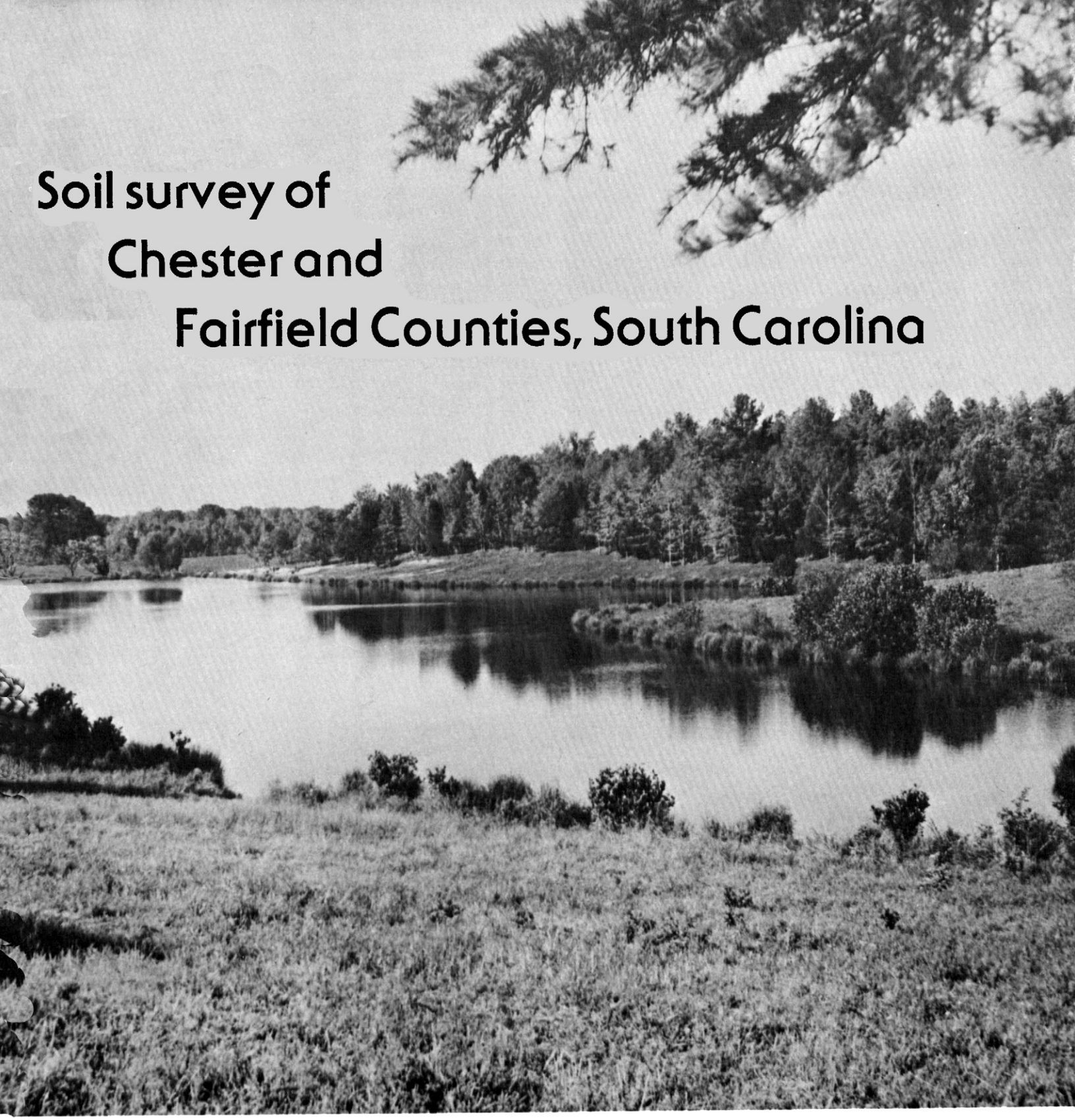
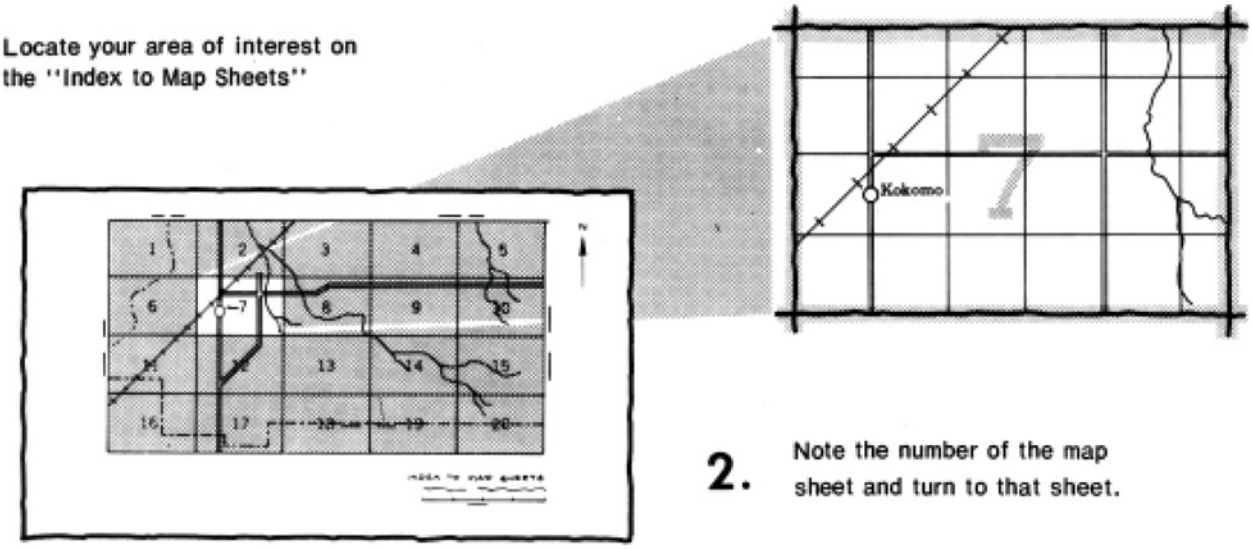
Soil survey of Chester and Fairfield Counties, South Carolina



United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
South Carolina Agricultural Experiment Station and
South Carolina Land Resources Conservation Commission

HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"



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

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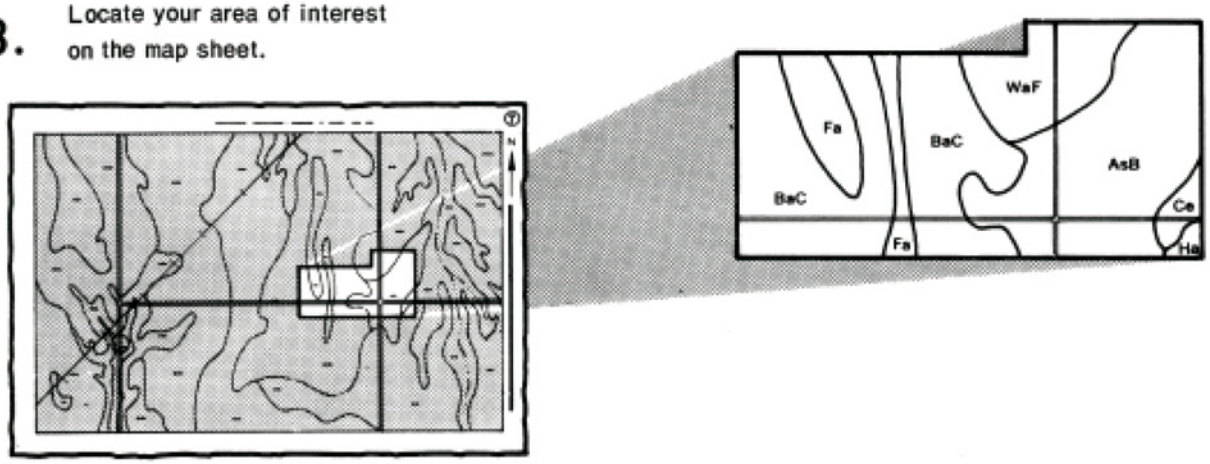

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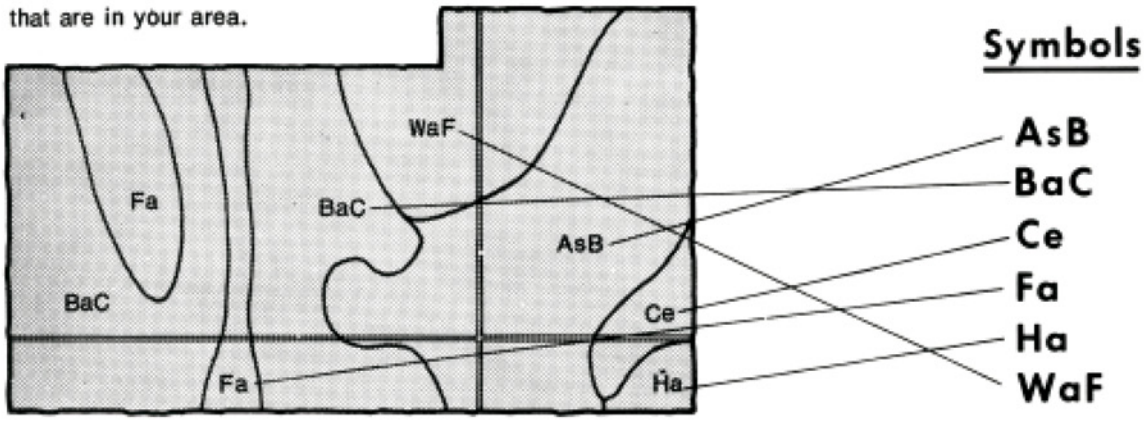
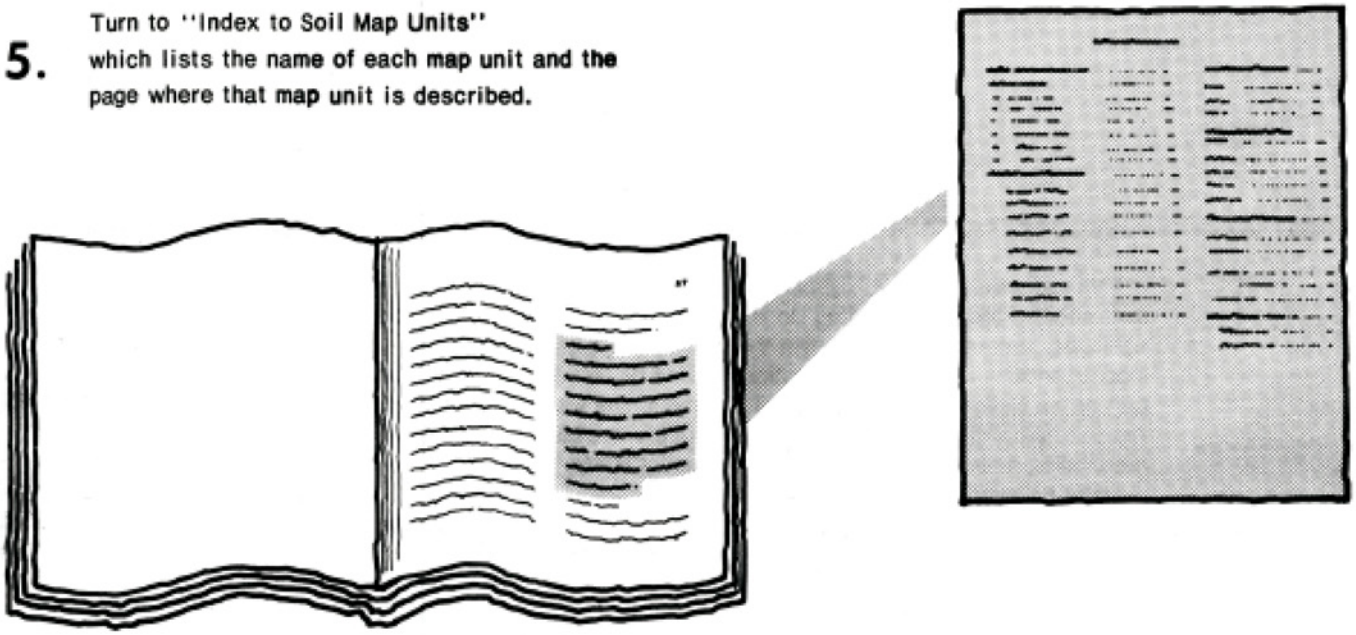
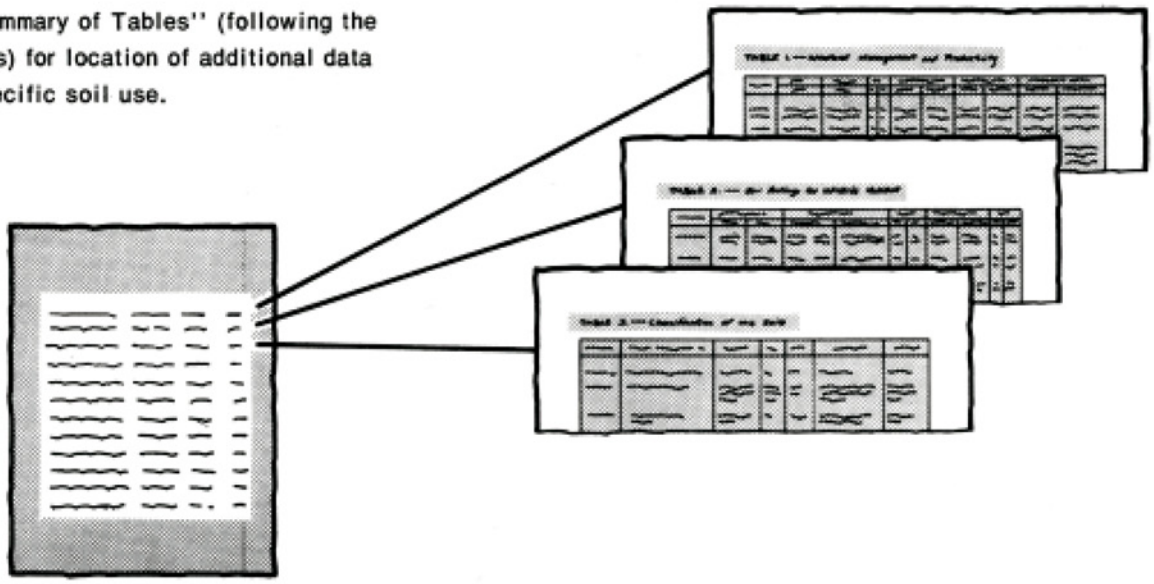


THIS SOIL SURVEY

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 1969-1977. Soil names and descriptions were approved in 1977. 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, the Forest Service, the South Carolina Agricultural Experiment Station, and the South Carolina Land Resources Conservation Commission. It is part of the technical assistance furnished to the Chester Soil and Water Conservation District and the Fairfield Soil and Water 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: Farm pond. Cecil sandy clay loam, 6 to 10 percent slopes, eroded, is in the foreground. Wilkes sandy loam, 6 to 15 percent slopes, is in the background.

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Foreword

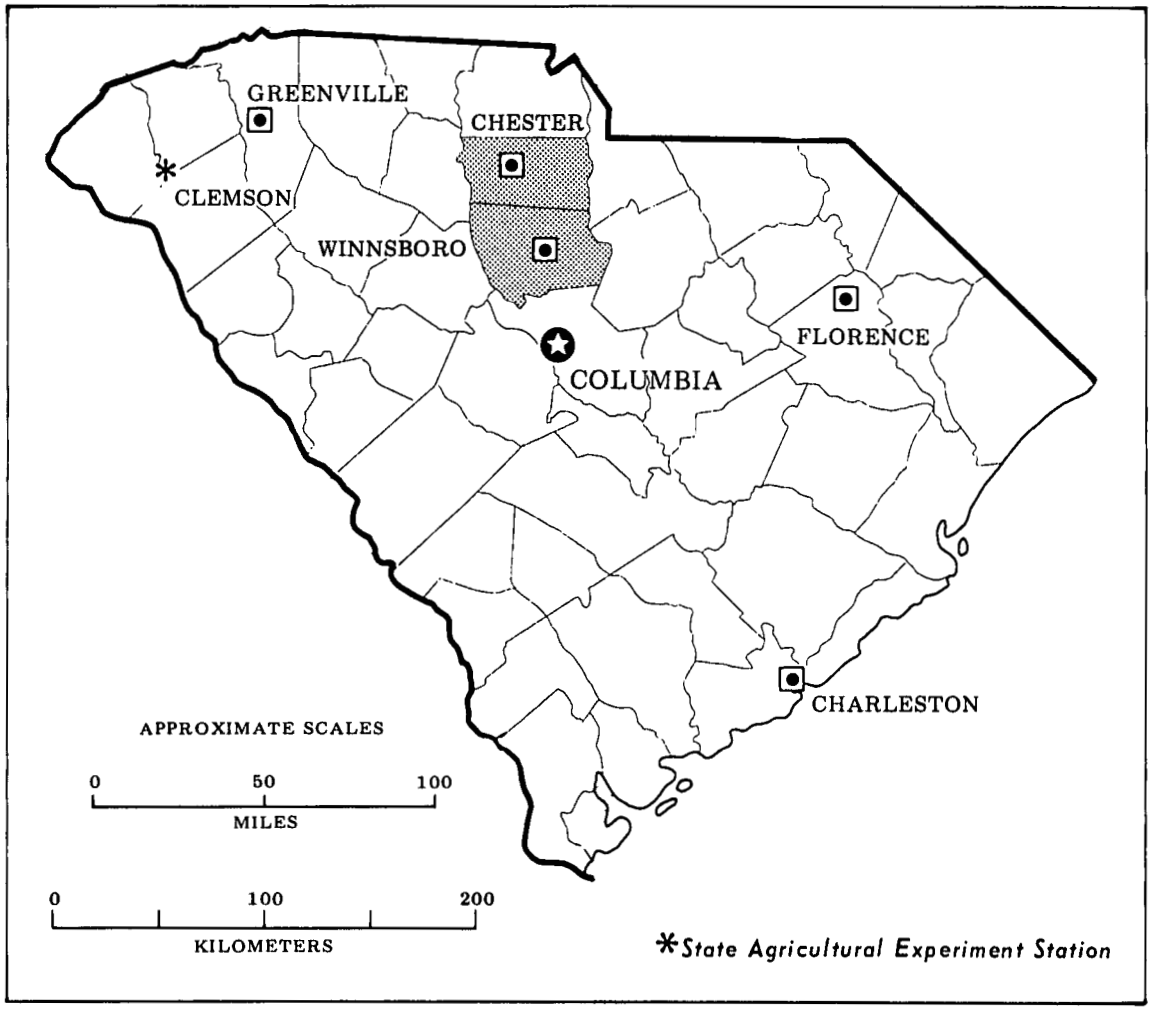
This soil survey contains information that can be used in land-planning programs in Chester and Fairfield Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations,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

George E. Huey
State Conservationist
Soil Conservation Service



Location of Chester and Fairfield Counties in South Carolina.

Soil survey of Chester and Fairfield Counties, South Carolina

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with

South Carolina Agricultural Experiment Station and
South Carolina Land Resources Conservation Commission

By Gene E. Hardee, Soil Conservation Service

Soils surveyed by Gene E. Hardee, John C. Meetze,
James H. Allen, George A. Hanczar, Dennis DeFrancesco, and
John L. Coker, Soil Conservation Service, and
L. E. Andrew, Forest Service

CHESTER AND FAIRFIELD COUNTIES are in the north-central part of South Carolina. Chester, the county seat of Chester County, has a population of about 7,000. Winnsboro, the county seat of Fairfield County, has a population of about 3,400. Chester County has a population of 30,000 and a total land area of 585 square miles, or 374,000 acres, including 1,960 acres of water in bodies of less than 40 acres. Fairfield County has a population of 20,000 and a total land area of 699 square miles, or 447,000 acres, including 6,185 acres of water in bodies of less than 40 acres. Both counties are predominantly rural, and much of the land is used for pulpwood production. Textiles is the major industry of both counties.

Chester County and most of Fairfield County—in the Southern Piedmont Land Resource Area—is referred to as the Piedmont. About 2,000 acres at the southeast corner of Fairfield County—in the Carolina and Georgia Sand Hills Land Resource Area, a part of the Coastal Plain—is referred to as the Sand Hills (*3*). Chester and Fairfield Counties have generally rolling relief and are drained by numerous creeks.

Chester County is bounded by York County to the north, Lancaster County to the east, Union County to the west, and Fairfield County to the south. The Broad River separates Chester and Union Counties, and the Catawba River separates Chester and Lancaster Counties.

Fairfield County is bounded by Chester County to the north, Lancaster and Kershaw Counties to the east, Union and Newberry Counties to the west, and Richland County to the south. Wateree Lake separates Fairfield County from Lancaster County and part of Kershaw County. The Broad River separates Fairfield County from Union and Newberry Counties and part of Richland County.

The elevation in Chester County generally ranges from 270 feet at the confluence of Rocky Creek and the Catawba River to about 700 feet in the upper part of the county. In the uplands, the elevation of the ridges commonly ranges from 450 to 700 feet. The elevation in Fairfield County ranges from slightly less than 200 feet at the confluence of the Broad and Little Rivers to about 625 feet in the upper part of the county. In the uplands, the elevation of the ridges commonly ranges from 350 to 625 feet.

General nature of the counties

The area of Chester and Fairfield Counties, South Carolina, was settled around 1750 by the Scotch-Irish from Pennsylvania and by some Irish who came by way of Charleston. Several English and French Huguenot families settled in the southern part of Fairfield County (*4, 5*). As in most areas, the pioneers first settled near sources of water and game.

