7	0-5	95-100	90-100	85-95	75-85	45-60	20-35
Carbo	6-25	Clay--------------	CH	A-7	0-20	95-100	90-100	85-95	70-90	65-75	35-45
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CnC, CnD, CnE-----	0-16	Silt loam---------	ML, CL, CL-ML	A-4	0-5	85-100	70-95	65-90	55-80	24-35	4-10
Claiborne	16-42	Silty clay loam, cherty silty clay loam.	CL, ML	A-4, A-6, A-7	0-5	85-100	70-95	65-90	60-80	30-45	8-20
	42-62	Clay, cherty clay	MH, CH	A-7	0-5	80-100	75-90	65-85	60-75	51-73	20-42
CoB, CoC, CoD-----	0-5	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0-2	90-100	85-100	75-95	70-90	24-39	5-16
Collegedale	5-64	Silty clay, clay	MH, CH, CL	A-7	0-2	95-100	90-100	80-95	75-95	41-80	18-46
CpC3, CpD3--------	0-7	Clay--------------	CL, ML, CH, MH	A-6, A-7	0-2	95-100	90-100	80-95	75-95	34-55	12-28
Collegedale	7-64	Clay, silty clay	MH, CH, CL	A-7	0-2	95-100	90-100	80-95	75-95	41-80	18-46
CrC*, CrE*:											
Collegedale------	0-5	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0-2	90-100	85-100	75-95	70-90	24-39	5-16
	5-64	Silty clay, clay	MH, CH, CL	A-7	0-2	95-100	90-100	80-95	75-95	41-80	18-46
Rock outcrop.											
CyD---------------	0-12	Flaggy silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-30	70-100	65-100	60-100	55-100	25-42	4-20
Cynthiana	12-19	Flaggy clay, flaggy silty clay, clay.	MH, CH, CL	A-7	5-30	70-100	65-100	60-100	55-100	45-75	20-45
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DeC, DeD----------	0-6	Silt loam---------	CL-ML, CL	A-4, A-6	0	90-100	80-100	75-95	65-80	24-30	5-11
Dewey	6-34	Clay, silty clay, silty clay loam.	CL	A-6	0	90-100	80-100	75-95	70-85	27-40	12-20
	34-62	Clay, silty clay, cherty clay.	MH, CH, ML, CL	A-6, A-7	0-5	85-100	75-100	70-95	65-85	38-68	12-34
DgD3--------------	0-7	Silty clay loam	CL	A-6	0	90-100	80-100	75-95	70-80	25-39	12-20
Dewey	7-34	Clay, silty clay, silty clay loam.	CL	A-6	0	90-100	80-100	75-95	70-85	27-40	12-20
	34-62	Clay, silty clay, cherty clay.	MH, CH, ML, CL	A-6, A-7	0-5	85-100	75-100	70-95	65-85	38-68	12-34
DuC, DuD----------	0-14	Silt loam---------	CL-ML, CL	A-4, A-6	0-2	85-100	80-90	70-80	65-75	18-30	5-11
Dunmore	14-62	Clay, silty clay	MH	A-7	0-2	90-100	80-95	75-95	75-95	51-70	20-36

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Em---------- Emory	0-36	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0-2	95-100	90-100	85-100	80-95	25-40	4-15
	36-60	Silty clay loam, clay loam, silt loam.	CL	A-4, A-6, A-7	0-2	90-100	75-100	70-100	65-95	25-45	9-20
EtB, EtC--------- Etowah	0-6	Silt loam--------	ML, CL, SM-SC, CL-ML	A-4	0	80-100	75-100	70-95	45-70	20-30	3-10
	6-50	Silty clay loam, clay loam.	CL	A-4, A-6	0	80-100	75-100	70-95	65-85	25-35	10-15
	50-62	Silty clay loam, clay loam, clay.	CL, ML, MH	A-6, A-7	0	80-100	75-100	70-95	65-85	39-60	15-25
FuC, FuD, FuE---- Fullerton	0-12	Cherty silt loam	ML, CL-ML, CL, GM	A-2, A-4	2-15	60-94	50-88	40-80	30-70	16-30	3-10
	12-27	Cherty silty clay loam, cherty silt loam.	CL, GC, SC	A-2, A-6, A-7	2-18	60-90	50-85	40-75	30-70	29-42	11-17
	27-64	Cherty clay, cherty silty clay.	MH, ML, GC, SC	A-2, A-7	2-18	60-90	50-85	40-75	30-75	48-78	20-42
GaC---------- Gilpin	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GdC*: Gladeville------	0-9	Flaggy silty clay loam.	GC, CL, CH	A-2, A-6, A-7	5-20	40-65	30-55	25-55	20-55	38-55	20-34
	9	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
GeB---------- Greendale	0-60	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0-2	80-100	75-100	65-95	60-90	20-35	3-12
GrE---------- Grimsley	0-6	Stony loam-------	ML, CL-ML, SM, SM-SC	A-4, A-2, A-1	15-35	65-90	60-85	35-80	20-65	<30	NP-10
	6-58	Stony loam, stony clay loam, stony sandy clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-6, A-1	25-45	50-75	45-70	25-60	15-50	15-49	5-20
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ha---------- Hamblen	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0-2	90-100	80-100	65-95	55-85	22-38	3-14
	8-60	Silt loam, loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0-2	80-100	75-100	60-95	55-85	22-40	3-17
HoB, HoC--------- Holston	0-12	Loam----------	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	12-61	Loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-35	5-10
JeC, JeD--------- Jefferson	0-10	Loam----------	SM, SC, ML, CL	A-2, A-4	5-20	75-90	70-90	50-80	30-65	20-35	2-10
	10-58	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	58-66	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	5-25	55-75	50-75	35-70	20-60	20-35	2-10