Chester and Fairfield Counties were established in 1785. The name "Chester" is directly traceable to the

Scotch-Irish settlers, who came from Chester County, Pennsylvania. "Fairfield" is generally agreed to have come from the many "fair fields" in the county at that time.

The early settlers found life difficult, not only because they were isolated from the thriving seaport towns, but also because there were conflicts with the Cherokee and Catawba Indians.

The boundaries separating the two tribes were not well defined. The area of Chester and Fairfield Counties was actually a buffer zone. To the west lived the Cherokees, and to the east the Catawbas. Both used Chester and Fairfield Counties as a common hunting ground.

Cotton cultivation expanded as the cotton gin came into common use. Clean cultivation increased, replacing many areas formerly used as woodland and pasture. This steady increase in clean cultivation, along with accelerated erosion, continued until about 1920, when difficulty in controlling the boll weevil increased the risk of growing cotton as a cash crop.

As fields became unproductive as a result of erosion and depletion of nutrients, they were abandoned and new ground was cleared. Much of the survey area, once cleared and cultivated, has reverted to woodland and pasture.

Climate

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

Chester and Fairfield Counties are hot and generally humid in summer from moist maritime air. Winter is moderately cold and short because the mountains to the west protect the counties against many cold waves. Precipitation is evenly distributed throughout the year and is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Chester, South Carolina, in the period 1951 to 1973. 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 44 degrees F, and the average daily minimum temperature is 31 degrees. The lowest temperature on record, which occurred at Chester on December 13, 1962, is -5 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred at Chester on June 27, 1954, 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 47 inches. Of this, 25 inches, or 53 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 8.40 inches at Chester on August 23, 1967. Thunderstorms occur on about 55 days each year, and most occur in summer.

Average seasonal snowfall is 5 inches. The greatest snow depth at any one time during the period of record was 7 inches. On an average of 1 day, 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 less than 50 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 65 percent of the time possible in summer and 58 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in April.

Geology

Wilber J. Campbell, geologist, Soil Conservation Service, helped prepare this section.

Nine geologic units (fig. 1), predominantly metamorphic rock, underlie Chester and Fairfield Counties (*6*)—metamorphic granite, granitoid gneiss, mica gneiss, amphibolite, slate and argillites, and metavolcanic rock. There are also areas of igneous rock, the gabbro and the intrusive granite geologic units, in both counties and several areas of Coastal Plain sediment at the southeast corner of Fairfield County.

The slates and argillites and the metavolcanic rock geologic units, part of the Carolina Slate Belt, are in the southern part of Fairfield County. All are formations of Cambrian age. Slate is a hardened shale. Argillite is a baked clay consisting of fine-grained clastic particles. Metavolcanic rock consists of fine crystalline minerals that are likely to form silts and clays when weathered. The slates and argillites weather rapidly, but the metavolcanic rock weathers at a much slower rate. Georgeville and Herndon soils formed in residuum of the rock of these geologic units.

Coastal Plain sediment is principally the sands and clays deposited during changes in sea level. The Coastal Plain sediment in the southeastern part of Fairfield County is part of the Tuscaloosa Formation, which is of Cretaceous age. Vaucluse and Blanton soils formed in this material.

Gabbro is a dark, basic igneous rock that is mainly of dark feldspar—a formation of the Pennsylvanian to Permian period. It is resistant to weathering except where

LEGEND

QKu	Coastal Plain
PPgb	Gabbro
Pgi	Intrusive Granite
COgm	Metamorphic Granite
COgg	Granitoid Gneiss
COmg	Mica Gneiss
COam	Amphibolite
Csa	Slate and Argillite
Cmv	Metavolcanic Rock

SOURCE: "The Crystaline Rocks of South Carolina" by William C. Overstreet and Henry Bell III, from Geological Survey Bulletin No. 1183; modified by Paul Nystrom, South Carolina State Development Board, Division of Geology.

Scale 1:333,473

1 0 1 2 3 4 5 Miles

1 0 5 10 KM

Figure 1.—Geology map of Chester and Fairfield Counties, South Carolina.

fractured. Iredell, Winnsboro, and Armenia soils formed in residuum of gabbro.

Amphibolite, which means many varieties, consists of dark gray, green, and black iron, magnesium, and silicate minerals, which are generally basic. This is a formation of the Cambrian to Ordovician period. It is not subject to rapid weathering. Wilkes, Winnsboro, Mecklenburg, Iredell, and Armenia soils and some Cataula, Cecil, Hiwassee, and Madison soils formed in residuum, of this rock.

Intrusive granite and metamorphic granite are generally high in silicate minerals and feldspar and include some mafic minerals. Intrusive granite is an igneous rock formed during the Pennsylvania era, and metamorphic granite formed during the Cambrian to Ordovician period. Both are resistant to weathering except where fractured. Appling, Rion, and Wateree soils formed in residuum of intrusive granite; Appling, Cataula, Cecil, Helena, Wilkes, Pacolet, Rion, and Wateree soils formed in residuum of metamorphic granite.

Two different geologic units of gneiss, mica gneiss and granitoid gneiss, occur in Chester and Fairfield Counties. Gneiss is a metamorphic rock consisting of various granular minerals in alternate bands. Mica gneiss is dominantly mica but also contains large amounts of feldspar and quartz. Granitoid gneiss has a considerable amount of quartz. Mica gneiss weathers at a moderate rate, but granitoid gneiss is resistant to weathering. These units formed during the Cambrian to Ordovician period. The soils derived from these formations vary from one location to another depending on the mineral content of the formation. Appling, Cecil, Hiwassee, Madison, Mecklenburg, Wilkes, Pacolet, and Winnsboro soils formed in material weathered from granitoid gneiss. Appling, Cataula, Cecil, Hiwassee, Madison, and Pacolet soils formed in material weathered from mica gneiss.

The geology map showing the geologic units in Chester and Fairfield Counties has a belted appearance trending northeast-southwest (fig. 1).

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 for broad land use planning" and "Soil maps for detailed planning."

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 for broad land use planning

The general soil maps at the back of this publication show 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.

Areas dominated by soils formed in alluvial deposits or by soils formed in coastal marine deposits

The Chewacla-Toccoa and Vaucluse-Blanton map units consist of soils formed in deposits of material

moved primarily by water from one area and deposited in another. The Chewacla-Toccoa unit consists of soils of recent origin that formed in alluvial deposits on flood plains. The Vaucluse-Blanton unit consists of upland soils of the Sand Hills. These soils formed in coastal marine deposits.

1. Chewacla-Toccoa

Somewhat poorly drained and well drained, nearly level loamy soils that are subject to flooding and are very strongly acid to slightly acid throughout

These nearly level soils are on broad flood plains along the Broad and Catawba Rivers in Chester County and along the Broad River in Fairfield County. They formed in alluvial deposits.

This map unit makes up about 1.5 percent of Chester County and 1 percent of Fairfield County. In Chester County about 55 percent of the unit is Chewacla soils, 35 percent is Toccoa soils, and 10 percent is soils of minor extent. In Fairfield County about 60 percent of the unit is Chewacla soils, 30 percent is Toccoa soils, and 10 percent is soils of minor extent.

Chewacla soils are deep and somewhat poorly drained. The subsoil is brown in the upper part and grayish brown or gray in the middle and lower parts. Toccoa soils are deep and well drained. They have a reddish brown underlying horizon.

About 70 percent of the acreage in this unit is included as minor soils in other map units because many areas are too small to be shown on a map for general planning.

Minor in this unit are Helena soils and the Molena Variant. Helena soils have a yellow or brown clayey subsoil. The Molena Variant has a loamy sand subsoil. It is somewhat excessively drained.

This unit is mainly woodland. Some tracts are pasture. Flooding and wetness are severe limitations for cultivated crops.

Suitability is fair to poor for row crops, good for pasture, and good for woodland. Because of the wetness and flooding, it is poor for residential and urban use.

Habitat for squirrel, woodcock, quail, turkey, and deer is good on this unit. The game population can be increased with additional management. Wetness and flooding are severe limitations for most kinds of recreation.

2. Vaucluse-Blanton

Well drained and moderately well drained, gently sloping and sloping loamy soils that are extremely acid to strongly acid in the subsoil; on uplands

These gently sloping to sloping soils are in the Sand Hills in the southeast corner of Fairfield County. They formed in marine deposits.

This map unit makes up less than 1 percent of Fairfield County. It does not occur in Chester County. About 80 percent of the map unit is Vaucluse soils, 11 percent is Blanton soils, and the remaining 9 percent is soils of minor extent.

Vaucluse soils are well drained and are slowly permeable because of a dense, brittle layer in the subsoil. They have a sandy surface layer less than 20 inches thick. Blanton soils are moderately well drained, are moderately permeable, and have a sandy surface layer 40 inches or more thick. In both soils, the subsoil is yellowish brown, reddish yellow, or yellowish red. Mottles in the lower part of the subsoil are very pale brown or light gray.

Minor in this unit are Georgeville, Herndon, and Rion soils. Georgeville and Herndon soils have a clayey subsoil and do not have a dense, brittle layer in the subsoil. Rion soils are moderately deep and do not have a dense, brittle layer in the subsoil.

This unit is mainly pasture and woodland. A few acres are cultivated. A restricted root zone is the main limitation in the Vaucluse soils, and droughtiness caused by the thick sandy surface layer is the main limitation in the Blanton soils.

Suitability is fair to poor for row crops. It is fair for woodland. If proper installation overcomes the limitations, suitability is good to fair for residential and other urban use.

Habitat for woodland and openland wildlife is fair. With additional management, the small game population can be increased. This unit is suitable for recreation, but there are no recreation facilities.

Areas dominated by upland soils that formed in residuum of diorite, gabbro, hornblende gneiss, and hornblende schist and in places are cut by acidic mineral dikes

The Iredell-Armenia, Wilkes-Cataula-Winnsboro, Wilkes-Winnsboro-Mecklenburg, and Wilkes-Hiwassee-Madison map units consist of soils formed predominantly in residuum of dark basic rocks and of soils formed in acidic rocks, for example, granite, gneiss, and schist. Except for Iredell-Armenia, all are gently sloping to steep soils on uplands. Iredell soils are on broad gentle slopes, and Armenia soils are on nearly level flood plains.

3. Iredell-Armenia

Moderately well drained, gently sloping, deep clayey soils on uplands and poorly drained, nearly level, deep clayey soils on flood plains; slightly acid to mildly alkaline in the subsoil

These nearly level to gently sloping soils are in the north-central and southeastern parts of Chester County. They formed in residuum of diorite, gabbro, hornblende gneiss, and hornblende schist.

This map unit makes up about 7 percent of Chester County. It does not occur in Fairfield County. About 79

percent of the map unit is Iredell soils, 7 percent is Armenia soils, and 14 percent is soils of minor extent.

Iredell soils are moderately well drained, are slowly permeable, and have an olive brown or olive subsoil. Armenia soils are poorly drained, are slowly permeable, and have a thick, dark surface layer and a gray subsoil. These soils have montmorillonitic mineralogy. Iredell soils are on broad to moderate ridges, and Armenia soils are on narrow to moderate flood plains.

Minor in this unit are Chewacla, Mecklenburg, Toccoa, and Winnsboro soils. Mecklenburg soils have a red subsoil, and Winnsboro soils have a brown subsoil. Chewacla and Toccoa soils formed in alluvial deposits. Both have a loamy subsoil.

This unit is used mainly for cultivated crops and pasture. Some tracts are woodland. The narrow range of moisture content in which these soils can be cultivated and the wetness of the Armenia soils are the main limitations for cultivated crops.

Suitability is fair to poor for most row crops, good to fair for pasture, and fair for woodland. Because of the high shrink-swell potential, low strength, slow permeability, and wetness, it is poor for most residential and urban use.

The habitat for rabbit, squirrel, quail, and dove is fair to good on this unit. With additional management, the game population can be increased. Several small farm ponds have been built, and most are stocked. The suitability for most kinds of recreation is fair to poor because of wetness (fig. 2).

4. Wilkes-Cataula-Winnsboro

Well drained, gently sloping to steep, moderately deep and deep clayey soils that are very strongly acid to mildly alkaline in the subsoil

These gently sloping to steep soils are in the western parts of Chester and Fairfield Counties. They formed in residuum of diorite, gabbro, and hornblende schist and in places are cut by acidic mineral dikes.

This map unit makes up approximately 5.5 percent of Chester County and 12 percent of Fairfield County. In Chester County about 64 percent of the unit is Wilkes

Figure 2.—Cart paths are paved because of low strength in this Iredell soil. Golf course on Iredell fine sandy loam, 1 to 6 percent slopes.

soils, 17 percent is Cataula soils, 13 percent is Winnsboro soils, and 6 percent is soils of minor extent. In Fairfield County about 59 percent of the unit is Wilkes soils, 22 percent is Cataula soils, 13 percent is Winnsboro soils, and 6 percent is soils of minor extent.

All these soils are well drained. Wilkes soils are moderately deep, are moderately slowly permeable, and have a brown or olive subsoil. Cataula soils are deep, have a red subsoil, and are slowly permeable because of a dense brittle layer in the subsoil. Winnsboro soils are deep, are slowly permeable, and have a brown subsoil.

Cataula soils and the gently sloping and sloping Winnsboro soils are on narrow to broad irregularly shaped ridgetops. Wilkes soils and the moderately steep Winnsboro soils are on side slopes adjacent to drainageways.

Minor in this unit are Cecil, Chewacla, and Toccoa soils. Cecil soils have a red subsoil and do not have a dense brittle layer in the subsoil. Chewacla and Toccoa soils formed in alluvial deposits. They are subject to flooding.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation for cultivated crops. A restricted root zone is a limitation in Cataula soils.

In Wilkes soils and the moderately steep Winnsboro soils, suitability is poor for row crops and pasture because of the slope. In Cataula soils and the gently sloping Winnsboro soils, it is good to fair for row crops. Suitability is fair for woodland throughout the unit. It is poor for residential and other urban use in most of the unit because of the steepness of slope, but it is fair in Cataula soils and the gently sloping and sloping Winnsboro soils.

Habitat for squirrel, quail, turkey, and deer is fair to good on this map unit. With additional management, the game population can be increased. Steepness of slope is a major limitation for recreation in most of this unit.

5. Wilkes-Winnsboro-Mecklenburg

Well drained, gently sloping to steep, moderately deep and deep clayey soils that are medium acid to mildly alkaline in the subsoil

These gently sloping to steep soils occur as broad areas throughout Chester and Fairfield Counties. They formed in residuum of diorite, gabbro, and hornblende schist and in places are cut by acidic mineral dikes.

This map unit makes up approximately 23 percent of Chester County and 23 percent of Fairfield County. In Chester County about 51 percent of the unit is Wilkes soils, 23 percent is Winnsboro soils, 12 percent is Mecklenburg soils, and 14 percent is soils of minor extent. In Fairfield County about 49 percent is Wilkes soils, 34 percent is Winnsboro soils, 8 percent is Mecklenburg soils, and 9 percent is soils of minor extent.

All these soils are well drained. Wilkes soils are moderately deep, have moderately slow permeability, and have a brown or olive subsoil. Winnsboro soils are deep, have slow permeability, and have a brown subsoil. Mecklenburg soils are deep, have slow permeability, and have a red subsoil.

Mecklenburg soils and the gently sloping and sloping Winnsboro soils are on narrow to broad irregularly shaped ridgetops. Wilkes soils and the moderately steep Winnsboro soils are on side slopes adjacent to drainageways.

Minor in this unit are Cecil, Chewacla, Iredell, and Toccoa soils. Cecil soils have a red subsoil. They formed in residuum of granite, gneiss, and schist. Chewacla and Toccoa soils formed in alluvial deposits. They are subject to flooding. Iredell soils have a very plastic olive brown or olive subsoil. They are moderately well drained.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation for cultivated crops. A restricted root zone is a limitation in Wilkes soils.

In Wilkes soils and the moderately steep Winnsboro soils, suitability is poor for row crops and pasture because of the slope. In Mecklenburg soils and the gently sloping and sloping Winnsboro soils, it is good to fair for row crops. Suitability is fair for woodland throughout the unit. It is poor for residential and other urban use in most of the unit because of the steepness of slope, but it is fair in Mecklenburg soils and the gently sloping and sloping Winnsboro soils.

Habitat for squirrel, quail, turkey, and deer is fair to good on this map unit. With additional management, the game population can be increased. Lake Oliphant, Chester State Park Lake, and Mountain Lakes are suitable for fishing. Many small farm ponds have been constructed, and most are stocked. Steepness of slope is a severe limitation for recreation in most areas of this unit.

6. Wilkes-Hiwassee-Madison

Well drained, gently sloping to steep, moderately deep and deep clayey soils that are very strongly acid to mildly alkaline in the subsoil

These gently sloping to steep soils are in the western part of Chester County and the northwestern part of Fairfield County. They formed in residuum of diorite, gabbro, and hornblende schist and in places are cut by acidic mineral dikes.

This map unit makes up approximately 2 percent of Chester County and 2 percent of Fairfield County. In Chester County about 56 percent of the unit is Wilkes soils, 21 percent is Hiwassee soils, 15 percent is Madison soils, and 8 percent is soils of minor extent. In Fairfield County about 54 percent of the unit is Wilkes soils, 32 percent is Hiwassee soils, 11 percent is Madison soils, and 3 percent is soils of minor extent.

All these soils are well drained. Wilkes soils are moderately deep, are moderately slowly permeable, and have a brown or olive subsoil. Hiwassee soils are deep, are moderately permeable, and have a dark red subsoil.

Madison soils are deep, are moderately permeable, have a red subsoil, and have common to many flakes of mica throughout.

Hiwassee soils and the gently sloping and sloping Madison soils are on moderate to broad ridgetops. Wilkes soils and the moderately steep Madison soils are on side slopes adjacent to drainageways.

Minor in this unit are Cecil, Chewacla, Toccoa, and Winnsboro soils. Cecil soils are deep, have a red subsoil, and do not have common flakes of mica. Chewacla and Toccoa soils formed in alluvial deposits. They are subject to flooding. Winnsboro soils are deep. They have a brown subsoil.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation for cultivated crops.

In Wilkes soils and the moderately steep Madison soils, suitability is poor for row crops and fair to poor for pasture because of slope. In Hiwassee soils and the gently sloping and sloping Madison soils, it is good to fair for row crops and pasture. Suitability for woodland is good to fair throughout the unit. It is poor for residential or other urban use in most of the unit because of steepness of the slope, but is good in Hiwassee soils and the gently sloping and sloping Madison soils.

Habitat for rabbit, squirrel, quail, and deer is good in most areas of this map unit. With additional management, the game population can be increased. Many small ponds have been built, and most are stocked. Steepness of slope is a severe limitation for recreation in most areas of this unit.

Areas dominated by upland soils that formed in residuum of granite, gneiss, and schist

The Appling-Rion-Wateree, Cecil-Pacolet-Appling, Madison-Cecil-Hiwassee, Pacolet-Cataula-Madison, and Wateree-Rion-Helena map units consist of soils formed in residuum of acidic rocks. These map units are on gently sloping to steep uplands.

7. Appling-Rion-Wateree

Well drained, gently sloping to steep, deep and moderately deep clayey and loamy soils that are extremely acid to medium acid in the subsoil

These gently sloping to steep soils occur throughout Chester and Fairfield Counties. They formed in residuum of granite.

This map unit makes up about 3 percent of Chester County and 3 percent of Fairfield County. In Chester County about 46 percent of the unit is Appling soils, 39 percent is Rion soils, 7 percent is Wateree soils, and 8 percent is soils of minor extent. In Fairfield County about 51 percent of the unit is Appling soils, 36 percent is Rion soils, 6 percent is Wateree soils, and 7 percent is soils of minor extent.

Appling soils are well drained, deep, and moderately permeable. They have a subsoil of yellow or yellowish red clay. Rion soils are well drained, deep, and moderately permeable. They have a subsoil of brown or yellow sandy clay loam. Wateree soils are excessively drained, moderately deep, and moderately rapidly permeable. They have a subsoil of brown or yellow sandy loam. Appling soils are on broad, irregularly shaped ridges, and the strongly sloping to steep Rion and Wateree soils are on narrow to broad side slopes.

Minor in this unit are Chewacla, Toccoa, and Vance soils. Chewacla and Toccoa soils formed in alluvial deposits and are subject to flooding. Vance soils have a very firm and plastic subsoil.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation for cultivated crops.

In Appling soils suitability is good to fair for row crops and good for pasture. In Rion and Wateree soils suitability is poor for row crops and fair to poor for pasture because of the slope and droughtiness of Wateree soils. Suitability is good to fair for woodland throughout the unit. It is poor for residential and other urban use in the moderately steep or steep Rion and Wateree soils, but it is good to fair in the rest of the unit.

The habitat for rabbit, squirrel, quail, dove, and deer is fair to good on this unit. With additional management, the game population can be increased. Many small farm ponds have been built throughout the area, and most are stocked. Most of the unit is suitable for most kinds of recreation, but the steepness of slope is a major limitation in some areas.

8. Cecil-Pacolet-Appling

Well drained, gently sloping to moderately steep, deep clayey and loamy soils that are very strongly acid to medium acid in the subsoil

These gently sloping to moderately steep soils are throughout Chester and Fairfield Counties. They formed in residuum of granite, gneiss, and schist.

This map unit makes up about 36 percent of Chester County and 19 percent of Fairfield County. In Chester County about 37 percent is Cecil soils, 23 percent is Pacolet soils, 8 percent is Appling soils, and 32 percent is soils of minor extent. In Fairfield County 46 percent of the unit is Cecil soils, 32 percent is Pacolet soils, 6 percent is Appling soils, and 16 percent is soils of minor extent.