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
JgC, JgD, JgE---- Jefferson	0-10	Gravelly loam----	SM, SC, ML, CL	A-2, A-4	5-20	75-90	70-90	50-80	30-65	20-35	2-10
	10-58	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	58-66	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	5-25	55-75	50-75	35-70	20-60	20-35	2-10
JmE*: Jefferson-------	0-10	Gravelly loam----	SM, SC, ML, CL	A-2, A-4	5-20	75-90	70-90	50-80	30-65	20-35	2-10
	10-58	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	58-66	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	5-25	55-75	50-75	35-70	20-60	20-35	2-10
Grimsley--------	0-6	Stony loam-------	ML, CL-ML, SM, SM-SC	A-4, A-2, A-1	15-35	65-90	60-85	35-80	20-65	<30	NP-10
	6-58	Stony loam, stony clay loam, stony sandy clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-4, A-6	25-45	50-75	45-70	25-60	15-50	20-39	5-20
	58	Weathered bedrock	---	---	---	---	---	---	---	---	---
JSE*---------- Jefferson	0-10	Gravelly loam----	SM, SC, ML, CL	A-2, A-4	5-20	75-90	70-90	50-80	30-65	20-35	2-10
	10-58	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	5-20	75-90	70-90	50-80	30-70	15-35	2-15
	58-66	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	5-25	55-75	50-75	35-70	20-60	20-35	2-10
LeB---------- Leadvale	0-6	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	6-27	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	95-100	90-98	75-90	22-36	3-14
	27-42	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	95-100	80-98	70-90	23-42	3-18
	42-50	Silty clay loam, silty clay, clay.	CL, MH, ML, CH	A-6, A-7	0-5	90-100	90-100	85-95	70-90	32-58	12-26
LhE---------- Lehew	0-7	Loam----------	ML, CL-ML, SM, SM-SC	A-2, A-4	0-5	80-100	80-100	60-95	30-75	15-30	NP-7
	7-36	Very channery sandy loam, channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LyC---------- Lily	0-13	Loam----------	ML	A-4	0-5	90-100	85-100	70-95	55-75	<35	NP-7
	13-33	Clay loam, sandy clay loam, loam.	CL-ML, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	33-39	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, SM-SC, CL	A-4, A-2, A-6, A-1	0-10	65-100	50-100	40-95	20-75	<35	3-15
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaC---------- Minvale	0-13	Silt loam--------	ML, CL, CL-ML	A-4	0-5	75-95	75-90	65-85	55-75	<30	NP-10
	13-62	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
McC---------- Minvale	0-13	Cherty silt loam	ML, CL, GM, GM-GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	13-62	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
MhB---------- Monongahela	0-5	Loam----------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	5-22	Loam, silt loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	22-38	Loam, silt loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	75-100	70-95	45-95	20-40	1-15
	38-62	Silt loam, loam, clay loam.	ML, CL, SM, SC	A-4, A-6	5-20	75-100	60-100	60-95	40-95	20-40	1-15
MoC, MoD, MoE---- Montevallo	0-7	Shaly silt loam	ML, SM, GM	A-4	0-5	60-90	60-90	50-80	35-75	<40	NP-10
	7-18	Shaly silt loam, shaly loam, shaly silty clay loam.	SM, GC, ML, CL	A-2, A-4, A-6	0-5	55-90	50-90	30-80	30-75	20-40	5-15
	18-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
MpE*:											
Muskingum-------	0-5	Silt loam--------	ML, CL, SM, SC	A-2, A-4	0-10	75-100	70-95	50-90	30-80	20-35	2-10
	5-26	Silt loam, channery silt loam, channery loam.	GM, SM, ML, CL	A-4	0-15	70-90	55-85	50-80	40-75	20-35	2-10
	26-36	Very channery silt loam, very channery loam, channery loam.	GM, SM, ML, GM-GC	A-1, A-2, A-4	0-15	20-80	10-65	10-65	10-60	20-35	2-10
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gilpin----------	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	10-29	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	29-38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Petros----------	0-7	Shaly silt loam	CL, ML, CL-ML, GM	A-4	5-15	60-80	55-75	50-70	40-60	<30	NP-8
	7-18	Very shaly silt loam, very shaly silty clay loam.	GM, GC, GM-GC, GP-GM	A-2, A-1	10-25	25-49	20-45	15-40	10-35	20-39	3-17
	18-25	Weathered bedrock	---	---	---	---	---	---	---	---	---
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MrE*:											
Muskingum	0-5	Silt loam	ML, CL, SM, SC	A-2, A-4	0-10	75-100	70-95	50-90	30-80	20-35	2-10
	5-26	Silt loam, channery silt loam, channery loam.	GM, SM, ML, CL	A-4	0-15	70-90	55-85	50-80	40-75	20-35	2-10
	26-36	Very channery silt loam, very channery loam,	GM, SM, ML, GM-GC	A-1, A-2, A-4	0-15	20-80	10-65	10-65	10-60	20-35	2-10
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Petros	0-7	Shaly silt loam	CL, ML, CL-ML, GM	A-4	5-15	60-80	55-75	50-70	40-60	<30	NP-8
	7-18	Very shaly silt loam, very shaly silty clay loam.	GM, GC, GM-GC, GP-GM	A-2, A-1	10-25	25-49	20-45	15-40	10-35	20-39	3-17
	18-25	Weathered bedrock	---	---	---	---	---	---	---	---	---
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ne	0-8	Silt loam	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
Newark	8-30	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	4-20
	30-61	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	4-20
Nv	0-11	Loam	CL, ML, CL-ML	A-4	0	90-100	85-100	70-95	55-85	15-30	1-10
Newark Variant	11-23	Silt loam, loam	CL, ML, CL-ML	A-4, A-6	0	90-100	85-100	70-100	55-90	20-35	3-13
	23-52	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	60-95	25-42	5-18
	52-62	Gravelly silty clay loam, silty clay loam, gravelly silt loam.	CL, ML, CL-ML, GC	A-4, A-6, A-7	0-5	65-100	55-100	50-100	40-90	25-42	5-18
Pt*.											
Pits											
RaE*:											
Ramsey	0-14	Sandy loam	SM, CL-ML, ML, CL	A-4, A-2	0-10	85-100	75-95	60-75	34-70	15-25	2-8
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
SaB	0-8	Gravelly loam	CL-ML, CL, ML, SM	A-4	0-18	75-90	65-75	55-65	40-55	16-29	3-9
Sensabaugh	8-21	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	2-18	70-95	55-90	45-75	36-65	20-35	5-14
	21-60	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	5-25	70-90	55-75	45-65	35-55	22-36	6-15
ScB	0-13	Loam	ML, CL-ML, CL, SM	A-2, A-4	0-10	85-100	75-100	65-95	30-70	15-27	2-10
Sequatchie	13-44	Clay loam, loam, silt loam.	CL-ML, CL	A-4, A-6	0-10	85-100	75-100	65-95	55-85	20-32	5-15
	44-60	Sandy loam, loam, fine sandy loam.	ML, CL-ML, CL, SM	A-2, A-4	0-15	85-100	75-100	55-85	30-65	15-25	2-10