These soils are well drained, deep, and moderately permeable. Cecil and Pacolet soils have a red subsoil. Appling soils have a yellow or yellowish red subsoil. Cecil and Appling soils are on moderate to broad ridgetops, and Pacolet soils are on side slopes adjacent to drainageways.

Minor in this unit are Cataula, Chewacla, Hiwassee, Madison, Mecklenburg, Wilkes, Toccoa, Vance, and Winnsboro soils. Cataula soils have a dense and brittle

layer in the subsoil. Chewacla and Toccoa soils formed in alluvial deposits and are subject to flooding. Hiwassee soils have a dark red subsoil. Madison soils have common to many flakes of mica. Mecklenburg, Wilkes, and Winnsboro soils are slowly permeable or moderately slowly permeable. Vance soils have a very firm, yellow or brown subsoil and are slowly permeable.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation for cultivated crops.

In Cecil and Appling soils suitability is good to fair for row crops and pasture. In Pacolet soils suitability is poor for row crops and pasture because of the slope. Suitability is good for woodland throughout the unit. It is good to fair for residential and other urban use in Cecil and Appling soils, but it is poor in Pacolet soils because of the steepness of slope.

Habitat for rabbit, squirrel, quail, dove, and deer is fair to good on this unit. With additional management, the game population can be increased. Many small farm ponds have been built throughout the area. Most of the unit is well suited to recreation.

9. Madison-Cecil-Hiwassee

Well drained, gently sloping to moderately steep, deep clayey soils that are very strongly acid to slightly acid in the subsoil

These gently sloping to moderately steep soils are throughout Chester and Fairfield Counties. They formed in residuum of granite, gneiss, and schist.

This map unit makes up about 16.5 percent of Chester County and 10 percent of Fairfield County. In Chester County about 67 percent of the unit is Madison soils, 11 percent is Cecil soils, 5 percent is Hiwassee soils, and 17 percent is soils of minor extent. In Fairfield County about 40 percent of the unit is Madison soils, 15 percent is Cecil soils, 14 percent is Hiwassee soils, and 31 percent is soils of minor extent.

All these soils are deep, well drained, moderately permeable, and have a red subsoil. Madison soils have common to many flakes of mica throughout. Cecil soils, Hiwassee soils, and the gently sloping and sloping Madison soils are on narrow to broad ridgetops. The moderately steep Madison soils are on side slopes adjacent to drainageways.

Minor in this unit are Appling, Cataula, Chewacla, Pacolet, Rion, Toccoa, and Winnsboro soils. Appling and Winnsboro soils have a yellow, reddish yellow, or brown subsoil. Cataula soils have a dense and brittle layer in the subsoil. Chewacla and Toccoa soils formed in alluvial deposits and are subject to flooding. Pacolet soils have a solum less than 40 inches thick and do not have common flakes of mica. Rion soils have a subsoil of sandy clay loam.

This unit is mainly pasture and woodland. Some tracts are cultivated. Slope is the main limitation to cultivated crops.

Suitability for row crops and pasture is mainly good to fair. In the moderately steep Madison soils, it is poor. Suitability is good for woodland throughout most of the unit. Suitability for residential and urban use is mainly good to fair, but it is poor in the moderately steep Madison soils.

Habitat for deer, squirrel, and quail is good on most areas of this unit. With additional management, the game population can be increased. Many small farm ponds have been built throughout the area, and most are stocked. This unit is suitable for many kinds of recreation.

10. Pacolet-Cataula-Madison

Well drained, gently sloping to moderately steep, deep clayey soils that are very strongly acid to medium acid in the subsoil

These gently sloping to moderately steep soils are in the western part of Chester County and the northwestern part of Fairfield County. They formed in residuum of granite, gneiss, and schist.

This map unit makes up approximately 5 percent of Fairfield County and 5 percent of Chester County. In Chester County about 44 percent of the unit is Pacolet soils, 32 percent is Cataula soils, 18 percent is Madison soils, and 6 percent is soils of minor extent. In Fairfield County about 60 percent of the unit is Pacolet soils, 23 percent is Cataula soils, 10 percent is Madison soils, and 7 percent is soils of minor extent.

All these soils are well drained and have a red clayey subsoil. Pacolet and Madison soils are deep and moderately permeable. Cataula soils are deep. They are slowly permeable because of a dense, brittle, restrictive layer in the subsoil. Madison soils have common to many flakes of mica throughout the profile. Cataula soils and the gently sloping and sloping Madison soils are on ridgetops and short side slopes at the head of and adjacent to shallow drainageways. Pacolet soils and the moderately steep Madison soils are on side slopes adjacent to drainageways.

Minor in this unit are Appling, Cecil, Chewacla, and Toccoa soils. Appling soils have a yellow or yellowish red subsoil. Cecil soils are moderately permeable, have a solum more than 40 inches thick, and do not have common flakes of mica. Chewacla and Toccoa soils formed in alluvial deposits. They are subject to flooding.

This unit is mainly pasture and woodland. Some tracts are cultivated crops. Slope is the main limitation to cultivated crops. A restricted root zone is a limitation in the Cataula soils.

Suitability is poor for row crops and fair for pasture in Pacolet soils and the moderately steep Madison soils because of the slope. It is good to fair for row crops and pasture in Cataula soils and the gently sloping and sloping Madison soils. Suitability is fair for woodland. Suitability is poor for residential and other urban use in most of the unit because of the steepness of slope. It is good to

fair in Cataula soils and the gently sloping and sloping Madison soils.

Habitat for squirrel, turkey, and deer is fair to good on this unit. With additional management, the game population can be increased. Many small farm ponds have been built throughout the area, and most are stocked. This unit is suitable for many kinds of recreation.

11. Wateree-Rion-Helena

Well drained and moderately well drained, gently sloping to steep, moderately deep and deep loamy and clayey soils that are extremely acid to medium acid in the subsoil

These gently sloping to steep soils are in the southeastern part of Chester County and the eastern part of Fairfield County. They formed in residuum of granite.

This map unit makes up about 0.5 percent of Chester County and 9.5 percent of Fairfield County. In Chester County about 39 percent of the unit is Wateree soils, 35 percent is Rion soils, 12 percent is Helena soils, and 14 percent is soils of minor extent. In Fairfield County about 29 percent of the unit is Wateree soils, 28 percent is Rion soils, 5 percent is Helena soils, and 38 percent is soils of minor extent.

Wateree and Rion soils are well drained, moderately deep or deep, moderately permeable, and loamy. These soils have a yellow or brown subsoil. Helena soils are moderately well drained, deep, and slowly permeable. These soils have a brownish yellow subsoil that has gray mottles in the middle or lower part. The sloping to steep Wateree and Rion soils are on narrow to broad side slopes adjacent to drainageways. The gently sloping Helena soils are on broad ridges and narrow side slopes at the heads of and adjacent to drainageways.

Minor in this unit are Appling, Chewacla, Durham, Wilkes, Pacolet, Toccoa, Vance, and Winnsboro soils. Appling soils are deep and well drained. Chewacla and Toccoa soils formed in alluvial deposits and are subject to flooding. Durham soils are deep and have a subsoil of sandy clay loam. Wilkes and Winnsboro soils have a brown, clayey, plastic subsoil. Pacolet soils have a red, clayey subsoil. Vance soils have a very firm, yellow or brown subsoil.

This unit is mainly pasture and woodland. Some small tracts are cultivated. The slope is the main limitation for cultivated crops.

The Wateree and Rion soils have poor suitability for row crops and fair to poor suitability for pasture. The Helena soils have fair suitability for row crops and good to fair suitability for pasture. Suitability for woodland is fair. The suitability for residential use is fair except for the moderately steep and steep Wateree and Rion soils. The moderately steep and steep Wateree and Rion soils have poor suitability for most urban and residential use.

Habitat for squirrel, quail, and deer is good in most areas of this unit. With additional management, the game population can be increased. Steepness of slope is a major limitation for most kinds of recreation.

Areas dominated by upland soils that formed in residuum of slate and argillite

The Georgeville-Herndon map unit consists of soils formed in residuum of slate and argillite. These rocks consist of fine crystalline minerals that generally weather to silt and clay. The unit is gently sloping to strongly sloping soils of the Carolina Slate Belt.

12. Georgeville-Herndon

Well drained, gently sloping to strongly sloping, deep clayey soils that are extremely acid to strongly acid in the subsoil

These gently to strongly sloping soils are in the southern part of Fairfield County. They formed in residuum of slate and argillite.

This map unit makes up about 15 percent of Fairfield County. It is not in Chester County. About 53 percent of the map unit is Georgeville soils, 21 percent is Herndon soils, and 26 percent is soils of minor extent.

Georgeville soils have a red subsoil, and Herndon soils have a brown subsoil. Both have moderate permeability and are high in content of silt throughout.

Minor in this map unit are Appling, Cecil, Chewacla, Hiwassee, Pacolet, Rion, and Toccoa soils. Appling, Cecil, Hiwassee, Pacolet, and Rion soils are less silty. Chewacla and Toccoa soils are on flood plains and are loamy throughout.

This unit is mainly pasture and woodland. Some tracts are cultivated. The slope is the main limitation for cultivated crops.

The suitability is good to poor for row crops, good to fair for pasture, and good for woodland. It is fair to good for residential and other urban use.

Habitat for deer, rabbit, squirrel, quail, and turkey is good in most areas of this unit. With additional management, the game population can be increased. Many small farm ponds have been built throughout the area, and most are stocked. This unit is suitable for many kinds of recreation.

Soil maps for detailed planning

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, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

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, 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, Winnsboro sandy loam, 2 to 6 percent slopes is one of several phases in the Winnsboro series.

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

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. Wateree-Rion complex is an example.

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.

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

ApB—Appling loamy sand, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on medium and broad irregularly shaped ridgetops. Slopes are smooth and convex. Individual areas range from 10 to 100 acres.

Typically, the surface layer is brown loamy sand about 8 inches thick. From 8 to 20 inches the subsoil is strong brown clay loam; from 20 to 42 inches strong brown clay loam mottled with reddish yellow, yellow, yellowish red, and brownish yellow; and from 42 to 60 inches mottled yellowish red, very pale brown, and reddish yellow sandy clay loam. The underlying material to 70 inches is mottled reddish yellow, yellow, and white sandy loam.

Included in this unit are a few small eroded knolls that have a sandy clay loam surface layer; a few intermingled areas of Durham, Rion, and Vance soils; and a few boulder outcrops. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout except for the surface layer in limed areas. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good for loblolly pine (fig. 3) and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is good for most urban use. The low strength and the moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. Low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption area or by placing the filter line deeper in less clayey material.

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

ApC—Appling loamy sand, 6 to 10 percent slopes. This deep, well drained, sloping soil is on ridgetops and short side slopes at the head of and adjacent to shallow drainageways. Slopes are irregular and convex. Areas range from 10 to 75 acres.

Typically, the surface layer is brown loamy sand about 8 inches thick. From 8 to 20 inches the subsoil is strong brown clay loam; from 20 to 42 inches strong brown clay loam mottled with reddish yellow, yellow, yellowish red, and brownish yellow; and from 42 to 60 inches mottled yellowish red, very pale brown, and reddish yellow sandy clay loam. The underlying material to 70 inches is mottled reddish yellow, yellow, and white sandy loam.

Included in this unit are a few small eroded knolls that have a sandy clay loam surface layer; a few intermingled areas of Durham, Vance, Rion, and Wateree soils; and a few areas of boulder outcrops. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to very strongly acid unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. This soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good to fair for row crops and small grain and for hay and pasture. Erosion is a severe

Figure 3.—Planted loblolly pine on Appling loamy sand, 2 to 6 percent slopes.

hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The slope, low strength, and moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by special design or by cutting and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slope and moderate permeability of the clayey subsoil are moderate limitations for septic tank absorption fields. The moderate permeability can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material. The slope can be overcome by special design of the filter field or by cutting and filling to reduce the gradient.

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

Ar—Armenia loam. This deep, poorly drained, nearly level soil is in narrow depressed areas along drainageways and intermittent streams. It is occasionally flooded for brief periods from December to April. A few areas are in depressions in broad ridges of the uplands. Slopes are irregular and concave. Areas range from 5 to 50 acres.

Typically, the surface layer is dark brown loam about 2 inches thick. The subsurface layer is dark grayish brown loam. From 7 to 16 inches the subsoil is very dark gray sandy clay loam, from 16 to 20 inches very dark grayish brown sandy loam, from 20 to 29 inches very dark gray clay, from 29 to 48 inches dark gray clay loam, and from 48 to 67 inches mottled gray, light gray, light olive brown, and strong brown sandy clay loam. The underlying material to 80 inches is mottled gray, light gray, strong brown, and reddish brown sandy loam.

Included in this unit are areas of soils that do not have the thick dark colored surface layer of alluvial material, soils that are somewhat poorly drained, and a few intermingled areas of Iredell and Chewacla soils. The included areas make up about 20 percent of this unit.

This soil is medium in content of organic matter. It is medium acid to neutral in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is slow, and available water capacity is high. The soil can be worked within only a narrow range of moisture content. It has high shrink-swell potential.

The suitability is poor for most row crops and small grain and good to fair for pasture. Wetness and flooding are limitations. Drainage is needed if row crops are grown.

The suitability is fair for loblolly pine and eastern redcedar. Seedling mortality and equipment limitations are moderate.

The suitability is poor for most urban use. The high shrink-swell potential, low strength, flooding, and wetness are severe limitations. These limitations are difficult to overcome, and the design and installation needed for satisfactory performance may be expensive. Wetness and slow permeability of the clayey subsoil are severe limitations for septic tank absorption fields. These limitations are difficult to overcome, and the design and installation needed for satisfactory performance may be expensive. Wetness and slow permeability of the clayey subsoil are severe limitations for septic tank absorption fields. These limitations can be modified somewhat by drainage and by increasing the size of the absorption field, but it is difficult to modify the absorption field so that it functions properly.

The capability subclass is IIIw. The woodland suitability group is 4w.

BaB—Blanton sand, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is in the southeastern part of Fairfield County. It occupies ridgetops on high marine terraces of the Sand Hills. Slopes are broad, irregular, and convex. Areas are 10 to 30 acres.

Typically, the surface layer is light yellowish brown sand about 5 inches thick. From 5 to 52 inches the subsurface layer is pale brown sand and very pale brown sand. From 52 to 63 inches the subsoil is brownish yellow loamy sand, from 63 to 68 inches strong brown sandy loam with a few gray mottles, and from 68 to 80 inches strong brown sandy clay loam mottled with gray and red.

Included in this unit are areas of soils that have slopes of less than 2 percent, areas of soils in which the subsoil begins at a depth of less than 40 inches, and a few intermingled areas of Vaucluse soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderate, and available water capacity is low. The soil can be worked throughout a wide range of moisture content. The sandy surface layer makes the soil susceptible to soil blowing. The root zone is deep and is easily penetrated.

The suitability is poor for row crops and fair for small grain. Droughtiness and the rapid leaching of lime and fertilizer are limitations. The suitability is good to fair for hay and pasture, particularly Coastal bermudagrass. Soil blowing is a hazard in cultivated areas. Minimum tillage, cover crops, and stripcropping help to control soil blowing.

The suitability is good to fair for loblolly pine. Equipment limitations and seedling mortality are moderate.

The suitability is good for most urban use. The high risk of corrosion to concrete and steel is a limitation, but it can be overcome by special design and proper installation. The soil has a slight limitation for septic tank absorption fields.

The capability subclass is IIIs. The woodland suitability group is 3s.

CaB—Cataula sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on irregularly shaped ridges. Slopes are smooth and convex. Areas range from 10 to 100 acres.

Typically, the surface layer is dark yellowish brown sandy loam about 7 inches thick. From 7 to 12 inches the subsoil is strong brown sandy loam, from 12 to 22 inches yellowish red clay loam, and from 22 to 31 inches reddish yellow clay. From 31 to 51 inches is a dense brittle layer. From 31 to 39 inches it is dark red sandy clay loam separated by very pale brown clay, and from 39 to 51 inches it is dark red sandy clay loam separated by light brownish gray clay. Below the dense brittle layer from 51 to 58 inches is red sandy clay loam, and from 58 to 71 inches is mottled yellowish red, pale yellow, and pale brown sandy clay loam. The underlying material to 85 inches is sandy loam.

Included in this unit are areas of soils that have a sandy clay loam surface layer; soils that have slopes of less than 2 percent or more than 6 percent; and a few intermingled areas of Appling, Cecil, Madison, Hiwassee, and Winnsboro soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the dense brittle layer. Available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is moderately deep to the dense brittle layer that restricts root development and water movement.

The suitability is good for row crops and small grain. The effect of the dense brittle layer on root penetration is a moderate limitation. The suitability is good for hay and pasture. Erosion is a moderate hazard in cultivated areas (fig. 4). Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The high risk of corrosion to concrete and steel is a limitation, but can be overcome by special design and careful installation. Low strength and moderate shrink-swell potential also are limitations, but they can be overcome by excavating

Figure 4.—Cotton ready for harvest on Cataula sandy loam, 2 to 6 percent slopes. Planting rows up and down slopes caused the erosion in foreground.

and filling with more desirable material or by special reinforced foundations for buildings. The slow permeability of the dense brittle layer is a severe limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption area or by placing the filter line in more permeable material.

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

CaC—Cataula sandy loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on narrow ridgetops and short side slopes adjacent to drainageways. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is dark yellowish brown sandy loam about 7 inches thick. From 7 to 12 inches the subsoil is strong brown sandy loam, from 12 to 22 inches yellowish red clay loam, and from 22 to 31 inches reddish yellow clay. From 31 to 51 inches is a dense brittle layer. From 31 to 39 inches it is dark red sandy clay loam separated by very pale brown clay, and from 39 to 51 inches it is dark red sandy clay loam separated by light brownish gray clay. Below the dense brittle layer from 51 to 58 inches is red sandy clay loam, and from 58 to 71 inches is mottled yellowish red, pale yellow, and pale brown sandy clay loam. The underlying material to 85 inches is sandy loam.

Included in this unit are areas of soils that have a sandy clay loam surface layer; soils that have slopes of less than 6 percent or more than 10 percent; and a few intermingled areas of Appling, Cecil, Madison, Pacolet, Hiwassee, and Winnsboro soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the dense brittle layer. Available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is moderately deep to the dense brittle layer that restricts root development and water movement.

The suitability is fair for row crops and small grain. The susceptibility to erosion and the effect of the dense brittle layer on root penetration are severe limitations. The suitability is good for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The slope, high risk of corrosion to concrete and steel, moderate shrink-swell potential, and low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. Low strength and moderate shrink-swell potential can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slope can be overcome by special design or by cutting and filling to reduce the gradient.

The slow permeability of the dense brittle layer is a severe limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption area or by placing the filter line in more permeable material.

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

CcC2—Cataula sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, sloping soil is on ridgetops and short side slopes at the head of and adjacent to shallow drainageways. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 7 inches thick. From 7 to 12 inches the subsoil is yellowish red sandy clay loam, from 12 to 22 inches yellowish red clay loam, and from 22 to 31 inches reddish yellow clay. From 31 to 51 inches is a dense brittle layer. From 31 to 39 inches it is dark red sandy clay loam separated by very pale brown clay, and from 39 to 51 inches it is dark red sandy clay loam separated by light brownish gray clay. Below the dense brittle layer from 51 to 58 inches is red sandy clay loam, and from 58 to 71 inches is mottled yellowish red, pale yellow, and pale brown sandy clay loam. The underlying material to 85 inches is sandy loam.

Included in this unit are areas of soils that have a clay loam surface layer; soils that have slopes of less than 6 percent or more than 10 percent; and a few intermingled areas of Cecil, Madison, Pacolet, Hiwassee, and Winnsboro soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid unless the surface layer has been limed. Permeability is moderately slow in the upper part of the subsoil and slow in the dense brittle layer. Available water capacity is medium. The soil can be worked within only a narrow range of moisture content. The root zone is moderately deep to the dense brittle layer that restricts root development and water movement.

The suitability is fair to poor for row crops and small grain. The thin surface layer, susceptibility to erosion, slope, and the effects of the dense brittle layer on root development are limitations. The suitability is fair for hay and pasture. The hazard of erosion is a moderate to severe limitation in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and yellow-poplar. The erosion hazard, seedling mortality, and equipment limitations are moderate.

The suitability is fair for most urban use. The slope, low strength, moderate shrink-swell potential, and high risk of corrosion to concrete and steel are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength and moderate shrink-swell potential can be overcome by excavating and filling with more desirable material or by reinforced foundations. The slope can be overcome by special design or by cutting and filling to reduce the gradient. The slow permeability of the dense brittle layer is a severe limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption area or by placing the filter line in more permeable material.

The capability subclass is VIe. The woodland suitability group is 5c.

CeB—Cecil sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on medium and broad irregularly shaped ridgetops. Slopes are smooth and convex. Areas range from 10 acres to more than 100 acres.

Typically, the surface layer is yellowish red sandy loam about 5 inches thick. From 5 to 9 inches the subsoil is red sandy clay loam, from 9 to 31 inches red clay, and from 31 to 52 inches red clay loam. The underlying material to 72 inches is mottled red, yellowish red, and reddish yellow clay loam and sandy clay loam.