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SdC, SdD--------- Sequoia	0-5	Silt loam---------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-95	80-95	23-35	5-15
	5-38	Silty clay, clay, shaly silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-95	55-95	43-74	20-40
	38-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
Se*: Sewanee---------	0-30	Silt loam---------	ML, CL-ML, CL, SM	A-4, A-2	0	80-100	75-100	65-95	30-65	16-30	3-10
	30-54	Loam, gravelly loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-2	0-5	60-100	55-100	45-95	26-70	16-30	3-10
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ealy----------	0-60	Loam----------	ML, CL-ML, SM, SM-SC	A-4, A-2	0-3	85-100	75-100	60-95	30-60	<20	3-8
ShC, ShD--------- Shouns	0-16	Silt loam---------	ML, CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	55-90	15-30	3-12
	16-47	Silty clay loam, clay loam.	CL	A-4, A-6	0	80-100	75-100	70-95	60-90	25-40	8-17
	47-60	Silty clay loam, clay loam, shaly clay loam.	CL	A-6, A-4, A-7	10-25	75-100	65-90	60-85	50-75	30-45	10-20
St---------- Staser	0-32	Loam----------	CL, CL-ML, ML	A-4, A-6	0	90-100	80-100	60-85	55-80	20-35	3-15
	32-60	Silt loam, loam, fine sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-2	0-5	45-100	40-100	35-80	30-75	20-35	5-15
TaB---------- Tasso	0-7	Silt loam---------	ML, CL-ML, CL	A-4	0-5	90-100	80-95	70-85	60-75	20-30	3-9
	7-22	Silt loam, loam, silty clay loam.	CL	A-4, A-6	0-5	90-100	80-95	75-90	65-80	27-36	9-15
	22-36	Silty clay loam, clay loam, cherty silty clay loam.	CL	A-4, A-6	0-5	70-100	65-95	60-90	50-85	27-36	9-15
	36-72	Clay, clay loam, silty clay loam.	CL, ML, MH, CH	A-6, A-7	0-15	80-100	70-95	65-90	55-85	35-55	14-25
UDC*, UDE*. Udorthents											
UhD---------- Upshur Variant	0-6	Silt loam---------	CL, ML, CL-ML	A-4, A-6	0	95-100	90-100	80-100	65-90	20-35	5-15
	6-30	Silty clay, clay, shaly clay.	CH, MH, CL	A-7	0	85-100	75-100	70-100	55-95	45-70	20-40
	30-36	Very shaly silty clay, very shaly clay, shaly clay.	CH, MH, CL, ML	A-7, A-6	0-2	75-90	65-85	60-85	50-80	35-65	15-35
	36-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
UpD3---------- Upshur Variant	0-4	Silty clay loam	CL, ML, CH, MH	A-6, A-7	0	95-100	90-100	80-100	75-95	35-55	12-28
	4-29	Silty clay, clay, shaly clay.	CH, MH, CL	A-7	0	85-100	75-100	70-100	55-95	45-70	20-40
	29-33	Very shaly silty clay, very shaly clay, shaly clay.	CH, MC, CL, ML	A-7, A-6	0-2	75-90	65-85	60-85	50-80	35-65	15-35
	33-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ur*. Urban land											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WaD---------- Waynesboro	0-6	Loam----------	ML, CL-ML, CL, SM	A-4	0-5	85-100	80-100	70-95	43-70	16-29	2-9
	6-22	Clay loam, loam, sandy clay loam.	CL, ML, SC	A-4, A-6, A-7	0-5	90-100	85-100	75-95	45-75	30-41	9-17
	22-72	Clay loam, sandy clay, clay.	MH, CL, ML, CH	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-75	38-68	9-32
WeB*:											
Welchland-------	0-9	Cobbly loam------	ML, CL-ML, SM, SM-SC	A-4	8-25	75-95	65-85	55-75	40-60	<25	NP-6
	9-27	Cobbly loam, cobbly sandy loam, cobbly sandy clay loam.	CL-ML, CL, SC, SM-SC	A-4	8-25	75-90	60-85	50-75	36-60	18-29	5-10
	27-60	Cobbly loam, cobbly sandy loam, cobbly loamy sand.	SM, SM-SC, ML, CL-ML	A-4, A-2	15-40	60-90	40-80	30-65	20-55	<25	NP-6
Ealy----------	0-60	Loam----------	ML, CL-ML, SM, SM-SC	A-4, A-2	0-3	85-100	75-100	60-95	30-60	<20	3-8
Wh---------- Whitwell	0-8	Loam----------	ML, CL-ML, CL	A-4	0-3	80-100	75-100	70-100	55-95	15-28	3-10
	8-60	Clay loam, loam, silt loam.	CL, CL-ML, ML, SC	A-4, A-6	0-3	80-100	75-100	60-90	40-80	15-35	3-15
ZeE---------- Zenith	0-8	Gravelly loam----	ML, CL-ML	A-4	0-15	70-90	65-85	60-80	50-70	16-23	3-7
	8-42	Gravelly loam, gravelly clay loam, cobbly loam.	CL-ML, CL	A-4, A-6	5-20	70-85	65-80	60-75	50-65	20-32	5-12
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