Included in this unit are areas of soils that have a sandy clay loam surface layer, small areas that have a few cobblestones and boulders on the surface, soils that have slopes of more than 6 percent, and a few intermingled areas of Cataula and Winnsboro soils. Also included in the southern part of Fairfield County are a few small areas of Georgeville and Herndon soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture (fig. 5). Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is good for most urban use. The moderate risk of corrosion to steel and concrete and the low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

CnB2—Cecil sandy clay loam, 2 to 6 percent slopes, eroded. This deep, well drained, gently sloping soil is on medium and broad irregularly shaped ridgetops. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are smooth and convex. Areas range from 10 acres to more than 60 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. From 5 to 9 inches the subsoil is red sandy clay loam, from 9 to 31 inches red clay, and from 31 to 52 inches red clay loam. The underlying material to 72 inches is mottled red, yellowish red, and reddish yellow clay loam and sandy clay loam.

Included in this unit are small areas that have a few cobblestones and boulders on the surface; soils that have slopes of more than 6 percent; and a few intermingled areas of Cataula and Winnsboro soils. Also included in the southern part of Fairfield County are a few small areas of Georgeville and Herndon soils. The included areas make up 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate and available water capacity is medium. The soil clods unless it is worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grain because the surface layer is thin. It is good to fair for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine. The erosion hazard, seedling mortality, and equipment limitations are moderate.

The suitability is good for most urban use. The moderate risk of corrosion to steel and concrete and the low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or placing the filter line deeper in less clayey material.

The capability subclass is IIIe. The woodland suitability group is 4c.

Figure 5.—White clover and fescue on Cecil sandy loam, 2 to 6 percent slopes.

CnC2—Cecil sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, sloping soil is on medium and broad irregularly shaped ridgetops. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are smooth and convex. Areas range from 10 acres to more than 60 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. From 5 to 9 inches the subsoil is red sandy clay loam, from 9 to 31 inches red clay, from 31 to 52 inches red clay loam. The underlying material to 72 inches is mottled red, yellowish red, and reddish yellow clay loam and sandy clay loam.

Included in this unit are small areas that have a few cobblestones and boulders on the surface, soils that have slopes of less than 6 percent or more than 10 percent, and a few intermingled areas of Cataula and Winnsboro soils. Also included in the southern part of Fairfield County are a few areas of Georgeville and Herndon soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil clods unless it is worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grains because the surface layer is thin. It is fair for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine. The erosion hazard, equipment limitations, and seedling mortality are moderate limitations.

The suitability is fair for most urban use. The slope, moderate risk of corrosion to steel and concrete, and low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by special design or by cutting

and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

The capability subclass is IVe. The woodland suitability group is 4c.

Cw—Chewacla loam. This deep, somewhat poorly drained, nearly level soil is in narrow, long areas of flood plains along perennial streams. It is commonly flooded for brief periods from November to April. Areas range from 10 acres to more than 100 acres.

Typically, the surface layer is brown loam about 7 inches thick. From 7 to 14 inches the subsoil is brown loam mottled with dark brown and black, from 14 to 22 inches pale brown clay loam mottled with brown, from 22 to 30 inches very dark gray and light brownish gray clay loam mottled with very dark grayish brown and yellowish brown; and from 30 to 43 inches mottled light brownish gray, dark yellowish brown, black, very dark grayish brown, and yellowish brown loam. The substratum to 60 inches is stratified yellowish brown, brownish yellow, very dark grayish brown, very dark gray, and gray loam.

Included in this unit are small areas of well drained soils that are sandy throughout, well drained soils and poorly drained soils that are loamy in the subsoil, poorly and somewhat poorly drained soils that are clayey in the subsoil, soils south of Winnsboro that have more silt in the subsoil than is common for Chewacla soils; a few intermingled areas of Armenia and Toccoa soils; and a few areas of similar soils that are frequently flooded. The included areas make up about 40 percent of this unit.

This soil is medium to low in content of organic matter. It is slightly acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is high. This soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is poor for row crops and small grain. Wetness and flooding are limitations. Yields can be high, however, if the soil is properly drained and protected from flooding. The suitability is good for pasture (fig. 6).

The suitability is good for yellow-poplar, cottonwood, loblolly pine, and sweetgum. Equipment limitations and seedling mortality are moderate.

The suitability is poor for most urban use. Flooding and wetness are severe limitations that are difficult to overcome. The wetness can be modified by drainage, and the flooding can be modified by filling to raise the ground elevation, by diking, or by installing water control structures. Flooding and wetness are severe limitations for septic tank absorption fields. These limitations are difficult to overcome.

The capability subclass is IIIw. The woodland suitability group is 1w.

DuB—Durham loamy sand, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on narrow to medium ridgetops. Slopes are smooth and convex. Areas are 10 to 40 acres.

Typically, the surface layer is brown loamy sand about 5 inches thick. The subsurface layer is pale brown sandy loam. From 12 to 20 inches the subsoil is brownish yellow sandy loam, from 20 to 40 inches brownish yellow sandy clay loam mottled with yellowish red, and from 40 to 48 inches yellowish brown sandy loam. The underlying material to 60 inches is loamy sand.

Included in this unit are areas of soils that have slopes of more than 6 percent or less than 2 percent; a few intermingled areas of Appling, Vance, and Helena soils; and an area of well drained, fine loamy soils that formed in loamy sediment on an old river terrace. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, terraces, farming on the contour, cover crops, including grasses and legumes, and stripcropping reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is good for most urban use. The moderate risk of corrosion to concrete and steel is a limitation. This limitation can be overcome by special design and proper installation. The soil has a slight limitation for septic tank absorption fields.

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

GeB—Georgeville loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad to narrow ridges in the southern part of Fairfield County. Slopes are smooth and convex. Areas range from 10 to 200 acres.

Typically, the surface layer is reddish brown loam about 4 inches thick. From 4 to 18 inches the subsoil is red clay; from 18 to 24 inches red silty clay; from 24 to 30 inches red silty clay loam; and from 30 to 60 inches dark red, strong brown, reddish brown, and brownish yellow silt loam. The underlying material to 70 inches is mottled dark red, reddish yellow, yellowish red, and reddish brown silt loam.

Included in this unit are a few areas of small eroded knolls that have a silty clay loam surface layer, a few intermingled areas of Cecil and Hiwassee soils, a few areas of soils in which the solum is less than 40 inches

Figure 6.—Fescue pasture on Chewacla loam.

thick, and soils that have slopes of less than 2 percent or more than 6 percent. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. This soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, terraces, farming on the contour, cover crops, including grasses and legumes, and stripcropping reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is good for most urban use. The high risk of corrosion to steel and concrete and the low strength are limitations. The risk of corrosion can be overcome by design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

GeC—Georgeville loam, 6 to 10 percent slopes. This deep, well drained, moderately sloping soil is in the southern part of Fairfield County. It is on narrow ridgetops and side slopes perpendicular to drainageways. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is reddish brown loam about 4 inches thick. From 4 to 18 inches the subsoil is red clay; from 18 to 24 inches red silty clay; from 24 to

30 inches red silty clay loam; and from 30 to 60 inches dark red, strong brown, reddish brown, and brownish yellow silt loam. The underlying material to 70 inches is mottled dark red, reddish yellow, yellowish red, and reddish brown silt loam.

Included in this unit are a few areas of eroded knolls that have a silty clay loam surface layer, a few intermingled areas of Cecil and Hiwassee soils, a few areas of soils in which the solum is less than 40 inches thick, and soils that have slopes of more than 10 percent. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. This soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good to fair for row crops and small grain. The slope and the size of the area are limitations. The suitability is good for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, terraces, farming on the contour, cover crops, including grasses and legumes, and stripcropping reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The slope, high risk of corrosion to steel and concrete, and low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be modified by special design or by cutting and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

HaB—Helena sandy loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on broad ridges and narrow side slopes at the head of and adjacent to drainageways. Slopes are smooth and convex. Areas are 10 to 30 acres.

Typically, the surface layer is yellowish brown sandy loam about 6 inches thick. The subsurface layer is brownish yellow sandy loam. From 9 to 16 inches the subsoil is brownish yellow loam mottled with brown; from 16 to 20 inches brownish yellow clay mottled with strong brown and yellowish red; from 20 to 30 inches brownish yellow clay mottled with strong brown, reddish yellow, red, strong brown, pale brown, light gray, and dark yellowish brown; from 30 to 40 inches mottled strong brown, light gray, and reddish yellow clay; and from 40 to 60 inches mottled light gray, strong brown, reddish yellow, white, and very pale brown sandy clay loam with many balls of light gray kaolin clay. The underlying material to 66 inches is mottled strong brown, very pale brown, and reddish brown sandy clay loam with many balls of light gray kaolin clay.

Included in this unit are a few areas of small eroded knolls that have a sandy clay loam surface layer; a few areas of soils that have a subsoil of sandy clay loam; a few intermingled areas of Appling, Cataula, Cecil, and Vance soils; and a few small areas where slopes are more than 6 percent. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid unless the surface layer has been limed. Permeability is slow, and available water capacity is high. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated. This soil has high shrink-swell potential.

The suitability is fair for row crops and small grain. A perched high water table is a limitation. The suitability is good to fair for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. Equipment limitations are moderate.

The suitability is poor for most urban use. The high shrink-swell potential, high risk of corrosion to steel and concrete, and low strength are limitations. The risk of corrosion can be overcome only through special design and careful installation. The high shrink-swell potential and low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slow permeability of the clayey subsoil and the perched high water table are severe limitations for septic tank absorption fields. The slow permeability can be overcome by increasing the size of the field or by other modifications in the filter field. The perched high water table can be overcome by drainage.

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

HnB—Herndon loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is in the southern part of Fairfield County. It is in irregularly shaped areas on broad ridges. Slopes are smooth and convex. Areas range from 10 to 100 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is grayish brown loam. From 7 to 12 inches the subsoil is yellowish brown silty clay loam; from 12 to 24 inches strong brown silty clay mottled with yellowish red; from 24 to 36 inches mottled strong brown, yellowish red, and red silty clay; and from 36 to 58 inches mottled strong brown, brownish yellow, and yellow silt loam. The underlying material to 72 inches is mottled light yellowish brown, strong brown, and light gray silt loam.

Included in this unit are a few intermingled areas of Appling and Cecil soils, areas of soils that have slopes of more than 6 percent, areas of moderately deep soils, and areas of soils that have a subsoil of silty clay loam. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to extremely acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes in the cropping system, terracing, and farming on the contour reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is good for most urban use. The high risk of corrosion to steel and concrete and the low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

HnD—Herndon loam, 6 to 15 percent slopes. This deep, well drained, sloping to strongly sloping soil is in the southern part of Fairfield County. It is on ridges and side slopes adjacent to drainageways. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer is grayish brown loam. From 7 to 12 inches the subsoil is yellowish brown silty clay loam; from 12 to 24 inches strong brown silty clay mottled with yellowish red; from 24 to 36 inches mottled strong brown, yellowish red, and red silty clay; and from 36 to 58 inches mottled strong brown, brownish yellow, and yellow silt loam. The underlying material to 72 inches is mottled light yellowish brown, strong brown, and light gray silt loam.

Included in this unit are areas of soils that have a surface layer of gravelly fine sandy loam, a few intermingled areas of Appling, Cecil, and Pacolet soils, and soils that have slopes of less than 6 percent or more than 15 percent. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to extremely acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair to poor for row crops and small grain, mainly because of the hazard of erosion. It is good to fair for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The slope, high risk of corrosion to steel and concrete, and low strength are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be modified by special design or by cutting and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slope and moderate permeability of the clayey subsoil are moderate limitations for septic tank absorption fields. The moderate permeability can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material. The slope can be modified by special design and layout or by cutting and filling.

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

HsB—Hiwassee sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridges. Slopes are smooth and convex. Areas range from 10 to 100 acres.

Typically, the surface layer is dark reddish brown sandy loam about 4 inches thick. From 4 to 10 inches the subsoil is dark red sandy clay loam; from 10 to 50 inches dark red clay; from 50 to 58 inches mottled dark red and strong brown sandy clay; and from 58 to 70 inches mottled dark red, red, yellow, and white sandy clay loam.

Included in this unit are a few intermingled areas of Georgeville and Winnsboro soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is slightly acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. This soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is good for most urban use. The low strength and the moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by other modifications in the filter field.

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

HsC—Hiwassee sandy loam, 6 to 10 percent slopes. This deep, well drained, moderately sloping soil is on ridgetops and short side slopes at the head of and adjacent to shallow drainageways. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is dark reddish brown sandy loam about 4 inches thick. From 4 to 10 inches the subsoil is dark red sandy clay loam; from 10 to 50 inches dark red clay; from 50 to 58 inches mottled dark red and strong brown sandy clay; and from 58 to 70 inches mottled dark red, red, yellow, and white sandy clay loam.

Included in this unit are small areas where slopes are less than 6 percent or more than 10 percent and a few intermingled areas of Georgeville and Winnsboro soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is slightly acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. This soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good to fair for row crops and small grain because of the slope. It is good for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is fair for most urban use. The slope, low strength, and moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by special design or by cutting and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by other modifications in the filter field.

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

HwB2—Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded. This deep, well drained, gently sloping soil is on ridgetops and high terraces. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are smooth and convex. Areas range from 10 to 75 acres.

Typically, the surface layer is dark red sandy clay loam about 4 inches thick. From 4 to 50 inches the subsoil is dark red clay; from 50 to 58 inches mottled dark red and strong brown sandy clay; and from 58 to 70 inches mottled dark red, red, yellow, and white sandy clay loam.

Included in this unit are a few intermingled areas of Georgeville and Winnsboro soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is slightly acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate and available water capacity is medium. This soil can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grain because of the thin surface layer. It is good to fair for hay and pasture. Because of the slope and thin surface layer, erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine. The erosion hazard, equipment limitations, and seedling mortality are moderate.

The suitability is good for most urban use. The low strength and moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by other modifications in the filter field.

The capability subclass is IIIe. The woodland suitability group is 4c.

HwC2—Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, moderately sloping soil is on ridgetops and short side slopes at the head of and adjacent to shallow drainageways. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are irregular and convex. Areas are 10 to 50 acres.

Typically, the surface layer is dark red sandy clay loam about 4 inches thick. From 4 to 50 inches the subsoil is

dark red clay; from 50 to 58 inches mottled dark red and strong brown sandy clay; and from 58 to 70 inches mottled dark red, red, yellow, and white sandy clay loam.

Included in this unit are small areas where slopes are less than 6 percent or more than 10 percent and a few intermingled areas of Cataula and Winnsboro soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is slightly acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grain. The thin surface layer and slope are the main limitations. The suitability is fair for hay and pasture. Because of the thin surface layer and slope, erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine. The erosion hazard, equipment limitations, and seedling mortality are moderate.

The suitability is fair for most urban use. The slope, low strength, and moderate risk of corrosion to steel and concrete are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by special design or by cutting and filling to reduce the gradient. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by other modifications in the filter field.

The capability subclass is IVe. The woodland suitability group is 4c.

IdB—Iredell fine sandy loam, 1 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on broad ridges. Slopes are smooth and convex. Areas range from 10 to 400 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 7 inches thick. From 7 to 20 inches the subsoil is brown clay, from 20 to 24 inches dark brown and dark grayish brown clay, and from 24 to 27 inches olive loam. From 27 to 32 inches the underlying material is finely mottled gray, brown, and black loam; and from 32 to 62 inches it is finely mottled gray, brown, and black sandy loam.

Included in this unit are areas of soils that have a surface layer of clay loam and a few intermingled areas of Armenia and Mecklenburg soils. The included areas make up about 10 percent of this unit.

This soil is low in content of organic matter. It is medium acid to neutral in the surface layer, slightly acid or neutral in the upper part of the subsoil, and slightly acid to mildly alkaline in the lower part of the subsoil and in the underlying material. Permeability is slow, and available water capacity is medium. This soil can be worked within only a medium range of moisture content. The root zone is deep and is fairly easily penetrated. The shrink-swell potential is high.

The suitability is fair for most row crops (fig. 7) and small grain. The soil is limited because it is difficult to manage. The suitability is good for cotton, hay, and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and eastern redcedar. Equipment limitations and seedling mortality are moderate.

The suitability is poor for most urban use. The high shrink-swell potential, low strength, and wetness are limitations. The high shrink-swell potential and low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The wetness can be overcome by drainage to remove the water which perches above the very firm clayey layer during periods of heavy rainfall. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields, and wetness is also a limitation. These limitations are difficult to overcome. The slow permeability can be modified by increasing the size of the field or by placing the filter line deeper in less clayey material. The wetness can be modified by drainage.

The capability subclass is IIe. The woodland suitability group is 4c.

MaB—Madison sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on medium and broad ridgetops. Slopes are irregular and convex. Areas range from 10 to 100 acres.

Typically, the surface layer is brown sandy loam about 4 inches thick. From 4 to 16 inches the subsoil is red sandy clay, and from 16 to 26 inches it is red sandy clay loam. From 26 to 43 inches the underlying material is red sandy clay loam; and from 43 to 80 inches it is mottled red and white, firm saprolite of weathered schist that crushes to coarse sandy loam. Many fine flakes of mica are throughout the subsoil and the underlying material.

Included in this unit are small areas that have a surface layer of sandy clay loam, areas where slopes are more than 6 percent, and a few intermingled areas of Cataula soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and easily penetrated.

The suitability is good for row crops and small grain

Figure 7.—Soybeans on Iredell fine sandy loam, 1 to 6 percent slopes.

(fig. 8). It is good for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is good for most urban use. The low strength, risk of high corrosion to steel, and moderate risk of corrosion to concrete are limitations. The risk of corrosion to steel and concrete can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

MdC2—Madison sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, sloping soil is on ridgetops and broad side slopes. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are irregular and convex. Areas are 10 to 75 acres.

Typically, the surface layer is yellowish red sandy clay loam about 4 inches thick. From 4 to 16 inches the subsoil is red sandy clay, and from 16 to 26 inches it is red sandy clay loam. From 26 to 43 inches the underly-

Figure 8.—Wheat on Madison sandy loam, 2 to 6 percent slopes.

ing material is red sandy clay loam, and from 43 to 80 inches it is mottled red and white, firm saprolite of weathered schist that crushes to coarse sandy loam. Many fine flakes of mica are throughout the subsoil and the underlying material.

Included in this unit are small areas that have a surface layer of sandy loam, areas where slopes are less than 6 percent or more than 10 percent, and a few intermingled areas of Cataula soils. The included areas make up about 25 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The soil can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grain. The thin, eroded surface layer and slope are the main limitations. The suitability is fair for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine and yellow-poplar. The erosion hazard, equipment limitations, and seedling mortality are moderate.

The suitability is fair for most urban use. The low strength, high risk of corrosion to steel, and moderate risk of corrosion to concrete are limitations. The risk of corrosion to steel and concrete can be overcome by special design and careful installation. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The moderate permeability of the clayey subsoil is a moderate limitation for septic tank absorption fields. This limitation can be overcome by increasing the size of the field or by placing the filter line deeper in less clayey material.

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

MdE2—Madison sandy clay loam, 10 to 25 percent slopes, eroded. This deep, well drained, strongly sloping to moderately steep soil is on side slopes adjacent to drainageways. In cultivated areas the surface layer is a mixture of topsoil and subsoil. There are a few deep gullies. Slopes are irregular and convex. Areas range from 20 to 200 acres.

Typically, the surface layer is reddish brown sandy clay loam about 4 inches thick. From 4 to 16 inches the subsoil is red sandy clay, and from 16 to 26 inches it is red sandy clay loam. From 26 to 43 inches the underlying material is red sandy clay loam, and from 43 to 80 inches it is mottled red and white, firm saprolite of weathered schist that crushes to coarse sandy loam. Many fine flakes of mica are throughout the subsoil and the underlying material.

Included in this unit are small areas that have a surface layer of sandy loam, areas where slopes are less than 10 percent or more than 25 percent, and a few intermingled areas of Wilkes soils. The included areas make up about 25 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout. Permeability is moderate, and available water capacity is medium. The root zone is deep and is easily penetrated by plant roots.

The suitability for row crops and small grain is poor because of the steepness of slope and high susceptibility to erosion. The suitability for hay and pasture is fair in strongly sloping areas and poor in moderately steep areas. Erosion is a severe hazard.

The suitability is fair for loblolly pine and yellow-poplar. The severe erosion hazard, moderate equipment limitations, and moderate seedling mortality are limitations.

The suitability is poor for most urban use. The steepness of slope is a severe limitation that is difficult to overcome. This limitation can be modified by special design or by cutting and filling to reduce the gradient. The steepness of slope is a severe limitation for septic tank absorption fields. This limitation can be modified by special design and layout or by cutting and filling to reduce the gradient.

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

MeB—Mecklenburg fine sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on irregularly shaped, broad ridges. Slopes are smooth and convex. Areas are 10 to 100 acres.

Typically, the surface layer is reddish brown fine sandy loam about 7 inches thick. From 7 to 11 inches it is dark red sandy clay loam, from 11 to 28 inches reddish brown and yellowish red clay mottled with strong brown, and from 28 to 39 inches mottled yellowish red and strong brown clay loam. The underlying material to 72 inches is mottled strong brown, yellowish brown, and light olive brown loam.

Included in this unit are areas of soils that have a surface layer of gravelly fine sandy loam and a few intermingled areas of Cecil, Iredell, Madison, and Winnsboro soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is medium acid to neutral throughout. Permeability is slow, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is good to fair for row crops and small grain. It is good for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is good to fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use or management.

The suitability is fair for most urban use. The moderate shrink-swell potential, low strength, high risk of corrosion to steel, and moderate risk of corrosion to concrete are limitations. The risk of corrosion to steel and concrete can be overcome by special design and careful installation. The moderate shrink-swell potential and low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the absorption area or by placing the filter line deeper in less clayey material.

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

MkC2—Mecklenburg sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, sloping soil is on narrow ridges and side slopes. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are smooth and convex. Areas range from 10 to 200 acres.