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

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
AeD----------	0-9	0.6-2.0	0.14-0.19	4.5-5.5	Low----------	0.24	5
Allen	9-42	0.6-2.0	0.12-0.17	4.5-5.5	Low----------	0.20	
	42-62	0.6-2.0	0.10-0.17	4.5-5.5	Low----------	0.20	
AmC, AmD, AmE----	0-6	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.37	3
Armuchee	6-18	0.2-0.6	0.10-0.14	4.5-5.5	Moderate-------	0.37	
	18-24	0.2-0.6	0.05-0.10	4.5-5.5	Moderate-------	0.32	
	24-40	---	---	---	----------	----	
ArD3, ArE3-------	0-6	0.6-2.0	0.12-0.17	4.5-5.5	Low----------	0.37	2
Armuchee	6-14	0.2-0.6	0.10-0.14	4.5-5.5	Moderate-------	0.37	
	14-20	0.2-0.6	0.05-0.10	4.5-5.5	Moderate-------	0.32	
	20-35	---	---	---	----------	----	
AuE*:							
Armuchee--------	0-6	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.37	3
	6-18	0.2-0.6	0.10-0.14	4.5-5.5	Moderate-------	0.37	
	18-24	0.2-0.6	0.05-0.10	4.5-5.5	Low----------	0.32	
	24-40	---	---	---	----------	----	
Muskingum-------	0-5	2.0-6.0	0.12-0.18	4.5-6.0	Low----------	0.28	3
	5-26	0.6-2.0	0.08-0.14	4.5-5.5	Low----------	0.28	
	26-36	0.6-2.0	0.02-0.12	4.5-5.5	Low----------	0.17	
	36	---	---	---	----------	----	
BaE*:							
Bland-----------	0-3	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-------	0.43	2
	3-31	0.2-0.6	0.10-0.15	5.1-7.3	Moderate-------	0.43	
	31-36	0.2-0.6	0.06-0.15	5.1-7.3	Moderate-------	0.43	
	36	---	---	---	----------	----	
Rock outcrop.							
BoC, BoD, BoE----	0-11	2.0-6.0	0.07-0.12	4.5-5.5	Low----------	0.28	5
Bodine	11-63	2.0-6.0	0.05-0.10	4.5-5.5	Low----------	0.28	
CaD, CaE---------	0-6	2.0-6.0	0.10-0.16	4.5-6.0	Low----------	0.24	3-2
Calvin	6-22	2.0-6.0	0.08-0.16	4.5-6.0	Low----------	0.28	
	22-29	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.28	
	29	---	---	---	----------	----	
CbB----------	0-6	0.6-2.0	0.18-0.22	5.1-6.0	Low----------	0.37	3
Capshaw	6-20	0.6-2.0	0.16-0.20	5.1-6.0	Low----------	0.37	
	20-60	0.06-0.2	0.12-0.18	5.1-6.0	Moderate-------	0.24	
CeC----------	0-6	0.2-0.6	0.16-0.19	6.1-7.3	Moderate-------	0.49	2
Carbo	6-25	0.06-0.2	0.10-0.14	6.6-7.8	High----------	0.49	
	25	---	---	---	----------	----	
CnC, CnD, CnE----	0-16	0.6-2.0	0.17-0.21	4.5-6.0	Low----------	0.32	4
Claiborne	16-42	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.32	
	42-62	0.6-2.0	0.14-0.17	4.5-5.5	Moderate-------	0.32	
CoB, CoC, CoD----	0-5	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.37	5
Collegedale	5-64	0.6-0.06	0.12-0.17	4.5-5.5	Moderate-------	0.24	
CpC3, CpD3-------	0-7	0.2-0.6	0.14-0.20	4.5-5.5	Moderate-------	0.28	5
Collegedale	7-64	0.6-0.06	0.12-0.17	4.5-5.5	Moderate-------	0.24	
CrC*, CrE*:							
Collegedale-----	0-5	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.37	5
	5-64	0.6-0.06	0.12-0.17	4.5-5.5	Moderate-------	0.24	
Rock outcrop.							

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
CyD----------	0-12	0.6-2.0	0.15-0.20	6.1-7.8	Low----------	0.37	2
Cynthiana	12-19	0.2-0.6	0.08-0.15	6.1-7.8	Low----------	0.28	
	19	---	---	---	----------	----	
DeC, DeD---------	0-6	0.6-2.0	0.18-0.20	4.5-5.5	Low----------	0.32	5
Dewey	6-34	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-------	0.24	
	34-62	0.6-2.0	0.08-0.17	4.5-5.5	Moderate-------	0.24	
DgD3---------	0-7	0.6-2.0	0.14-0.19	4.5-5.5	Low----------	0.24	5
Dewey	7-34	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-------	0.24	
	34-62	0.6-2.0	0.08-0.17	4.5-5.5	Moderate-------	0.24	
DuC, DuD---------	0-14	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.30	5
Dunmore	14-62	0.6-2.0	0.12-0.17	4.5-5.5	Moderate-------	0.20	
Em----------	0-36	0.6-2.0	0.17-0.21	5.1-6.0	Low----------	0.37	5
Emory	36-60	0.6-2.0	0.16-0.20	5.1-6.0	Low----------	0.37	
EtB, EtC---------	0-6	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.37	5
Etowah	6-50	0.6-2.0	0.16-0.20	4.5-5.5	Low----------	0.32	
	50-62	0.6-2.0	0.16-0.20	4.5-5.5	Low----------	0.32	
FuC, FuD, FuE----	0-12	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.28	5
Fullerton	12-27	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.24	
	27-64	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-------	0.20	
GaC----------	0-10	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
Gilpin	10-29	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.28	
	29-38	---	---	---	----------	----	
GdC*:							
Gladeville------	0-9	0.6-2.0	0.05-0.11	6.6-8.4	Moderate-------	0.17	1
	9	---	---	---	----------	----	
Rock outcrop.							
GeB----------	0-60	0.6-2.0	0.13-0.18	5.1-6.0	Low----------	0.32	5
Greendale							
GrE----------	0-6	2.0-6.0	0.07-0.12	4.5-5.5	Low----------	0.20	4
Grimsley	6-58	2.0-6.0	0.05-0.11	4.5-5.5	Low----------	0.20	
	58	---	---	---	----------	----	
Ha----------	0-8	0.6-2.0	0.18-0.20	4.5-7.3	Low----------	0.32	5
Hamblen	8-60	0.6-2.0	0.17-0.20	4.5-7.3	Low----------	0.32	
HoB, HoC---------	0-12	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.32	5
Holston	12-61	0.6-2.0	0.13-0.20	4.5-5.5	Low----------	0.32	
JeC, JeD, JgC,							
JgD, JgE--------	0-10	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	4
Jefferson	10-58	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	
	58-66	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17	
JmE*:							
Jefferson-------	0-10	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	4
	10-58	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	
	58-66	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17	
Grimsley--------	0-6	2.0-6.0	0.07-0.12	4.5-5.5	Low----------	0.20	4
	6-58	2.0-6.0	0.05-0.11	4.5-5.5	Low----------	0.20	
	58	---	---	---	----------	----	
JSE*----------	0-10	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	4
Jefferson	10-58	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28	
	58-66	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.17	