Typically, the surface layer is reddish brown sandy clay loam about 7 inches thick. From 7 to 11 inches the subsoil is dark red sandy clay loam, from 11 to 28 inches reddish brown and yellowish red clay mottled with strong brown, and from 28 to 39 inches mottled yellowish red and strong brown clay loam. The underlying material to 72 inches is mottled strong brown, yellowish brown, and light olive brown loam.

Included in this unit are areas of soils that have a surface layer of sandy loam, fine sandy loam, or loam; areas where slopes are less than 6 percent or more than 10 percent; and a few intermingled areas of Cecil, Iredell, Madison, and Winnsboro soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is medium acid to neutral throughout. Permeability is slow,

and available water capacity is medium. The soil can be worked only within a narrow range of moisture content. The root zone is deep and is easily penetrated.

The suitability is poor for row crops and small grain. The thin surface layer and slope are limitations. The suitability is fair for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and yellow-poplar. The erosion hazard, equipment limitations, and seedling mortality are moderate limitations.

The suitability is fair for most urban use. The moderate shrink-swell potential, low strength, high risk of corrosion to steel, moderate risk of corrosion to concrete, and slope are limitations. The risk of corrosion to steel and concrete can be overcome by design and careful installation procedures. The moderate shrink-swell potential and low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slope can be modified by cutting and filling to reduce the gradient or by special design. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the field or by placing the filter line deeper in less clayey material.

The capability subclass is IVe. The woodland suitability group is 4o.

MoB—Molena Variant sand, 1 to 4 percent slopes. This deep, somewhat excessively drained, gently sloping soil is on high river terraces. Slopes are smooth and convex. Areas are 100 to 300 acres.

Typically, the surface layer is 6 inches of dark reddish brown sand. From 6 to 11 inches the subsoil is dark reddish brown coarse loamy sand, from 11 to 19 inches reddish brown sandy loam, and from 19 to 44 inches strong brown loamy sand. The underlying material to 64 inches is very pale brown fine sand.

Included in this unit are a few intermingled areas of Durham soils and soils that have a surface layer of sand or loamy sand to a depth of more than 20 inches. The included areas make up about 25 percent of this unit.

This soil is low in content of organic matter. It is slightly acid or neutral throughout. Permeability is moderately rapid to rapid, and available water capacity is low. The soil can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops because the soil is droughty. It is good for hay and pasture. It is well suited to Coastal bermudagrass and other grasses that are better suited to sandy soils. Soil blowing is a moderate hazard in cultivated areas. Minimum tillage, cover crops, and stripcropping help to control soil blowing.

The suitability is good for loblolly pine. Seedling mortality and equipment limitations are moderate.

The suitability is good for most urban use, and there are no significant limitations. The soil has a slight limitation for septic tank absorption fields.

The capability subclass is IIIs. The woodland suitability group is 3s.

PaE—Pacolet sandy loam, 10 to 25 percent slopes. This deep, well drained, strongly sloping to moderately steep soil is on side slopes adjacent to drainageways. Slopes are irregular and convex. Areas range from 20 acres to more than 200 acres.

Typically, the surface layer is brown sandy loam about 3 inches thick. The subsoil from 3 to 29 inches is red clay, and from 29 to 37 inches it is red clay loam mottled with reddish yellow. From 37 to 52 inches the underlying material is mottled red and reddish yellow clay loam, and from 52 to 70 inches it is light yellowish brown loam mottled with red and strong brown.

Included in this unit are areas of eroded soils that have a surface layer of sandy clay loam or clay loam, areas where boulders or cobblestones are on the surface, areas of soils that have slopes of less than 10 percent or more than 25 percent, and a few intermingled areas of Cataula and Wilkes soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid throughout unless the surface layer has been limed. Permeability is moderate, and available water capacity is medium. The root zone is deep and is easily penetrated.

The suitability for row crops and small grain is poor because of the steepness of slopes. The suitability for hay and pasture is fair in the strongly sloping areas, and poor in the moderately steep areas. Erosion is a severe hazard.

The suitability is good to fair for loblolly pine and yellow-poplar. The erosion hazard and equipment limitations are moderate.

The suitability is poor for most urban use. The steepness of slope and high risk of corrosion to steel and concrete are limitations. The slope can be modified by cutting and filling to reduce the gradient or by special design. The risk of corrosion can be overcome by special design and careful installation. The steepness of slope is a severe limitation for septic tank absorption fields. The limitation can be reduced by proper layout or by cutting and filling to reduce the gradient.

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

RnF—Rion loamy sand, 15 to 40 percent slopes. This deep, well drained, moderately steep to steep soil is on side slopes adjacent to drainageways. Slopes are irregular and convex. Areas are 20 acres to more than 75 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 3 inches thick. The subsurface layer is brown loamy sand. From 7 to 17 inches the subsoil is

brownish yellow sandy loam, from 17 to 26 inches light yellowish brown sandy clay loam, from 26 to 31 inches reddish yellow sandy clay loam mottled with very pale brown and light brownish gray, and from 31 to 38 inches white sandy clay loam mottled with brownish yellow and brownish gray. The underlying material to 60 inches is mottled white, gray, and brownish yellow sandy loam.

Included in this unit are areas of eroded soils that have a surface layer of sandy clay loam or clay loam; areas where boulders or cobblestones are on the surface; areas of soils that have a clayey subsoil; areas where slopes are less than 15 percent; and a few intermingled areas of Appling, Cataula, Wilkes, Vance, and Wateree soils. Also included are a few intermingled areas of Georgeville and Herndon soils and a few areas of soils in which the solum is shallow and contains many fragments of slate. These areas are south of Winnsboro. The included areas make up about 25 percent of this unit.

This soil is low in content of organic matter. It is medium acid to very strongly acid throughout. Permeability is moderate, and available water capacity is low to moderate. The root zone is deep and is easily penetrated.

The suitability is poor for row crops, small grain, hay, and pasture because of the steepness of slope. Erosion is a serious hazard if this soil is disturbed.

The suitability is fair for loblolly pine and yellow-poplar. The erosion hazard, equipment limitations, and seedling mortality are moderate.

The suitability is poor for most urban use. The steepness of slope, high risk of corrosion to concrete, and moderate risk of corrosion to steel are limitations. The slope can be modified by cutting and filling to reduce the gradient or by special design. The risk of corrosion to concrete and steel can be overcome by special design and careful installation. The steepness of slope is a severe limitation for septic tank absorption fields. This limitation can be modified by proper layout of the filter field or by cutting and filling to reduce the gradient, but it is difficult to overcome.

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

To—Toccoa loam. This deep, well drained, nearly level soil is on narrow, long flood plains along major and minor streams. It is occasionally flooded for brief periods from January to December (fig. 9). Areas range from 8 acres to more than 100 acres.

Typically, the surface layer is brown loam 2 inches thick over dark reddish brown sandy loam 6 inches thick. From 8 to 32 inches the underlying material is reddish brown sandy loam, from 32 to 50 inches brown sandy loam, from 50 to 56 inches strong brown loam, and from 56 to 74 inches brown sandy loam.

Included in this unit are areas of well drained soils that are sandy throughout. These areas are identified by the sand spot symbol. Also included are areas of well drained soils that have a loamy subsoil, soils that have a clayey subsoil, soils that have more silt in the subsoil than is typical for this Toccoa soil, and a few intermingled areas of Chewacla soils. The included areas make up about 35 percent of this unit.

This soil is low in content of organic matter. It is slightly acid to strongly acid throughout unless the surface layer has been limed. Permeability is moderately rapid, and available water capacity is low to medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is easily penetrated.

The suitability is fair for row crops and small grain. The occasional flooding and high water table are limitations. The suitability is good for hay and pasture.

The suitability is good for loblolly pine, sweetgum, and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is poor for most urban use. Flooding and wetness are limitations that are difficult to overcome. Wetness can be modified by drainage, and flooding can be modified by filling to raise the ground elevation, by diking, or by installing water control structures. Flooding and wetness are severe limitations for septic tank absorption fields. These limitations are difficult to overcome.

The capability subclass is IIw. The woodland suitability group is 1o.

UD—Udorthents, loamy and clayey. This unit consists of areas where the soil has been disturbed or removed by machinery to a depth of more than 2 feet and areas where refuse from mined areas has accumulated (fig. 10). The largest areas are the Chester Airport in Chester County and the Richtex clay pits and the fill areas around the granite quarries near Rion and Blair in Fairfield County. Smaller areas occur elsewhere in Chester and Fairfield Counties. Areas range from about 3 acres to 350 acres. Some areas too small to be shown at the scale of mapping are identified by spot symbols on the soil map. Slopes are gentle to strong, ranging from 4 to 15 percent.

The fill material and disturbed soil material is generally a nonhomogenous mixture of clayey and loamy material and some boulders and cobblestones, all of which is refuse from areas mined for granite. The thickness of this material is highly variable but is more than 2 feet.

In some areas the soil material has been excavated to a depth of more than 4 feet. The rest of the soil material in these areas, however, is highly weathered and can support vegetation.

Included in this unit are some granite quarries and small areas of nonsoil material, for example, granite boulders from the quarries. Also included are small areas of Appling, Cecil, Georgeville, Helena, Madison, and Wateree soils. The included areas make up about 25 percent of this unit.

The soil material in most areas of this unit is low in content of organic matter. Reaction is extremely acid to

Figure 9.—Flooding in area of Toccoa loam.

neutral throughout. Permeability varies. The available water capacity is generally medium. Internal drainage and runoff are highly variable. Depth of the root zone also varies.

The suitability is poor for row crops because of the slope, the erosion hazard, and the drainage. It is fair to poor for hay and pasture.

The suitability is fair to poor for loblolly pine. The equipment limitation is severe. The erosion hazard and seedling mortality are moderate.

The suitability is poor for urban use. In most areas the material is highly unstable and is subject to some subsidence. Steepness of slope and erosion are severe limitations in some areas. These limitations can be overcome only by extremely good design and careful installation.

The suitability is poor for almost any kind of use in

Figure 10.—Scattered loblolly pine and native grasses on Udorthents, loamy and clayey. The pond was created by excavating clay for use in making bricks.

many areas of this unit. Careful onsite investigation is needed to determine the suitability and limitations for any proposed use.

No capability subclass or woodland suitability group is assigned.

VaB—Vance sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridges and short breaks to drainageways. Slopes are smooth and convex. Areas range from 10 to 75 acres.

Typically, the surface layer is yellowish brown sandy loam about 4 inches thick. From 4 to 12 inches is strong brown clay mottled with red; from 12 to 29 inches mottled brownish yellow, very pale brown, red, and dark red clay; and from 29 to 37 inches mottled pale yellow, light brownish gray, red, and strong brown clay. From 37 to 43 inches the underlying material is mottled pale yellow, white, yellowish brown, gray, and yellowish red sandy loam; and from 43 to 60 inches it is mottled pale yellow, yellowish brown, and yellowish red, firm saprolite of granite that crushes to loamy sand.

Included in this unit are areas of soils that have a surface layer of sandy clay loam and a few intermingled

areas of Appling, Cataula, Durham, and Helena soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep, but the firm subsoil hinders root penetration.

The suitability is good for row crops and small grain. It is somewhat limited because of the firmness of the subsoil. It is good for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is poor for most urban use. The low strength and high risk of corrosion to concrete and steel are limitations. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The risk of corrosion can be overcome by special design and careful installation. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified somewhat by increasing the size of the field, but it is difficult to modify the field so that it functions properly.

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

VnC2—Vance sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained soil is on short, irregularly shaped slopes adjacent to drainageways. In cultivated areas the surface layer is a mixture of topsoil and subsoil. Slopes are smooth and convex. Areas range from 10 acres to more than 50 acres.

Typically, the surface layer is yellowish brown sandy clay loam about 4 inches thick. From 4 to 12 inches the subsoil is strong brown clay mottled with red; from 12 to 29 inches mottled brownish yellow, very pale brown, red, and dark red clay; and from 29 to 37 inches mottled pale yellow, light brownish gray, red, and strong brown clay. From 37 to 43 inches the underlying material is mottled pale yellow, white, yellowish brown, gray, and yellowish red sandy loam; and from 43 to 60 inches it is mottled pale yellow, yellowish brown, and yellowish red, firm saprolite of granite that crushes to loamy sand.

Included in this unit are areas of soils that have slopes of less than 6 percent or more than 10 percent and a few intermingled areas of Appling, Cataula, Durham, and Helena soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid throughout unless the surface layer has been limed. Permeability is slow, and available water capacity is medium. The soil can be worked within only a narrow range of moisture content. The root zone is deep, but the firm subsoil hinders root penetration.

The suitability is fair for row crops and small grain. The slope and the thin, eroded surface layer are limitations. The suitability is fair for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, terraces, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is poor for most urban use. The low strength, high risk of corrosion to concrete and steel, and slope are limitations. The low strength can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The risk of corrosion can be overcome by special design and careful installation. The slope can be modified by cutting and filling to reduce the gradient or by special design. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified somewhat by increasing the size of the field, but it is difficult to modify the field so that it functions properly.

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

VuB—Vaucluse sand, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is in the southeastern part of Fairfield County. It is on broad, irregularly shaped ridges. Slopes are smooth and convex. Areas are 10 to 50 acres.

Typically, the surface layer is light yellowish brown sand about 4 inches thick. From 4 to 16 inches the subsoil is yellowish brown sandy loam, from 16 to 22 inches yellowish brown sandy clay loam, and from 22 to 28 inches brownish yellow sandy clay loam. From 28 to 50 inches is a dense brittle layer. This layer is strong brown sandy clay loam separated into coarse peds by light gray sandy clay. The underlying material to 70 inches is mottled strong brown, light reddish brown, and light gray sandy clay loam.

Included in this unit are areas of soils that have a solum less than 40 inches thick; soils that do not have a dense brittle layer; soils that have a surface layer more than 20 inches thick; soils that have slopes of less than 2 percent or more than 6 percent; and a few intermingled areas of Blanton, Georgeville, and Herndon soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid in the surface layer and upper part of the subsoil unless the surface layer has been limed. It is strongly acid to extremely acid in

the lower part of the subsoil and in the underlying material. Permeability is moderately slow in the upper part of the subsoil and slow in the brittle layer. Available water capacity is low. The soil can be worked throughout a wide range of moisture content. The root zone is moderately deep to the dense brittle layer that restricts root penetration and water movement.

The suitability is fair for row crops and small grain. The effects of the dense brittle layer on root development and low available water capacity are limitations. The suitability is good to fair for hay and pasture, particularly Coastal bermudagrass. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine. The severe windthrow hazard because of restriction of root development by the dense brittle layer is the only significant limitation.

The suitability is good for most urban use. The high risk of corrosion to concrete is a limitation, but this limitation can be overcome by special design and careful installation. The slow permeability of the dense brittle layer is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the field, or in some cases, by placing the filter line deeper in more permeable material.

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

VuC—Vaucluse sand, 6 to 10 percent slopes. This deep, well drained soil is in the southeastern part of Fairfield County. It is on small to medium irregularly shaped ridgetops and sloping areas adjacent to drainageways. Slopes are smooth and convex. Areas are 8 to 25 acres in size.

Typically, the surface layer is light yellowish brown sand about 4 inches thick. From 4 to 16 inches the subsoil is yellowish brown sandy loam, from 16 to 22 inches yellowish brown sandy clay loam, and from 22 to 28 inches brownish yellow sandy clay loam. From 28 to 50 inches is a dense brittle layer. This layer is strong brown sandy clay loam separated into coarse peds by light gray sandy clay. The underlying material to 70 inches is mottled strong brown, light reddish brown, and light gray sandy clay loam.

Included in this unit are areas of soils that have a solum less than 40 inches thick; soils that do not have a dense brittle layer; soils that have a surface layer more than 20 inches thick; soils that have slopes of less than 6 percent or more than 10 percent; and a few intermingled areas of Blanton, Georgeville, Herndon, and Rion soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid or very strongly acid in the surface layer and upper part of the subsoil unless the surface layer has been limed. It is strongly acid to extremely acid in the lower part of the subsoil and the underlying material. Permeability is moderately slow in the upper part of the subsoil and slow in the brittle layer. Available water capacity is low. The soil can be worked throughout a wide range of moisture content. The root zone is moderately deep to the dense brittle layer that restricts root penetration and water movement.

The suitability is fair for row crops and small grain. The effects of the dense brittle layer on root development, low available water capacity, and slope are limitations. The suitability is good to fair for hay and pasture, particularly Coastal bermudagrass. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, and farming on the contour reduce runoff and help to control erosion.

The suitability is fair for loblolly pine. The severe windthrow hazard because of restriction of root development by the dense brittle layer is the only significant limitation.

The suitability is fair for urban use. The high risk of corrosion to concrete and slope are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by cutting and filling to reduce the gradient or by special design. The slow permeability of the dense brittle layer is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the field or, in some cases, by placing the filter line deeper in more permeable material.

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

WaD—Wateree-Rion complex, 6 to 15 percent slopes. This complex consists of areas of Wateree and Rion soils that are so intricately mixed or so small in size that it was not practical to map them separately. It occupies narrow or broad, sloping or strongly sloping, irregular and convex side slopes. Areas range from 30 to 400 acres. Individual areas of each soil range from one-half acre to 10 acres.

Wateree sandy loam makes up about 45 percent of each mapped area. Typically, the surface layer is brown sandy loam 3 inches thick. The subsoil from 7 to 13 inches is brownish yellow sandy loam. From 13 to 22 inches it is light yellowish brown sandy loam. The underlying material from 22 to 27 inches is mottled yellowish brown, strong brown, yellowish red, and white sandy loam. From 27 to 49 inches it is mottled yellowish brown, red, strong brown, yellowish red, and black firm saprolite that crushes to gravelly sandy loam. Beneath this is white granite rock.

This soil is low in content of organic matter. It is very strongly acid to medium acid in the surface layer and extremely acid to medium acid in the subsoil and underlying material. Permeability is moderately rapid, and available water capacity is low. The soil can be worked throughout a medium range of moisture content. The root zone is moderately deep.

Rion loamy sand makes up about 35 percent of each mapped area. Typically, the surface layer is very dark grayish brown loamy sand about 3 inches thick. The subsurface layer, from 3 to 7 inches, is brown loamy sand. The upper part of the subsoil, from 7 to 17 inches, is brownish yellow sandy loam. The middle part, from 17 to 26 inches, is light yellowish brown sandy clay loam. The lower part, from 26 to 31 inches, is reddish yellow sandy clay loam mottled with very pale brown and light brownish gray. From 31 to 38 inches is white sandy clay loam mottled with brownish yellow and brownish gray. The underlying material, from 38 to 60 inches is mottled white, gray, and brownish yellow sandy loam.

This soil is low in content of organic matter. It is medium acid to very strongly acid except for the surface layer in limed areas. Permeability is moderate, and available water capacity is low to medium. The root zone is deep and is easily penetrated by roots.

Included in this unit are areas of soils that are sandy throughout; areas where cobblestones or boulders are on the surface and throughout the solum; soils south of Winnsboro that are silty throughout the solum; a few intermingled areas of Appling, Cecil, Durham, Pacolet, and Wilkes soils; and a few areas where slopes are less than 6 percent or more than 15 percent. The included areas make up about 20 percent of this unit.

The suitability is poor for row crops and small grain because of the slope and droughtiness of the Wateree soil. Erosion is a severe hazard. The suitability is fair for hay and pasture. Continued use of cover crops, especially permanent pasture and legumes, reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

The suitability is fair for most urban use. Slope is the major limitation. The slope can be overcome by cutting and filling to reduce the gradient or by special design. Depth to rock and slope are moderate limitations on the Wateree soil. Slope is a moderate limitation for septic tank absorption fields on the Rion soil. Depth to rock can be overcome by special layout or by increasing the size of the absorption field. Slope can be modified by cutting and filling to reduce the gradient.

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

WaF—Wateree-Rion complex, 15 to 40 percent slopes. This map unit is on narrow to broad, long, moderately steep to steep side slopes. Slopes are irregular and convex. The unit consists of areas of soils that are so intricately mixed or so small in size that it was not practical to map them separately. Areas range from 30 to 200 acres. Individual areas of each soil range from one-half acre to 10 acres.

Wateree sandy loam makes up about 45 percent of each unit. Typically, the surface layer is brown and is 3 inches thick. From 3 to 13 inches the subsoil is brownish yellow sandy loam, and from 13 to 22 inches it is light yellowish brown sandy loam. From 22 to 27 inches the underlying material is mottled yellowish brown, strong brown, yellowish red, and white sandy loam; and from 22 to 49 inches it is mottled yellowish brown, brown, red, strong brown, yellowish red, and black firm saprolite that crushes to gravelly sandy loam. Beneath this is white granite rock (fig. 11).

This soil is low in content of organic matter. It is very strongly acid to medium acid in the surface layer and extremely acid to medium acid in the subsoil and underlying material. Permeability is moderately rapid, and available water capacity is low. The root zone is moderately deep.

Rion loamy sand makes up about 35 percent of each unit. Typically, the surface layer is very dark grayish brown and is about 3 inches thick. The subsurface layer is brown loamy sand. From 7 to 17 inches the subsoil is brownish yellow sandy loam, from 17 to 26 inches light yellowish brown sandy clay loam, from 26 to 31 inches reddish yellow sandy clay loam mottled with very pale brown and light brownish gray, and from 31 to 38 inches white sandy clay loam mottled with brownish yellow and brownish gray. The underlying material to 60 inches is mottled white, gray, and brownish yellow sandy loam.

This soil is low in content of organic matter. It is medium acid to very strongly acid throughout. Permeability is moderate, and available water capacity is low to medium. The root zone is deep and is easily penetrated.