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
LeB----------	0-6	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.43	3
Leadvale	6-27	0.6-2.0	0.17-0.20	4.5-5.5	Low----------	0.43	
	27-42	0.06-0.6	0.06-0.11	4.5-5.5	Low----------	0.43	
	42-50	0.06-0.6	0.06-0.11	4.5-5.5	Low----------	0.24	
LhE----------	0-7	0.6-20	0.08-0.12	4.5-5.5	Low----------	0.24	3
Lehew	7-36	0.6-20	0.06-0.10	4.5-5.5	Low----------	0.17	
	36	---	---	---	----------	----	
LyC----------	0-13	0.6-6.0	0.13-0.18	3.6-5.5	Low----------	0.28	3
Lily	13-33	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.28	
	33-39	2.0-6.0	0.08-0.17	3.6-5.5	Low----------	0.17	
	39	---	---	---	----------	----	
MaC----------	0-13	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.34	4
Minvale	13-62	0.6-2.0	0.09-0.14	4.5-5.5	Low----------	0.28	
McC----------	0-13	2.0-6.0	0.10-0.15	4.5-5.5	Low----------	0.34	4
Minvale	13-62	0.6-2.0	0.09-0.14	4.5-5.5	Low----------	0.28	
MhB----------	0-5	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.43	3
Monongahela	5-22	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43	
	22-38	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43	
	38-62	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.43	
MoC, MoD, MoE----	0-7	0.6-2.0	0.09-0.18	4.5-6.0	Low----------	0.37	2
Montevallo	7-18	0.6-2.0	0.02-0.12	4.5-6.0	Low----------	0.37	
	18-48	---	---	---	----------	----	
MpE*:							
Muskingum-------	0-5	2.0-6.0	0.12-0.18	4.5-6.0	Low----------	0.28	3
	5-26	0.6-2.0	0.08-0.14	4.5-5.5	Low----------	0.28	
	26-36	0.6-2.0	0.02-0.12	4.5-5.5	Low----------	0.17	
	36	---	---	---	----------	----	
Gilpin----------	0-10	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	10-29	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.28	
	29-38	---	---	---	----------	----	
Petros----------	0-7	0.6-6.0	0.10-0.14	4.5-5.5	Low----------	0.15	1
	7-18	0.6-6.0	0.04-0.09	4.5-5.5	Low----------	0.15	
	18-25	---	---	---	----------	----	
	25	---	---	---	----------	----	
MrE*:							
Muskingum-------	0-5	2.0-6.0	0.12-0.18	4.5-6.0	Low----------	0.28	3
	5-26	0.6-2.0	0.08-0.14	4.5-5.5	Low----------	0.28	
	26-36	0.6-2.0	0.02-0.12	4.5-5.5	Low----------	0.17	
	36	---	---	---	----------	----	
Petros----------	0-7	0.6-6.0	0.10-0.14	4.5-5.5	Low----------	0.15	1
	7-18	0.6-6.0	0.04-0.09	4.5-5.5	Low----------	0.15	
	18-25	---	---	---	----------	----	
	25	---	---	---	----------	----	
Ne----------	0-8	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5
Newark	8-30	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	
	30-61	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43	
Nv----------	0-11	0.6-2.0	0.15-0.21	5.6-8.4	Low----------	0.37	5
Newark Variant	11-23	0.6-2.0	0.15-0.22	5.6-8.4	Low----------	0.37	
	23-52	0.6-2.0	0.14-0.20	5.6-8.4	Low----------	0.32	
	52-62	0.6-2.0	0.10-0.18	5.6-8.4	Low----------	0.32	
Pt*.							
Pits							

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
RaE*:							
Ramsey	0-14	6.0-20	0.09-0.12	4.5-5.5	Low	0.17	1
	14	---	---	---	---	---	
Rock outcrop.							
SaB	0-8	0.6-6.0	0.10-0.16	5.6-7.8	Low	0.20	---
Sensabaugh	8-21	0.6-6.0	0.10-0.16	5.6-7.8	Low	0.20	
	21-60	0.6-6.0	0.10-0.15	5.6-7.8	Low	0.20	
ScB	0-13	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.24	5
Sequatchie	13-44	0.6-2.0	0.15-0.20	4.5-5.5	Low	0.24	
	44-60	0.6-2.0	0.09-0.14	4.5-5.5	Low	0.24	
SdC, SdD	0-5	0.6-2.0	0.17-0.20	4.5-5.5	Low	0.37	3
Sequoia	5-38	0.2-0.6	0.08-0.16	4.5-5.5	Moderate	0.24	
	38-62	---	---	---	---	---	
Se*:							
Sewanee	0-30	0.6-2.0	0.14-0.20	4.5-5.5	Low	0.28	4
	30-54	0.6-2.0	0.10-0.18	4.5-5.5	Low	0.28	
	54	---	---	---	---	---	
Ealy	0-60	2.0-6.0	0.10-0.17	5.1-5.5	Low	0.32	5
ShC, ShD	0-16	0.6-2.0	0.13-0.20	5.1-6.0	Low	0.24	5
Shouns	16-47	0.6-2.0	0.12-0.18	5.1-6.0	Low	0.28	
	47-60	0.6-2.0	0.09-0.15	5.1-6.0	Low	0.28	
St	0-32	0.6-2.0	0.15-0.22	5.6-7.3	Low	0.32	5
Staser	32-60	0.6-6.0	0.07-0.18	5.6-7.3	Low	0.28	
TaB	0-7	0.6-2.0	0.17-0.20	4.5-5.5	Low	0.32	4
Tasso	7-22	0.6-2.0	0.17-0.19	4.5-5.5	Low	0.32	
	22-36	0.2-2.0	0.10-0.15	4.5-5.5	Low	0.32	
	36-72	0.6-2.0	0.10-0.15	4.5-5.5	Moderate	0.28	
UDC*, UDE*.							
Udorthents							
UhD	0-6	0.6-2.0	0.17-0.21	5.1-7.3	Low	0.43	3
Upshur Variant	6-30	0.06-0.2	0.10-0.16	5.6-7.8	Moderate	0.28	
	30-36	0.06-0.2	0.06-0.12	5.6-7.8	Moderate	0.28	
	36-45	---	---	---	---	---	
UpD3	0-4	0.6-2.0	0.14-0.19	5.1-7.3	Moderate	0.37	3
Upshur Variant	4-29	0.06-0.2	0.10-0.16	5.6-7.8	Moderate	0.28	
	29-33	0.06-0.2	0.06-0.12	5.6-7.8	Moderate	0.28	
	33-45	---	---	---	---	---	
Ur*.							
Urban land							
WaD	0-6	0.6-2.0	0.16-0.20	4.5-5.5	Low	0.24	5
Waynesboro	6-22	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.28	
	22-72	0.6-2.0	0.10-0.15	4.5-5.5	Moderate	0.28	
WeB*:							
Welchland	0-9	2.0-6.0	0.09-0.14	4.5-5.5	Low	0.17	5
	9-27	2.0-6.0	0.08-0.14	4.5-5.5	Low	0.17	
	27-60	2.0-6.0	0.05-0.11	4.5-5.5	Low	0.17	
Ealy	0-60	2.0-6.0	0.10-0.17	5.1-5.5	Low	0.32	5
Wh	0-8	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.32	4
Whitwell	8-60	0.6-2.0	0.14-0.20	4.5-5.5	Low	0.32	