Included in this unit are areas of soils that are sandy throughout; areas where cobblestones or boulders are on the surface and throughout the solum; soils south of Winnsboro that are silty throughout the solum; a few intermingled areas of Wilkes and Pacolet soils; and a few small areas where slopes are less than 15 percent. The included areas make up about 20 percent of this unit.

The suitability is poor for row crops, small grain, pasture, and hay because of the steepness of slope. Erosion is a severe hazard.

The suitability is fair for loblolly pine and yellow-poplar. Equipment limitations, erosion hazard, and seedling mortality are moderate.

The suitability is poor for most urban use. The steepness of slope is a severe limitation. The slope can be modified by special design and careful installation. The steepness of slope is a severe limitation for septic tank absorption fields. This limitation can be modified by proper layout of the filter field, but it is difficult to overcome.

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

WkD—Wilkes sandy loam, 6 to 15 percent slopes. This moderately deep, well drained, sloping to strongly sloping soil is on narrow ridges and side slopes. Slopes are irregular and convex. Areas range from 15 to 150 acres.

Figure 11.—Profile of Wateree sandy loam. Bedrock is at a depth of about 50 inches.

Typically, the surface layer is pale brown sandy loam about 7 inches thick. From 7 to 10 inches the subsoil is mottled yellowish red and yellowish brown clay, from 10 to 13 inches yellowish brown sandy clay, and from 13 to 19 inches is yellowish brown sandy clay loam. From 19 to 23 inches the underlying material is mottled yellowish brown, white, and black sandy loam; and from 23 to 51 inches it is light gray and black, firm saprolite that crushes to sandy loam. This material is underlain by black and white hard rock.

Included in this unit are a few intermingled areas of Cataula, Cecil, Madison, Mecklenburg, Pacolet, Rion, Vance, Wateree, and Winnsboro soils and soils that have a loamy subsoil. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is moderately slow, and available water capacity is low. The soil can be worked throughout a medium range of moisture content. The root zone is moderately deep.

The suitability is poor for row crops and small grain. The slope and depth of the root zone are limitations. The suitability is fair for hay and pasture. Erosion is a severe hazard, and cultivated crops are poorly suited. Continued use of cover crops, especially permanent pasture and legumes, reduces runoff and helps to control erosion.

The suitability is fair for loblolly pine, post oak, south-

ern red oak, and sweetgum. There are no significant limitations in woodland use and management.

The suitability is poor for most urban use. Steepness of slope, depth to rock, and moderate shrink-swell potential are limitations. The slope can be modified by cutting and filling or by special design. The shrink-swell potential can be overcome by excavating and filling with more desirable material or by special design. The depth to rock can be overcome only by ripping or blasting the bedrock or by using designs that do not go to the bedrock. The depth to rock is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the field or by other modifications in the filter field.

The capability subclass is VIe. The woodland suitability group is 4o.

WkF—Wilkes sandy loam, 15 to 40 percent slopes. This moderately deep, well drained, moderately steep to steep soil is on broad, long side slopes. Slopes are irregular and convex. Areas range from 20 to 200 acres.

Typically, the surface layer is pale brown sandy loam about 7 inches thick. From 7 to 10 inches the subsoil is mottled yellowish red and yellowish brown clay, from 10 to 13 inches yellowish brown clay loam, and from 13 to 19 inches yellowish brown sandy clay loam. From 19 to 23 inches the underlying material is mottled yellowish brown, white, and black sandy loam; and from 23 to 51 inches it is light gray and black, firm saprolite that crushes to sandy loam. This material is underlain by black and white hard rock.

Included in this unit are a few intermingled areas of Cataula, Cecil, Mecklenburg, Pacolet, Rion, Vance, Wateree, and Winnsboro soils; soils that have a loamy subsoil; soils that have slopes of less than 15 percent; and a few areas of eroded knolls that have a surface layer of sandy clay loam. The included areas make up about 25 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is moderately slow, and available water capacity is low. The root zone is moderately deep.

Because of the steepness of slope, row crops, small grain, pasture, and hay are poorly suited to this soil. Erosion is a severe hazard.

The suitabilty is fair for loblolly pine, post oak, southern red oak, and sweetgum. The erosion hazard and equipment limitations are moderate.

The suitability is poor for most urban use. The steepness of slope, depth to rock, and moderate shrink-swell potential are severe limitations. The slope can be modified by cutting and filling or by special design. The shrink-swell potential can be overcome by excavating and filling with more desirable material or by special design. The depth to rock can be overcome only by ripping or blasting the bedrock or by using designs that do not go to the bedrock. The depth to rock and the slope are severe limitations for septic tank absorption fields. These limitations can be modified by increasing the size of the field, by proper layout of the field, or by other modifications in the field.

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

WnB—Winnsboro sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on medium, irregularly shaped ridgetops (fig. 12). Slopes are smooth and convex. Areas range from 10 to 200 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsurface layer is light olive brown sandy loam. From 9 to 20 inches the subsoil is yellowish brown mottled with black; from 20 to 38 inches it is mottled yellowish brown, strong brown, brownish yellow, dark greenish gray, olive gray, and black loam. From 38 to 51 inches the underlying material is mottled dark greenish gray, white, and black sandy loam; and from 51 to 65 inches it is dark greenish gray and white weathered rock that crushes to sandy loam.

Included in this unit are areas of soils that have a surface layer of sandy clay loam; a few intermingled areas of Cataula, Cecil, Helena, Iredell, Mecklenburg, and Wilkes soils; areas where slopes are less than 2 percent; and a few areas with boulders and cobblestones. Also included in the southern part of Fairfield County are areas of Georgeville and Herndon soils. The included areas make up about 15 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is slow, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is fairly easily penetrated by plant roots. The shrink-swell potential is high.

The suitability is good for row crops and small grain and for hay and pasture. Erosion is a moderate hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and eastern redcedar. There are no significant limitations in woodland use and management.

The suitability is poor for urban use. The low strength, high shrink-swell potential, and high risk of corrosion to steel are limitations. The risk of corrosion can be overcome by special design and careful installation. The low strength and high shrink-swell potential can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified by in-

Figure 12.—Landscape of Winnsboro and Iredell soils.

creasing the size of the field or by other modifications in the field.

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

WnC—Winnsboro sandy loam, 6 to 10 percent slopes. This deep, well drained soil is on irregularly shaped narrow ridges and on side slopes adjacent to small streams. Slopes are smooth and convex. Areas range from 10 to 100 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsurface layer is light olive brown sandy loam. From 9 to 20 inches the subsoil is yellowish brown clay mottled with black; and from 20 to 38 inches it is mottled yellowish brown, strong brown, brownish yellow, dark greenish gray, olive gray, and black loam. From 38 to 51 inches the underlying material is mottled dark greenish gray, white, and black sandy loam; and from 51 to 65 inches it is dark greenish gray and white weathered rock that crushes to sandy loam.

Included in this unit are areas of soils that have a surface layer of sandy clay loam; a few intermingled areas of Cataula, Cecil, Mecklenburg, and Wilkes soils; soils that have slopes of less than 6 percent or more than 10 percent; and a few areas with boulders and cobblestones. Also included in the southern part of Fairfield County are areas of Georgeville and Herndon soils. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is slow, and available water capacity is medium. The soil can be worked throughout a medium range of moisture content. The root zone is deep and is fairly easily penetrated by plant roots. The shrink-swell potential is high.

The suitability is good to fair for row crops and small grain. The slope is a limitation. The suitability is good for hay and pasture. Erosion is a severe hazard in cultivated areas. Minimum tillage, cover crops, including grasses and legumes, stripcropping, farming on the contour, and terraces reduce runoff and help to control erosion.

The suitability is fair for loblolly pine and eastern redcedar. There are no significant limitations in woodland use or management.

The suitability is poor for urban use. The slope, low strength, high shrink-swell potential (fig. 13), and high risk of corrosion to steel are limitations. The risk of corrosion can be overcome by special design and careful installation. The slope can be overcome by cutting and filling to reduce the gradient or by special design. The low strength and high shrink-swell potential can be overcome by excavating and filling with more desirable material or by special reinforced foundations. The slow permeability of the clayey subsoil is a severe limitation for septic tank absorption fields. This limitation can be modified by increasing the size of the field or by other modifications in the field.

The capability subclass is IIIe. The woodland suitability group is 4o.

WnE—Winnsboro sandy loam, 10 to 25 percent slopes. This deep, well drained, strongly sloping to steep soil is adjacent to streams or narrow ridges. Slopes are irregular and convex. Areas are from 10 to 75 acres in size.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The subsurface layer is light olive brown sandy loam. From 9 to 20 inches the subsoil is yellowish brown clay mottled with black; and from 20 to 38 inches it is mottled yellowish brown, strong brown, brownish yellow, dark greenish gray, olive gray, and black loam. From 38 to 51 inches the underlying material is mottled dark greenish gray, white, and black sandy loam, and from 51 to 65 inches it is dark greenish gray and white weathered rock that crushes to sandy loam.

Included in this unit are areas of soils that have a surface layer of sandy clay loam; a few intermingled areas of Cecil, Mecklenburg, Pacolet, and Wilkes soils; soils that have slopes of less than 10 percent or more than 25 percent; a few areas that have narrow, moderately deep gullies; and a few areas with boulders and cobblestones. The included areas make up about 20 percent of this unit.

This soil is low in content of organic matter. It is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil and underlying material. Permeability is slow, and available water capacity is medium. The root zone is deep and is fairly easily penetrated by plant roots. The shrink-swell potential is high.

The suitability is poor for row crops, small grain, hay, and pasture because of the slope. Erosion is a severe hazard.

The suitability is fair for loblolly pine and eastern redcedar. The erosion hazard and equipment limitations are moderate.

Figure 13.—Shrinking and swelling in clay subsoil of Winnsboro sandy loam, 6 to 10 percent slopes.

The suitability is poor for urban use. The steepness of slope is a severe limitation, and the low strength, high shrink-swell potential, and high risk of corrosion to steel are other limitations. The slope can be modified by cutting and filling to reduce the gradient or by special design. The low strength and high shrink-swell potential can be overcome by excavating and filling with more

desirable material or by special reinforced foundations. The risk of corrosion can be overcome by special design and careful installation. The slope and the slow permeability of the clayey subsoil are severe limitations for septic tank absorption fields. These limitations can be modified by increasing the size of the field and by special design or layout, but it is difficult to modify the field so that it functions properly.

The capability subclass is VIe. The woodland suitability group is 4r.

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 sand and gravel, 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

Charles A. Holden, Jr., agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils 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 "Soils maps for detailed planning." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

More than 146,000 acres in the survey area was used for crops and pasture in 1967, according to the Conservation Needs Inventory (*8*). Of this total, 74,000 acres was used for permanent pasture; 12,000 acres for row crops, mainly cotton and soybeans; 6,000 acres for close growing crops, mainly wheat and oats; and 17,000 acres, for rotation hay and pasture. The rest was idle cropland.

The soils in Chester and Fairfield Counties have good potential for increased food production. About 167,000 acres of potentially good cropland is currently used as woodland, and about 53,000 acres is pasture. In addition to using the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the survey area. This soil survey can help facilitate the application of such technology.

The acreage in crops and pasture has gradually been decreasing as more and more land is used for urban development. In 1967, about 15,550 acres in Chester County and 13,000 acres in Fairfield County was urban and built-up land. This acreage has been increasing at the rate of about 500 acres per year. The use of this soil survey to help make land use decisions that will influence the future role of farming in the survey area is discussed in the section "General soil map for broad land use planning."

Erosion is a major concern on about 90 percent of Chester and Fairfield Counties. It is a hazard on about 95 percent of the cropland and pasture. Erosion commonly occurs if the field lacks a plant cover, the soil is disturbed, or the slope is more than 2 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Mecklenburg, Cecil, Winnsboro, and Madison soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone, for example, a dense brittle layer, as in Cataula and Vaucluse soils, or bedrock, as in Wateree and Wilkes soils. Second, erosion on farmland results in water pollution by sedimentation of streams. Erosion control minimizes the amount of sediment flowing into streams and improves the quality of water for municipal use, recreation, and fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey spots because erosion has

removed the original friable surface layer. Clayey spots are common in areas of the eroded Cataula, Cecil, Hiwassee, Mecklenburg, and Vance soils.

Erosion control measures provide a protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps a plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soil. On livestock farms, which require pasture and hay, the legumes and grass forage crops in the cropping system reduce the risk of erosion on sloping land and may provide nitrogen for the following crop.

Slopes are so short and irregular that contour tillage or terracing is not practical in most areas of the sloping Appling, Cataula, Cecil, Georgeville, Herndon, Madison, Mecklenburg, Vance, and Winnsboro soils. To control erosion on these soils, a cropping system that provides substantial vegetation is needed, unless tillage is kept to a minimum. Minimizing tillage and leaving crop residue on the surface help increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but they are more difficult to use successfully in eroded areas, where the surface layer is a sandy clay loam, for example. No tillage for corn, which is increasing in acreage, is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area. It is more difficult to practice successfully, however, on the soils that have a sandy clay loam surface layer.

Terraces and diversions reduce the length of slope and the risk of runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Suitable for terraces are the gently sloping Appling, Cataula, Durham, Georgeville, Helena, Herndon, and Hiwassee soils; some of the gently sloping Madison and Mecklenburg soils; and most areas of the gently sloping Cecil soils. The other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the terrace channels, a clayey subsoil that would be exposed in terrace channels, or bedrock within a depth of 40 inches.

Contouring and contour stripcropping are also used to control erosion. They are best adapted to soils that have smooth uniform slopes, including most areas of the gently sloping and sloping Appling and Georgeville soils, but they can also be used on irregular slopes.

Soil blowing is a hazard on the sandy Blanton, Molena Variant, and Vaucluse soils. Blowing can damage these soils in a few hours if the wind is strong and the soils are dry and bare of vegetation or surface mulch. Maintaining a plant cover, surface mulch, or rough surface through proper tillage minimizes the risk of blowing on these soils.

Information on the design of erosion practices for each kind of soil is available at local offices of the Soil Conservation Service.

Drainage is the major management need on about 10 percent of the acreage used for crops and pasture. The poorly drained Armenia soils, about 2,100 acres, are too wet for crops commonly grown in the area.

Unless artificially drained, the somewhat poorly drained Chewacla soils are so wet that crops are usually damaged. Armenia, Chewacla, and Toccoa soils are subject to flooding and are difficult to drain. The best water management devices for these areas are watershed control structures that control the amount of water flowing down the flood plain.

Helena, Iredell, Vance, Mecklenburg, and Winnsboro soils have good natural drainage most of the year, but they tend to dry out slowly after rains. Helena soils have a high water table during wet periods because of lateral seepage from soils in higher positions on the landscape. Artificial drainage is needed in some of the wetter areas.

The design of both surface and subsurface drainage systems varies with the kind of soils. A combination of surface drainage and tile drainage is needed in most areas of the poorly drained soils used for intensive row cropping. Drains have to be more closely spaced in slowly permeable soils than in more permeable soils. Tile drainage is very slow in Armenia and Iredell soils. Finding adequate outlets for tile drainage is difficult in many areas of Armenia and Chewacla soils.

Fertility is naturally low in most soils on uplands. All but Armenia and Iredell soils are naturally acid. Soils on flood plains, such as Chewacla and Toccoa soils, are very strongly acid to slightly acid and are naturally higher in plant nutrients than most soils on uplands. Winnsboro and Mecklenburg soils are medium acid to mildly alkaline.

Many soils on uplands are very strongly acid in their natural state and require regular applications of ground limestone to raise the pH level sufficiently for good growth of most crops. The available phosphorus and potash levels are naturally low in most of these soils. On all soils the additions of lime and fertilizer should be based on the results of soil tests, on the need of the crops, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime needed.

Tilth is generally good in most soils of the survey area, and they can be worked throughout a medium to wide range of moisture content. Iredell soils, however, can be worked within only a narrow range of moisture content. Most soils used for crops have a surface layer of sandy loam that is light colored and low in content of organic matter.

Fall plowing is generally not a good practice because about 90 percent of the cropland consists of gently sloping or sloping soils that are subject to severe erosion if plowed in fall. An exception is Iredell soils. They commonly stay wet until late in spring and require less preparation for planting if they are plowed in fall.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn, cotton, soybeans, and grain sorghum are the principal row crops. Wheat, oats, rye, and barley are

the common close growing crops. Arrowleaf clover, sericea lespedeza, and tall fescue are grown to produce pasture, seed, and hay. But bermudagrass, dallisgrass, and white clover are the plants used only for permanent pasture.

Special crops grown commercially are vegetables, small fruits, tree fruits, and nursery plants. A small acreage is used for melons, stringbeans, lima beans, peas, sweet corn, tomatoes, and other vegetables and small fruits. In addition, large areas can be adapted to special crops such as grapes and many vegetables. Peaches are the most important tree fruit, and pecans the most important nut crop in the survey area.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. These are the Appling, Cecil, Durham, Georgeville, Herndon, Hiwassee, and Madison soils that have slopes of less than 6 percent. Crops can generally be planted and harvested earlier on all of these soils than on other soils in the survey area.

Most of the well drained soils are suitable for orchards and nursery plants. Soils in low positions where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards.

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

In general, the soils in the survey area that are well suited to crops are also well suited to urban development. Data on specific soils in this soil survey can be used in planning future land use. The potential productive capacity in farming should be weighed against soil limitations or suitability for nonfarm development.

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 woodland and for engineering purposes.

In the capability system, soils are generally grouped at two levels: capability class and subclass. 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.

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.

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.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Soil maps for detailed planning."

Woodland management and productivity

Norman W. Runge, forester, Soil Conservation Service, helped prepare this section.

About 66 percent of Chester County and 80 percent of Fairfield County was woodland in 1967, according to the Conservation Needs Inventory (*8*). Needleleaf species, predominantly loblolly pine, shortleaf pine, and eastern redcedar, are prevalent on uplands. Broadleaf species are generally dominant on flood plains along rivers and creeks, but there are many wooded areas that are predominantly hardwoods, mainly oak and hickory, in the uplands.

Wood products are highly important to the economy in both counties. Chester and Fairfield Counties are among the leading pulpwood-producing counties in South Carolina. Potential production is even greater than the actual production. In addition to wood products, the woodland provides recreation areas, habitat for many different types of wildlife, and natural beauty. The woodland also conserves soil and water.

Table 7 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 woodland suitability group for each soil. Soils assigned the same suitability group require the same general management and have about the same potential productivity.

The first part of the *suitability group*, 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 group, a letter, indicates the major, if any, 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.

In table 7, *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.

The *potential productivity* of merchantable or *common index* 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 calculated at age 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years 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.

Recreation

The soils of the survey area are rated in table 8 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 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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

James W. Preacher, biologist, Soil Conservation Service, helped prepare this section.

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 9, 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 established, 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, sorghum, millet, and soybeans.

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 tall fescue, lovegrass, sericea lespedeza, bicolor lespedeza, annual lespedeza, and clover.

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 croton, beggarweed, and partridge pea.

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, dogwood, and hickory.

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, cedar, and introduced ornamentals.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are hawthorn, sassafrass, blackberry, and grape. Examples that are commercially available and suitable for planting on soils rated good are autumn-olive, crabapple, beauty berry, and pyracantha.

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, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, rushes, sedges, and cutgrass.

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 waterfowl feeding areas, wildlife, watering developments, and beaver ponds.

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.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas.

Engineering

Howard E. Morrison, engineer, Soil Conservation Service, helped prepare this section.

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 and test 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 (*7*), 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 gravel, sand, 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 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. 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, a cemented pan, 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, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, 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 or to a cemented pan, 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.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary facilities

Table 11 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 11 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 or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan 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 11 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 or to a cemented pan, 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, bedrock, and cemented pans 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 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium 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; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, 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 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair, poor* or *unsuited* as a source of roadfill, topsoil, 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 properties and classifications 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 used in great quantities in many kinds of construction. The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The 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 properties and classifications.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that contains 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 sandy soils, 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, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, 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 13 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 for 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 com-

paction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. 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, to a cemented pan, or to other 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; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. 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 to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, 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 or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or 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 or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, 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. These results are reported in table 17.

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 properties and classifications

Table 14 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 morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in 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.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

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.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and chemical properties

Table 15 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. *Very high*, greater than 9 percent, is sometimes used.

Soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding.

Table 16 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 possi-

ble 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. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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 excavations.

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.

Engineering test data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and morphology." The soil samples were tested by the South Carolina State Highway Department, Research and Materials Laboratory.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) (*1*) or the American Society for Testing and Materials (ASTM) (*2*).

The tests and methods are: AASHTO classification (M-145-66); Unified classification (D-2487-66T); mechanical analysis (T88-57); Liquid limit (T89-60); plasticity index (T90-56).

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*10*). 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 18, 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 morphology

In this section, each soil series recognized in the survey area is described.

The characteristics of the entire soil, the dominant texture of the control section, and the material in which the soil 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 (*9*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*10*). 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 "Soil maps for detailed planning."

Appling series

The Appling series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from granite and gneiss. These gently sloping to sloping soils are on broad irregularly shaped ridges of the Piedmont Upland. Slopes range from 2 to 10 percent.

Appling soils are geographically associated with Cecil, Durham, Herndon, Rion, Vance, and Wateree soils. Cecil soils have hue redder than 5YR in the B2t horizon. Durham soils have a fine-loamy control section. Herndon soils have a control section that is more than 30 percent silt. Vance soils have mixed mineralogy. Rion and Wateree soils are on steeper side slopes and have a thinner solum. In addition, Rion soils have a fine-loamy control section, and Wateree soils do not have a Bt horizon.