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
ZeE----------	0-8	0.6-2.0	0.13-0.20	4.5-5.5	Low----------	0.15	4
Zenith	8-42	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.15	
	42	---	---	---	----------	----	

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

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "apparent" and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AeD---------- Allen	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
AmC, AmD, AmE, ArD3, ArE3------- Armuchee	C	None--------	---	---	>6.0	---	---	20-36	Soft	Moderate	Moderate.
AuE*: Armuchee---------	C	None--------	---	---	>6.0	---	---	20-36	Soft	Moderate	Moderate.
Muskingum--------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
BaE*: Bland----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate.
Rock outcrop.											
BoC, BoD, BoE----- Bodine	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High.
CaD, CaE---------- Calvin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Moderate.
CbB---------- Capshaw	C	None--------	---	---	4.0-5.0	Apparent	Dec-Mar	48-84	Hard	High-----	Moderate.
CeC---------- Carbo	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Low.
CnC, CnD, CnE----- Claiborne	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CoB, CoC, CoD, CpC3, CpD3------- Collegedale	C	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
CrC*, CrE*: Collegedale------	C	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Rock outcrop.											
CyD---------- Cynthiana	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
DeC, DeD, DgD3---- Dewey	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
DuC, DuD---------- Dunmore	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Em---------- Emory	B	Occasional	Very brief	Dec-Mar	5.0-6.0	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
EtB, EtC---------- Etowah	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
FuC, FuD, FuE----- Fullerton	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
GaC---------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High.
GdC*: Gladeville-------	D	None--------	---	---	>6.0	---	---	3-12	Hard	High-----	Low.
Rock outcrop.											

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
GeB--- Greendale	B	Occasional	Very brief	Dec-Mar	5.0-6.0	Apparent	Dec-Mar	>60	---	Low---	Moderate.
GrE--- Grimsley	B	None---	---	---	>6.0	---	---	40-60	Soft	Low---	High.
Ha--- Hamblen	C	Occasional	Very brief	Dec-Mar	2.0-3.0	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
HoB, HoC--- Holston	B	None---	---	---	>6.0	---	---	>60	---	Moderate	High.
JeC, JeD, JgC, JgD, JgE--- Jefferson	B	None---	---	---	>6.0	---	---	>60	---	Moderate	High.
JmE*:											
Jefferson---	B	None---	---	---	>6.0	---	---	>60	---	Moderate	High.
Grimsley---	B	None---	---	---	>6.0	---	---	40-60	Soft	Low---	High.
JSE*--- Jefferson	B	None---	---	---	>6.0	---	---	>60	---	Moderate	High.
LeB--- Leadvale	C	None---	---	---	2.0-3.0	Perched	Jan-Apr	>48	Soft	Moderate	Moderate.
LhE--- Lehew	C	None---	---	---	>6.0	---	---	20-40	Hard	Low---	High.
LyC--- Lily	B	None---	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
MaC, McC--- Minvale	B	None---	---	---	>6.0	---	---	>60	---	Moderate	Low.
MhB--- Monongahela	C	None---	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High---	High.
MoC, MoD, MoE--- Montevallo	D	None---	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate.
MpE*:											
Muskingum---	C	None---	---	---	>6.0	---	---	20-40	Soft	Low---	High.
Gilpin---	C	None---	---	---	>6.0	---	---	20-40	Soft	Low---	High.
Petros---	D	None---	---	---	>6.0	---	---	20-40	Hard	Low---	Moderate.
MrE*:											
Muskingum---	C	None---	---	---	>6.0	---	---	20-40	Soft	Low---	High.
Petros---	D	None---	---	---	>6.0	---	---	20-40	Hard	Low---	Moderate.
Ne--- Newark	C	Frequent---	Brief---	Dec-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High---	Low.
Nv--- Newark Variant	C	Frequent---	Brief---	Dec-Apr	1.0-2.0	Apparent	Dec-Apr	>60	---	High---	Low.
Pt*. Pits											
RaE*:											
Ramsey---	D	None---	---	---	>6.0	---	---	10-20	Hard	Low---	Moderate.
Rock outcrop.											
SaB--- Sensabaugh	B	Rare---	---	---	4.0-6.0	Apparent	Jan-Apr	>60	---	Low---	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
ScB---------- Sequatchie	B	Occasional	Very brief	Dec-Mar	>6.0	---	---	>60	---	Low------	Moderate.
SdC, SdD---------- Sequoia	C	None--------	---	---	>6.0	---	---	20-40	Soft	High-----	Moderate.
Se*:											
Sewanee----------	B	Occasional	Very brief	Dec-Mar	1.0-2.0	Apparent	Dec-Mar	40-60	Hard	Moderate	Moderate.
Ealy----------	B	Occasional	Very brief	Dec-Mar	5.0-6.0	Apparent	Dec-Mar	>60	---	Low------	Moderate.
ShC, ShD---------- Shouns	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
St---------- Staser	B	Occasional	Very brief	Dec-Mar	3.0-4.0	Apparent	Dec-Mar	>60	---	Low------	Low.
TaB---------- Tasso	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
UDC*, UDE*. Udorthents											
UhD, UpD3---------- Upshur Variant	C	None--------	---	---	>6.0	---	---	20-40	Soft	High-----	---
Ur*. Urban land											
WaD---------- Waynesboro	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High.
WeB*:											
Welchland--------	B	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Ealy----------	B	Occasional	Very brief	Dec-Mar	5.0-6.0	Apparent	Dec-Mar	>60	---	Low------	Moderate.
Wh---------- Whitwell	C	Occasional	Very brief	Dec-Mar	2.0-3.0	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
ZeE---------- Zenith	B	None--------	---	---	>6.0	---	---	40-60	Hard	Low------	Moderate.

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

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allen	Fine-loamy, siliceous, thermic Typic Paleudults
Armuchee	Clayey, mixed, thermic Ochreptic Hapludults
Bland	Fine, mixed, mesic Typic Hapludalfs
Bodine	Loamy-skeletal, siliceous, thermic Typic Paleudults
Calvin	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Capshaw	Fine, mixed, thermic Ultic Hapludalfs
Carbo	Very-fine, mixed, mesic Typic Hapludalfs
Claiborne	Fine-loamy, siliceous, mesic Typic Paleudults
Collegedale	Clayey, kaolinitic, thermic Typic Paleudults
Cynthiana	Clayey, mixed, mesic Lithic Hapludalfs
Dewey	Clayey, kaolinitic, thermic Typic Paleudults
Dunmore	Clayey, kaolinitic, mesic Typic Paleudults
Ealy	Coarse-loamy, siliceous, mesic Fluventic Dystrochrepts
Emory	Fine-silty, siliceous, thermic Fluventic Umbric Dystrochrepts
Etowah	Fine-loamy, siliceous, thermic Typic Paleudults
Fullerton	Clayey, kaolinitic, thermic Typic Paleudults
Gilpin*	Fine-loamy, mixed, mesic Typic Hapludults
Gladeville	Clayey-skeletal, mixed, thermic Lithic Rendolls
Greendale	Fine-loamy, siliceous, mesic Fluventic Dystrochrepts
Grimsley	Loamy-skeletal, siliceous, mesic Typic Hapludults
Hamblen	Fine-loamy, siliceous, thermic Fluvaquentic Eutrochrepts
Holston	Fine-loamy, siliceous, thermic Typic Paleudults
Jefferson	Fine-loamy, siliceous, mesic Typic Hapludults
Leadvale	Fine-silty, siliceous, thermic Typic Fragiudults
Lehew	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Minvale	Fine-loamy, siliceous, thermic Typic Paleudults
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Montevallo	Loamy-skeletal, mixed, thermic, shallow Typic Dystrochrepts
Muskingum	Fine-loamy, mixed, mesic Typic Dystrochrepts
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Newark Variant	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Petros	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Ramsey	Loamy, siliceous, mesic Lithic Dystrochrepts
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Sequatchie	Fine-loamy, siliceous, thermic Humic Hapludults
Sequoia	Clayey, mixed, mesic Typic Hapludults
Sewanee	Coarse-loamy, siliceous, mesic Fluvaquentic Dystrochrepts
Shouns	Fine-loamy, mixed, mesic Typic Hapludults
Staser	Fine-loamy, mixed, thermic Cumulic Hapludolls
Tasso	Fine-loamy, siliceous, thermic Fragic Paleudults
Upshur Variant	Fine, mixed, mesic Typic Hapludalfs
Waynesboro	Clayey, kaolinitic, thermic Typic Paleudults
Welchland	Coarse-loamy, siliceous, mesic Humic Hapludults
Whitwell	Fine-loamy, siliceous, thermic Aquic Hapludults
Zenith	Fine-loamy, siliceous, mesic Umbric Dystrochrepts

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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