Typical pedon of Appling loamy sand, 2 to 6 percent slopes, 13 miles northeast of Winnsboro in Fairfield County, 2,300 feet northeast of junction of State Highways 55 and 200, 100 feet south of State Highway 200, 75 feet west of cemetery:

Ap—0 to 8 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; common fine roots; few fine pores; strongly acid; abrupt smooth boundary.

B21t—8 to 20 inches; strong brown (7.5YR 5/8) clay loam; moderate coarse subangular blocky structure; firm; thin patchy faint clay films on faces of peds; few fine and medium roots; common fine pores; very strongly acid; clear wavy boundary.

B22t—20 to 34 inches; strong brown (7.5YR 5/8) clay loam; few coarse faint reddish yellow (7.5YR 6/8) mottles; moderate coarse subangular blocky structure; firm; thin patchy faint clay films on faces of peds; few fine pores; very strongly acid; clear wavy boundary.

B23t—34 to 42 inches; mottled strong brown (7.5YR 5/8), yellow (10YR 8/6), yellowish red (5YR 5/8), and brownish yellow (10YR 6/8) clay loam; weak thick platy structure; friable; thin patchy faint clay films on faces of peds; common fine pores; very strongly acid; gradual wavy boundary.

B3—42 to 60 inches; mottled yellowish red (5YR 5/8), very pale brown (10YR 8/3), and reddish yellow (7.5YR 6/6) sandy clay loam; weak thick platy structure; thin patchy faint clay films on faces of peds; common fine pores; very strongly acid; gradual wavy boundary.

C—60 to 70 inches; mottled reddish yellow (7.5YR 6/8), yellow (10YR 8/6), and white (10YR 8/2) sandy

loam; massive; contains original rock structure; friable; few fine roots; very strongly acid.

Solum thickness ranges from 40 to 60 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A1 or Ap horizon commonly is 4 to 8 inches thick but ranges to as much as 18 inches. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. It commonly is loamy sand but ranges to sandy loam. Some pedons have a thin A2 horizon of higher value than the Ap or A1 horizon.

Some pedons have a B1 horizon. This horizon is as much as 8 inches thick. It has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have a few fine pebbles of quartz.

The B2t horizon is 20 to 54 inches thick. It has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam, sandy clay, or clay. Most pedons have few to common red and yellowish brown mottles that increase in number with increasing depth. Flakes of mica range from none to few.

The B3 horizon is as much as 18 inches thick. It is mottled in shades of strong brown, very pale brown, light yellowish brown, red, reddish yellow, yellow, strong brown, or brownish yellow. It is sandy clay loam or sandy loam. Flakes of mica range from none to common.

The C horizon is 3 to more than 20 inches thick. It is mottled in shades of yellow, reddish yellow, brownish yellow, red, reddish brown, or white. It is sandy loam or sandy clay loam.

Armenia series

The Armenia series consists of poorly drained, slowly permeable clayey soils that formed in material weathered from gabbro, hornblende schist, hornblende gneiss, and other basic rocks commonly overlain by a layer of loamy alluvium. These nearly level soils are on small or medium flood plains of the Piedmont Upland. Slopes range from 0 to 1 percent.

Armenia soils are geographically associated with Chewacla, Iredell, Mecklenburg, and Winnsboro soils. Chewacla, Mecklenburg, and Winnsboro soils have mixed mineralogy. In addition, Mecklenburg and Winnsboro soils are on gently sloping to sloping uplands and do not have colors with chroma of 2 or less. Chewacla soils are less than 35 percent clay in the control section and do not have an argillic horizon. Iredell soils have matrix colors in the Bt horizon with chroma of more than 2.

Typical pedon of Armenia loam, 0 to 1 percent slopes, 8.2 miles northeast of Chester in Chester County, on State Highway 191, 1,050 feet west of junction of State Highways 191 and 323, 100 feet north of road, 25 feet east of drainageway:

Ap1—0 to 2 inches; dark brown (10YR 3/3) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine and medium roots; many fine pores; few black concretions; neutral; abrupt smooth boundary.

Ap2—2 to 7 inches; dark grayish brown (2.5YR 4/2) loam, grayish brown (10YR 5/2) dry; few fine faint dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure parting to moderate medium granular; friable; common fine and medium roots; many fine pores; few black concretions; neutral; clear wavy boundary.

B11—7 to 16 inches; very dark gray (10YR 3/1) sandy clay loam, dark gray (10YR 4/1) dry; weak coarse subangular blocky structure; slightly sticky, slightly plastic; common fine roots; common fine and medium pores; few fine and medium black concretions; neutral; clear wavy boundary.

B12—16 to 20 inches; very dark grayish brown (2.5YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate coarse subangular blocky structure; sticky, plastic; thin continuous distinct clay films in pores; few fine roots; common very fine pores; few fine and medium black concretions; neutral; clear wavy boundary.

B21t—20 to 29 inches; very dark gray (N 3/0) clay, gray (10YR 5/1) dry; common fine distinct olive brown (2.5Y 4/4) mottles; moderate coarse subangular blocky structure; sticky, very plastic; thin continuous distinct clay films in pores; few fine roots; few fine pores; few fine and medium black concretions; few fine pebbles of feldspar; mildly alkaline; gradual wavy boundary.

B22tcn—29 to 48 inches; dark gray (N 4/0) clay loam; few fine faint olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; sticky, very plastic; thin patchy faint clay films in pores; few fine roots; few very fine and fine pores; common fine and medium black concretions; few fine pebbles of feldspar; mildly alkaline; gradual wavy boundary.

B3cn—48 to 67 inches; mottled gray (5Y 5/1), light olive brown (2.5Y 5/6), light gray (10YR 7/2), and strong brown (7.5YR 5/8) sandy clay loam; massive; sticky, plastic; pockets of clay and coarse sandy clay loam; thin patchy faint clay films in pores; few very fine pores; many fine and medium black concretions; few fine pebbles of quartz and feldspar; neutral; clear wavy boundary.

C—67 to 80 inches; mottled gray (5Y 5/1), strong brown (7.5YR 5/8), light gray (10YR 7/2), and reddish brown (5YR 4/3) sandy loam; massive; friable; common fine pebbles of feldspar; few fine and medium pebbles of quartz; slightly acid.

Solum thickness is more than 40 inches. There are few to common, fine to medium dark concretions throughout the pedon. In some pedons, the Bt and C horizons have few to common pebbles of feldspar and

quartz. Reaction is medium acid to neutral in the A horizon and slightly acid to mildly alkaline in the B and C horizons.

The A horizon commonly is 6 to 11 inches thick but ranges to as much as 16 inches. It has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3.

The B1 horizon is as much as 13 inches thick. It has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. It is sandy loam, sandy clay loam, loam, or clay loam.

The B2t horizon is 19 to 36 inches thick. It is either neutral or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. This horizon has few to common mottles in shades of yellow, brown, or olive. It is clay or clay loam.

The B3 horizon is as much as 19 inches thick. It is mottled in hue of 10YR to 5Y, value of 3 to 8, and chroma of 1 to 6. It is sandy clay loam or clay loam.

The C horizon is mottled in shades of gray, yellow, brown, and white. It is sandy loam or sandy clay loam.

Blanton series

The Blanton series consists of deep, moderately well drained, moderately permeable loamy soils that formed in marine sediment. These gently sloping soils are on broad irregularly shaped ridges of the Sand Hills. Slopes range from 2 to 6 percent.

Blanton soils are geographically associated with Georgeville, Herndon, Rion, and Vaucluse soils. These soils are only in the southeastern part of Fairfield County, where the Sand Hills and Piedmont join. Georgeville and Herndon soils have a clayey control section. Rion soils are on steeper side slopes and have a solum that is less than 40 inches thick. Vaucluse soils have a fine-loamy control section and a dense brittle layer. All these associated soils have an A horizon that is less than 20 inches thick.

Typical pedon of Blanton sand, 2 to 6 percent slopes, 14.3 miles southeast of Winnsboro in Fairfield County, 0.7 mile northeast of junction of State Highways 34 and 67; 1,300 feet west of junction of State Highways 67 and 151, 250 feet north of State Highway 67:

Ap—0 to 5 inches; light yellowish brown (10YR 6/4) sand, weak fine granular structure; loose; few fine and medium roots; strongly acid; clear smooth boundary.

A21—5 to 38 inches; very pale brown (10YR 7/4) sand; few fine faint yellowish brown mottles; weak fine granular structure; loose; 30 percent of sand grains uncoated; medium acid; gradual smooth boundary.

A22—38 to 52 inches; very pale brown (10YR 7/4) sand; few medium distinct yellowish brown (10YR 5/8) mottles; single grained; loose; few coarse sand grains; 40 percent of sand grains uncoated; medium acid; gradual smooth boundary.

B1—52 to 63 inches; brownish yellow (10YR 6/8) loamy sand; weak fine granular structure; very friable; medium acid; gradual smooth boundary.

B21t—63 to 68 inches; strong brown (7.5YR 5/8) sandy loam; few medium faint gray (10YR 6/1) mottles; weak medium subangular blocky structure; thin patchy faint clay films on faces of peds and in pores; few very fine pores; friable; strongly acid; gradual smooth boundary.

B22t—68 to 80 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium faint gray (10YR 6/1) mottles and few medium distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; thin patchy faint clay films on faces of peds and in pores; few very fine pores; very strongly acid.

Solum thickness is more than 80 inches. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

The A1 horizon is as much as 4 inches thick, and the Ap horizon is 4 to 7 inches thick. These horizons have hue of 10YR, value of 4 to 6, and chroma of 2 to 4.

The A2 horizon is 33 to 72 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 3 to 6. It is sand or loamy sand. Some pedons have a few mottles of light yellowish brown or yellowish brown.

Most pedons have a B1 horizon. This horizon is as much as 20 inches thick. It has hue of 10YR, value of 6 or 7, and chroma of 3 to 8. It is loamy sand or sandy loam. Some pedons have a few mottles of light gray or strong brown.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. It is sandy loam or sandy clay loam. Most pedons have few to common light gray, strong brown, red, or reddish yellow mottles throughout.

Cataula series

The Cataula series consists of deep, well drained, slowly permeable clayey soils that formed in material weathered from gneiss, schist, or granite. These gently sloping to sloping soils are on broad and medium irregularly shaped ridges of the Piedmont Upland. They have a dense brittle layer (fig. 14) that restricts root penetration and water movement. Slopes range from 2 to 10 percent.

Cataula soils are geographically associated with Appling, Cecil, Hiwassee, Madison, Pacolet, Wilkes, and Winnsboro soils. None of these soils have the dense brittle layer that is typical of Cataula soils. Cecil soils do not have prominently mottled horizons. Pacolet and Wilkes soils are on steeper side slopes. Winnsboro and Pacolet soils have a solum that is less than 40 inches thick. Wilkes soils have a solum that is less than 20 inches thick. Madison soils contain many mica flakes.

Figure 14.—Restrictive dense brittle layer from 31 to 51 inches in profile of Cataula sandy loam, 2 to 6 percent slopes.

Hiwassee soils have value of less than 4 throughout the solum.

Typical pedon of Cataula sandy loam, 2 to 6 percent slopes, 7.6 miles northwest of Winnsboro in Fairfield County, 550 feet south of junction of State Highways 34 and 365, 30 feet east of State Highway 365:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

B1—7 to 12 inches; strong brown (7.5YR 5/6) sandy loam; weak medium granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21t—12 to 22 inches; yellowish red (5YR 5/6) sandy clay; common fine distinct red (2.5YR 5/6) mottles and few fine faint strong brown (7.5YR 5/6) mottles; weak medium angular blocky structure; friable; continuous distinct clay films on faces of peds; few fine roots; common fine pores; few fine pebbles of feldspar; medium acid; gradual smooth boundary.

B22t—22 to 31 inches; reddish yellow (7.5YR 6/6) sandy clay; common medium prominent red (2.5YR 5/6) mottles and common medium distinct yellow (10YR 7/6) mottles; moderate medium angular blocky structure; friable; continuous distinct clay films on faces of peds; few fine roots; few medium pores; few fine pebbles of feldspar; medium acid; clear smooth boundary.

Bx1—31 to 39 inches; dark red (2.5YR 3/6) sandy clay loam layers about 1 centimeter thick separated by very pale brown (10YR 7/3) clay layers about 0.5 to 1 centimeter thick; common medium distinct strong brown (7.5YR 5/6) mottles in the very pale brown layers; moderate thick platy structure parting to weak fine angular blocky; the dark red layers are brittle, the very pale brown layers are firm; few fine roots; common fine and few medium pores; few fine pebbles of feldspar; medium acid; gradual smooth boundary.

Bx2—39 to 51 inches; dark red (2.5YR 3/6) sandy clay loam layers about 2 centimeters thick separated by light brownish gray (10YR 6/2) clay layers about 1 centimeter thick; common medium distinct yellow (10YR 7/8) mottles and few fine distinct yellowish red (5YR 5/6) mottles in the light brownish gray layers; moderate thick platy structure parting to weak fine angular blocky; the dark red layers are brittle, the light brownish gray layers are firm; common fine and few medium pores; few fine pebbles of feldspar; medium acid; gradual smooth boundary.

B31—51 to 58 inches; red (2.5YR 4/8) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles and few fine distinct pale yellow (2.5Y 8/4) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; common fine pebbles of feldspar; medium acid; gradual smooth boundary.

B32—58 to 71 inches; finely mottled yellowish red (5YR 5/6), pale yellow (2.5Y 8/4), and pale brown (10YR 6/3) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; common fine pebbles of feldspar; strongly acid.

C—71 to 85 inches; yellow (10YR 8/6) sandy loam; few fine distinct yellowish red (5YR 5/6) mottles; massive; friable; common fine flakes of mica; common fine and medium pebbles of feldspar; few fine pebbles of quartz; strongly acid.

Solum thickness ranges from 41 to 80 inches. Depth to the dense brittle layer ranges from 16 to 40 inches. Reaction is medium acid to very strongly acid unless the surface layer has been limed.

The A horizon commonly is 4 to 8 inches thick but ranges to as much as 12 inches. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 or 6. It typically is sandy loam but ranges to sandy clay loam in eroded areas.

Most pedons have a B1 horizon. This horizon is as much as 6 inches thick. It has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6.

The B2t horizon is 6 to 19 inches thick. It has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 6 or 8. It is clay, sandy clay, or clay loam. Most pedons have common to many red, dark red, yellowish brown, light yellowish brown, and strong brown mottles that increase in number with increasing depth.

The Bx horizon commonly is 8 to 26 inches thick but ranges to as much as 39 inches. It is highly mottled and horizontally and reticulately streaked with dense, brittle, red layers and firm or very firm, brown layers. The red layers have hue of 10R to 5YR, value of 3 to 5, and chroma of 6 or 8. The brown layers have hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. In some pedons gray mottles are in the lower part of the Bx horizon. The red layers are sandy clay loam, clay loam, or sandy clay. The brown layers are clay.

Most pedons have a B3 horizon. This horizon is as much as 22 inches thick. It is mottled in shades of red, yellow, and brown. It is clay loam or sandy clay loam.

The C horizon is 6 inches to more than 20 inches thick. It commonly is mottled in shades of yellow, red, brown, and gray. It is sandy loam or loam.

Cecil series

The Cecil series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from granite, gneiss, and schist. These gently sloping to sloping soils are on medium and broad irregularly shaped ridges of the Piedmont Upland. Slopes range from 2 to 10 percent.

Cecil soils are geographically associated with Appling, Cataula, Georgeville, Herndon, Hiwassee, Madison, Pa-

colet, and Winnsboro soils. Appling soils have a Bt horizon that has hue of 5YR or yellower. Cataula soils have a dense brittle layer. Hiwassee soils have value of less than 4 throughout the solum. Georgeville and Herndon soils are more than 30 percent silt in the control section. Madison soils have common to many flakes of mica. Pacolet soils have a solum that is less than 40 inches thick, and they are on steeper side slopes. Winnsboro soils have mixed mineralogy and are more yellow.

Typical pedon of Cecil sandy loam, 2 to 6 percent slopes, 12 miles northwest of Winnsboro in Fairfield County, on State Highway 130, 5,020 feet northeast of junction of U.S. Highway 321 and State Highway 130, 20 feet west of highway:

Ap—0 to 5 inches; yellowish red (5YR 4/6) sandy loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

B1—5 to 9 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

B21t—9 to 15 inches; red (2.5YR 4/8) clay; moderate medium angular blocky structure; firm; continuous distinct clay films on faces of peds and in pores; many fine and medium roots; common very fine pores; strongly acid; gradual smooth boundary.

B22t—15 to 31 inches; red (10YR 4/8) clay; moderate medium angular blocky structure; firm; continuous distinct clay films on faces of peds and in pores; few fine roots; common very fine pores; strongly acid; clear smooth boundary.

B23t—31 to 52 inches; red (10YR 4/6) clay loam; moderate medium subangular blocky structure; firm; discontinuous faint films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

C1—52 to 61 inches; red (2.5YR 4/6) clay loam; common medium distinct yellowish red (5YR 5/6) and reddish yellow (7.5YR 6/6) mottles; massive; few fine pebbles of quartz; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C2—61 to 72 inches; coarsely mottled red (2.5YR 5/8) and yellowish red (5YR 5/8) loam; massive; few fine pebbles of quartz; few fine flakes of mica; very strongly acid.

Solum thickness ranges from 40 inches to more than 60 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

In most pedons, the A horizon is less than 6 inches thick, but it ranges to as much as 11 inches. It has hue of 5YR to 10YR, value of 4, and chroma of 2 to 6. It is mainly sandy loam, but where eroded, it is sandy clay loam.

Most pedons have a B1 horizon. This horizon is as much as 6 inches thick. It has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8.

The B2t horizon ranges from 21 to 49 inches. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is commonly clay, clay loam, or sandy clay, but in places it has a subhorizon of sandy clay loam. Flakes of mica range from none to few.

Some pedons have a B3 horizon. This horizon is as much as 22 inches thick. It is mottled red and yellowish red, or it has a red matrix with yellowish red or brown mottles.

The C horizon is 6 inches to more than 20 inches thick. It is mottled in shades of strong brown, yellowish brown, light yellowish brown, reddish yellow, yellowish red, light red, or red. It is sandy loam or sandy clay loam.

Chewacla series

The Chewacla series consists of deep, somewhat poorly drained, moderately permeable loamy soils that formed in alluvium on flood plains along the streams of the Piedmont Upland. Slopes are dominantly less than 1 percent but range to 2 percent.

Chewacla soils are geographically associated with Toccoa and Armenia soils. Toccoa soils are less than 18 percent clay in the control section and are well drained. Armenia soils have an argillic horizon that is more than 35 percent clay.

Typical pedon of Chewacla loam; 15 miles northeast of Chester in Chester County, 4.2 miles northeast of Richburg, 0.5 mile northeast of junction of State Highways 328 and 599, 225 feet west of Tinkers Creek, 750 feet north of State Highway 599:

A11—0 to 3 inches; brown (10YR 5/3) loam; common medium distinct dark yellowish brown (10YR 4/4) mottles along root channels and in pores; weak fine granular structure; very friable; many fine roots; many very fine pores; many fine flakes of mica; medium acid; clear smooth boundary.

A12C2—3 to 7 inches; brown (10YR 5/3) loam; common medium distinct reddish brown (5YR 4/4) mottles; weak fine granular structure; very friable; many fine roots; many very fine pores; many fine flakes of mica; slightly acid; clear smooth boundary.

B1—7 to 14 inches; brown (10YR 5/3) loam; common medium distinct dark brown (7.5YR 4/4) and few medium distinct black (10YR 2/1) mottles; weak fine granular structure; very friable; common fine roots; many very fine pores; many fine flakes of mica; slightly acid; clear smooth boundary.

B21—14 to 22 inches; pale brown (10YR 6/3) clay loam; common medium distinct brown (7.5YR 5/4) and very dark gray (5YR 3/1) mottles; weak medium subangular blocky structure; friable; common fine roots; many very fine pores; many fine flakes of mica; slightly acid; smooth boundary.

B22g—22 to 30 inches; light brownish gray (10YR 6/2) clay loam; common medium distinct very dark grayish brown (10YR 3/2) and yellowish red (5YR 4/6)

mottles; weak medium subangular blocky structure; firm; few fine roots; many very fine pores; many fine flakes of mica; slightly acid; clear wavy boundary.

B31g—30 to 38 inches; mottled light brownish gray (10YR 6/2), dark yellowish brown (10YR 4/4), black (10YR 2/1), very dark grayish brown (10YR 3/2), and yellowish brown (10YR 5/4) loam; massive; friable; few fine roots; common fine black and dark brown concretions; many fine flakes of mica; slightly acid; gradual wavy boundary.

B32—38 to 43 inches; mottled pale brown (10YR 6/3), dark brown (7.5YR 3/2), brown (10YR 4/3), and greenish gray (5GY 5/1) clay loam; massive; firm; few fine roots; many fine dark brown and black concretions; slightly acid; abrupt smooth boundary.

C1—43 to 50 inches; stratified yellowish brown, very dark grayish brown, very dark gray, and gray loam; massive; friable; common fine dark brown and black concretions; slightly acid; clear wavy boundary.

C2—50 to 60 inches; stratified brown, brownish yellow, gray, and very dark grayish brown loam; massive; friable; slightly acid.

Solum thickness ranges from 40 inches to more than 65 inches. Reaction is very strongly acid to slightly acid throughout unless the surface layer has been limed.

The A horizon commonly is 2 to 9 inches thick but ranges to as much as 18 inches. It has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. It is sandy loam, loam, or silt loam.

The B horizon is 38 to 53 inches thick. It is mottled in shades of brown and gray. The upper part has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 or 4. The lower part has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. This horizon is silty clay loam, clay loam, sandy clay loam, loam, or sandy loam. Flakes of mica range from few to common throughout. Mottles with chroma of 2 or less begin within 24 inches of the surface and continue with depth.

The C horizon is 5 inches to more than 30 inches thick. It is mottled in shades of yellow, brown, and gray. It is sandy clay loam, loam, loamy sand, or sandy loam.

Durham series

The Durham series consists of deep, well drained, moderately permeable loamy soils that formed in material weathered from granite, gneiss, or schist. These gently sloping soils are on narrow and medium irregularly shaped ridges of the Piedmont Upland. Slopes range from 2 to 6 percent.

Durham soils are geographically associated with Appling, Cecil, Cataula, Helena, and Vance soils. All these associated soils have a clayey control section.

Typical pedon of Durham loamy sand, 2 to 6 percent slopes, 6.5 miles southwest of Winnsboro in Fairfield county, 0.7 mile northwest of the junction of State Highways 269 and 304 on State Highway 304, 50 feet northeast of highway:

Ap—0 to 5 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; very friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.

A2—5 to 12 inches; pale brown (10YR 6/3) sandy loam; weak fine granular structure; very friable; common fine and medium roots; few coarse pebbles of quartz; strongly acid; clear smooth boundary.

B1—12 to 20 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; few coarse pebbles of quartz; very strongly acid; clear smooth boundary.

B21t—20 to 36 inches; brownish yellow (10YR 6/6) sandy clay loam; many medium faint yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky; thin patchy faint clay films on faces of peds; few fine roots; few coarse sand grains; very strongly acid; clear smooth boundary.

B22t—36 to 40 inches; brownish yellow (10YR 7/6) sandy clay loam; weak fine subangular blocky structure; friable; thin patchy faint clay films on faces of peds; few fine roots; very strongly acid; gradual smooth boundary.

B3—40 to 48 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine pebbles of feldspar; very strongly acid; gradual smooth boundary.

C—48 to 60 inches; pale yellow (2.5Y 7/4) loamy sand; massive; friable; common schist and feldspar fragments; very strongly acid.

Solum thickness ranges from 40 inches to more than 60 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A1 or Ap horizon is 2 to 8 inches thick. It has hue of 10YR, value of 5, and chroma of 2 or 3. It commonly is loamy sand but is sandy loam in places.

Most pedons have an A2 horizon. This horizon is as much as 10 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is loamy sand or sandy loam.

Most pedons have a B1 horizon. This horizon is as much as 8 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 4 or 6.

The B2t horizon is 20 to 30 inches thick. It has hue of 7.5YR or 10YR, value of 5 to 7, chroma of 6 or 8. Most pedons have few to many yellowish brown, strong brown, yellowish red, or red mottles.

Most pedons have a B3 horizon. This horizon is as much as 14 inches thick. It is mottled in shades of yellowish brown, red, yellowish red, or light gray. It is sandy loam or sandy clay loam.

The C horizon is mottled in shades of yellow, yellowish brown, strong brown, yellowish red, red, or light gray. It is loamy sand or sandy loam. Some pedons have a Cr horizon at a depth of less than 60 inches.

Georgeville series

The Georgeville series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from argillite. These gently sloping to sloping soils are on broad or narrow ridges and on side slopes adjacent to drainageways of the Piedmont Upland in the southern part of Fairfield County. Slopes range from 2 to 10 percent.

Georgeville soils are geographically associated with Cecil, Herndon, and Hiwassee soils. Cecil soils have a control section that is less than 30 percent silt. Herndon soils have hue of 5YR to 10YR. Hiwassee soils have value of less than 4 throughout the solum. In the southeastern part of Fairfield County, Georgeville soils are geographically associated with Blanton and Vaucluse soils. Blanton soils have a loamy control section. Vaucluse soils have a dense brittle layer.

Typical pedon of Georgeville loam, 2 to 6 percent slopes, 7.9 miles southeast of Winnsboro in Fairfield County, 1,250 feet north of junction of State Highways 30 and 227 on State Highway 227, 20 feet west of highway:

Ap—0 to 4 inches; reddish brown (5YR 4/4) loam; weak fine granular structure; very friable; many fine and few medium and large roots; many fine and medium pebbles of quartz; few cobblestones of quartz; strongly acid; abrupt smooth boundary.

B21t—4 to 18 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm, slightly sticky; thin continuous distinct clay films on faces of peds; many fine and few medium and large roots; many fine pores; few coarse pebbles of quartz; very strongly acid; clear wavy boundary.

B22t—18 to 24 inches; red (2.5YR 4/6) silty clay; few medium distinct yellowish red (5YR 5/8) mottles; moderate medium angular blocky structure; firm, slightly sticky; thin continuous distinct clay films on faces of peds; few fine roots; many very fine pores; few coarse pebbles of quartz; strongly acid; clear wavy boundary.

B23t—24 to 30 inches; red (2.5YR 4/6) silty clay loam; moderate medium angular blocky structure; firm, slightly sticky; thin continuous distinct clay films on faces of peds; many very fine pores; vertical quartz dike beginning at a depth of 24 inches; strongly acid; clear wavy boundary.

B31—30 to 40 inches; red (2.5YR 4/6) silt loam; common medium distinct dark red (2.5YR 3/6) mottles; moderate medium angular blocky structure; firm, slightly sticky; thin patchy faint clay films on faces of peds; many very fine pores; vertical quartz dike; strongly acid; gradual wavy boundary.

B32—40 to 52 inches; mottled dark red (2.5YR 3/6), red (2.5YR 4/8), strong brown (7.5YR 5/6), and weak red (10R 4/3) silt loam; weak medium angular blocky structure; firm; thin patchy faint clay films on faces of peds; many very fine roots; vertical quartz dike; very strongly acid; gradual wavy boundary.

B33—52 to 60 inches; mottled red (2.5YR 4/6), reddish brown (2.5YR 4/4), dark red (10R 3/6), and brownish yellow (10YR 6/8) silt loam; weak medium angular blocky structure; firm; thin patchy faint clay films on faces of peds; many very fine pores; very strongly acid; gradual wavy boundary.

C1—60 to 70 inches; mottled dark red, reddish yellow, and reddish brown silt loam; massive; friable; very strongly acid; gradual wavy boundary.

Solum thickness ranges from 40 to 70 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A horizon is 3 to 7 inches thick. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It commonly is loam but is silt loam or very fine sandy loam in places.

Some pedons have a B1 horizon. This horizon is as much as 6 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is silty clay loam or clay loam.

The B2t horizon is 22 to 50 inches thick. It has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It commonly is silty clay, clay, or clay loam, but it has subhorizons of silty clay loam in places.

Most pedons have a B3 horizon. This horizon is as much as 25 inches thick. It has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 6 or 8. It has few to many mottles of strong brown, reddish yellow, or very pale brown throughout. It is silt loam or silty clay loam.

The C horizon is mottled in shades of yellow, brownish yellow, strong brown, yellowish red, reddish yellow, and red. It is loam or silt loam. Fragments of slate range from common to many.

Helena series

The Helena series consists of deep, moderately well drained, slowly permeable clayey soils that formed in material weathered from gneiss or schist bisected by dikes of gabbro or diorite, commonly mixed with hornblende. These gently sloping soils are on broad ridges and narrow side slopes at the head of and adjacent to drainageways of the Piedmont Upland. They have a perched high water table from late in winter to early in spring. Slopes range from 2 to 6 percent.

Helena soils are geographically associated with Appling, Cataula, Cecil, Rion, Vance, and Wateree soils. None of these soils have the gray mottles associated with wetness of the Helena soils. Rion and Wateree soils are on steeper side slopes.

Typical pedon of Helena sandy loam, 2 to 6 percent slopes, 3.2 miles north of Chester in Chester County, 1,350 feet northeast of the junction of State Highways 190 and 1, 350 feet east of State Highway 190 on unpaved road; 100 feet southwest of unpaved road:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; common fine roots; few fine pebbles of quartz; strongly acid; abrupt smooth boundary.

A2—6 to 9 inches; brownish yellow (10YR 6/6) sandy loam; common medium distinct brown (10YR 5/3) mottles; weak fine granular structure; very friable; few fine roots; few fine pebbles of quartz; very strongly acid; clear wavy boundary.

B1—9 to 16 inches; brownish yellow (10YR 6/6) loam; few medium distinct brown (10YR 5/3) mottles; weak coarse subangular blocky structure; few fine roots; few fine and coarse pebbles of quartz; very strongly acid; clear wavy boundary.

B21t—16 to 20 inches; brownish yellow (10YR 6/6) clay; common medium distinct strong brown (7.5YR 5/6) mottles and common medium prominent yellowish red (5YR 5/6) mottles; moderate coarse subangular blocky structure; firm, plastic; few fine roots; thin continuous distinct clay films on faces of peds; few fine pebbles of quartz; few fine pockets of very coarse sand; very strongly acid; clear wavy boundary.

B22t—20 to 30 inches; brownish yellow (10YR 6/6) clay; common medium distinct strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6), few medium prominent red (2.5YR 4/6), and few medium distinct pale brown (10YR 6/3), light gray (10YR 7/1), and dark yellowish brown (10YR 4/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm, plastic; few fine roots; thin continuous distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

B23t—30 to 40 inches; mottled strong brown (7.5YR 5/8), light gray (N 7/0), and reddish yellow (7.5YR 6/6) clay; moderate coarse angular blocky structure; firm, plastic; few fine roots; thin continuous distinct clay films on faces of peds; few coarse pebbles of feldspar; very strongly acid; gradual wavy boundary.

B3—40 to 60 inches; mottled light gray (10YR 6/1), strong brown (7.5YR 5/8), reddish yellow (7.5YR 6/6), white (2.5Y 8/2), and very pale brown (10YR 7/3) sandy clay loam; massive; very firm, plastic; thin continuous distinct clay films in seams; common coarse white pebbles of feldspar; many balls of kaolin; many fine flakes of mica; very strongly acid; gradual wavy boundary.

C—60 to 66 inches; mottled light gray, strong brown, very pale brown, and red sandy clay loam; massive; very firm, plastic; few medium roots; thick patchy faint clay films in seams; common coarse white pebbles of feldspar; many balls of kaolin; many fine flakes of mica; strongly acid.

Solum thickness ranges from 23 to 60 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A1 or Ap horizon commonly is 6 to 10 inches thick, but it ranges to as much as 14 inches. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. Some pedons have a thin A2 horizon that has higher value than the Ap or A1 horizon.

Most pedons have a B1 horizon. This horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is loam or sandy clay loam.

The B2t horizon is 8 to 36 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. In the upper 24 inches, it has mottles of chroma 2 or less. It is clay or sandy clay. Most pedons have few to common mottles in shades of red, yellow, and brown that increase in number with increasing depth.

The B3 horizon is as much as 20 inches thick. It is mottled in shades of gray, brown, red, olive, yellow, and white. It is clay loam or sandy clay loam.

The C horizon is 9 inches to more than 12 inches thick. It is mottled in shades of brown, gray, and white. It is sandy loam or sandy clay loam.

Herndon series

The Herndon series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from argillite. These gently sloping to strongly sloping soils are in the southern part of Fairfield County. They are on broad irregularly shaped ridges and medium to narrow side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 2 to 15 percent.

Herndon soils are geographically associated with Appling, Cecil, Georgeville, Madison, Pacolet, and Rion soils. Appling, Cecil, Madison, Pacolet, and Rion soils have a control section that is less than 30 percent silt. In Cecil, Georgeville, and Pacolet soils, the Bt horizon has hue redder than 5YR. Madison and Rion soils have a solum that is less than 40 inches thick. Also, Madison soils have common or many flakes of mica throughout the profile.

Typical pedon of Herndon loam, 2 to 6 percent slopes, 9.1 miles south of Winnsboro in Fairfield County, 2,000 feet southeast of the junction of unpaved State Road 323 and U.S. Highway 321; in area of mature, planted loblolly pines:

A1—0 to 4 inches; dark grayish brown (2.5Y 4/2) loam; weak fine granular structure; very friable; many fine and medium roots; common fine pebbles of quartz; slightly acid; abrupt wavy boundary.

A2—4 to 7 inches; grayish brown (2.5YR 5/2) loam; weak fine granular structure; very friable; many fine and medium roots; common fine pebbles of quartz; medium acid; clear wavy boundary.

B1—7 to 12 inches; yellowish brown (10YR 5/8) silty clay loam; weak fine subangular blocky structure; very friable; common fine and medium roots; medium acid; gradual smooth boundary.

B21t—12 to 24 inches; strong brown (7.5YR 5/6) silty clay; few medium distinct yellowish red (5YR 4/6)

mottles; moderate medium subangular blocky structure; friable; few fine roots; medium acid; gradual smooth boundary.

B22t—24 to 36 inches; mottled strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; friable; few fine pebbles of quartz; medium acid; gradual smooth boundary.

B3—36 to 58 inches; mottled strong brown (7.5YR 5/6), brownish yellow (10YR 6/6), and yellow (2.5Y 7/6) silt loam; moderate medium subangular blocky structure; friable; medium acid; gradual smooth boundary.

C—58 to 72 inches; mottled light yellowish brown, strong brown, and light gray silt loam; massive, contains original rock structure; friable; few fine concretions; medium acid.

Solum thickness ranges from 40 to 70 inches. Reaction is strongly acid to extremely acid throughout unless the surface layer has been limed.

The A horizon commonly is 4 to 8 inches thick, but it ranges to as much as 11 inches in some pedons. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Some pedons have a few fine pebbles of quartz.

Most pedons have a B1 horizon. This horizon is as much as 6 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 4 to 8. It is silt loam or loam.

The B2t horizon is 20 to 40 inches thick. It has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It commonly is silty clay, clay loam, or clay, but some pedons have subhorizons of silty clay loam. In places, the lower part of the B2t horizon has mottles of reddish brown, yellowish brown, very pale brown, strong brown, and yellowish red.

Most pedons have a B3 horizon. This horizon is as much as 22 inches thick. It is mottled in shades of yellow, brown, red, and white. It is loam, silt loam, silty clay loam, or clay loam.

The C horizon is 4 to more than 27 inches thick. It is mottled in shades of white, brown, and red. It is silt loam, loam, or sandy loam.

Hiwassee series

The Hiwassee series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from schist, gneiss, or old alluvium. These gently sloping to sloping soils are on broad or medium ridges and medium or narrow side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 2 to 10 percent.

Hiwassee soils are geographically associated with Cataula, Cecil, Georgeville, Madison, Mecklenburg, Pacolet, Wilkes, and Winnsboro soils. All these soils have value of more than 4 throughout. In addition, Georgeville soils have a control section that is more than 30 percent silt or more than 40 percent silt and very fine sand. Madison soils contain many flakes of mica. Cataula soils have a dense brittle layer. Wilkes and Pacolet soils are on steeper side slopes. Also, Pacolet soils have a solum that is less than 40 inches thick, and Wilkes soils have a solum that is less than 20 inches thick. Mecklenburg and Winnsboro soils have a base saturation of more than 35 percent.

Typical pedon of Hiwassee sandy loam, 2 to 6 percent slopes, 14.5 miles southwest of Winnsboro in Fairfield County, 1.8 miles south of junction of State Highways 99 and 257, 4,400 feet south of Friendship Church, 120 feet west of State Highway 257:

Ap—0 to 4 inches; dark reddish brown (5YR 3/4) sandy loam, reddish brown (5YR 5/3) dry; weak fine granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

B1—4 to 10 inches; dark red (2.5YR 3/6) sandy clay loam, red (2.5YR 4/6) dry; moderate medium subangular blocky structure; firm, sticky; thin patchy faint clay films on faces of peds; common fine roots; many fine pores; medium acid; clear smooth boundary.

B21t—10 to 40 inches; dark red (2.5YR 3/6) clay, red (2.5YR 4/6) dry; moderate medium angular blocky structure; firm, sticky; thin continuous distinct clay films on faces of peds; few fine roots; many very fine pores; few cobblestones of quartz; strongly acid; clear smooth boundary.

B22t—40 to 50 inches; dark red (2.5YR 3/6) clay, red (2.5YR 4/8) dry; few medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; thin patchy faint clay films on faces of peds; many very fine pores; strongly acid; clear wavy boundary.

B31—50 to 58 inches; mottled dark red (2.5YR 3/6) and strong brown (7.5YR 5/8) sandy clay; weak medium subangular blocky structure; friable; thin patchy faint clay films on faces of peds; many very fine pores; strongly acid; gradual wavy boundary.

B32—58 to 70 inches; mottled dark red (2.5YR 3/6), red (2.5YR 5/6), yellow (10YR 7/6), and white (10YR 8/1) sandy clay loam; massive; friable; thin continuous distinct dark red clay films in seams; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Solum thickness ranges from 40 inches to more than 60 inches. Reaction is slightly acid to very strongly acid throughout unless the surface layer has been limed. Most pedons have few to common flakes of mica. Some pedons have few pebbles and cobblestones of quartz in some or all horizons, and some pedons have dark concretions in the B and C horizons.

The A horizon is 4 to 8 inches thick. It has hue of 2.5YR to 7.5YR, value of less than 4, and chroma of 2 to 6. It typically is sandy loam, but it is sandy clay loam in eroded areas.

The B2t horizon is 30 to 60 inches thick. It has hue of 10R or 2.5YR, value of less than 4, and chroma of 3 to

6. It is clay or clay loam. In some pedons, the lower part of this horizon has mottles of red, yellowish red, strong brown, or brown.

The B3 horizon is mottled in shades of dark red, red, yellow, white, or black, or it is dark red or red with or without the above mottles. It is sandy clay loam, clay loam, or sandy clay.

Iredell series

The Iredell series consists of deep, moderately well drained, slowly permeable clayey soils that formed in material weathered from diorite, gabbro, hornblende gneiss, or hornblende schist. These gently sloping soils are on broad to medium ridges of the Piedmont Upland. Slopes range from 1 to 6 percent.

Iredell soils are geographically associated with Armenia, Cecil, Hiwassee, Mecklenburg, Wilkes, and Winnsboro soils. Armenia soils are on flood plains or in depressions, and they dominantly have chroma of 2 or less throughout the control section. Cecil soils have kaolinitic mineralogy and are red in the control section. Hiwassee soils have kaolinitic mineralogy and have value of less than 4 throughout the solum. Mecklenburg soils have mixed mineralogy and are yellowish red to red in the control section. Wilkes soils are on steeper side slopes, and they have a thinner solum. Winnsboro soils have mixed mineralogy, and they have higher chroma in the control section.

Typical pedon of Iredell fine sandy loam, 1 to 6 percent slopes, 1 mile south of Chester on U.S. Highway 72 By-pass in Chester County, 223 feet north of fire hydrant in front of Southside Elementary School:

Ap1—0 to 5 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots; few fine pebbles; few fine black concretions; slightly acid; clear smooth boundary.

Ap2—5 to 7 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; many fine and medium roots; few fine black concretions; neutral; clear wavy boundary.

B21t—7 to 11 inches; brown (10YR 4/3) clay; moderate medium angular blocky structure; very firm, very sticky, very plastic; many fine and medium roots; thin patchy clay films on faces of peds; common slickensides; many fine (1 to 2 millimeters) black concretions; slightly acid; gradual smooth boundary.

B22t—11 to 20 inches; brown (10YR 4/3) clay; moderate medium and coarse angular blocky structure; very firm, very sticky, very plastic; many fine and medium roots along faces of peds; thin patchy clay films on faces of peds; common slickensides and pressure faces; common fine black concretions; few fine weathered feldspar crystals; neutral; gradual smooth boundary.

B23t—20 to 24 inches; dark grayish brown (2.5Y 4/2) clay; moderate medium and coarse angular blocky structure; very firm, very sticky, very plastic; many fine and medium roots, mostly along faces of peds; few fine pores; thin patchy clay films on faces of peds; few medium black concretions; few fine weathered feldspar crystals; slightly acid; gradual smooth boundary.

B3—24 to 27 inches; olive (5Y 4/3) loam; common medium distinct very pale brown (10YR 7/3) and few fine distinct dark grayish brown and black mottles; moderate medium and coarse angular blocky structure; firm, sticky, plastic; many fine and medium roots along faces of peds; few medium pores; thin patchy clay films on faces of peds; common soft dark grayish brown and black saprolite; neutral; clear wavy boundary.

C—27 to 32 inches; finely mottled dark greenish gray, very pale brown, and yellowish brown loam; 80 percent saprolite that crushes easily; many fine roots and thin patchy clay films along cleavage planes; neutral; gradual wavy boundary.

Cr1—32 to 44 inches; finely mottled greenish gray, very pale brown, black, and yellowish brown sandy loam; 90 percent saprolite that crushes easily; many fine roots and thin patchy clay films along cleavage planes; mildly alkaline; gradual wavy boundary.

Cr2—44 to 62 inches; finely mottled dark greenish gray, yellowish brown, black, and very pale brown sandy loam; 90 percent saprolite that crushes easily; few fine roots along cleavage planes; common fragments of hard rock; moderately alkaline.

Solum thickness ranges from 20 to 36 inches. Reaction is medium acid to neutral in the A horizon, slightly acid to neutral in the Bt horizon, and slightly acid to mildly alkaline in the B3 and C horizon. This soil cracks when dry, but cracks rarely extend upward through the B horizon.

The A horizon is 4 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3.

Some pedons have a B1 horizon. This horizon is as much as 4 inches thick. It is brown, light olive brown, or dark yellowish brown clay loam or sandy clay loam.

The B2t horizon is 12 to 18 inches thick. The upper part has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 to 6. The lower part has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 or 4. Dark concretions range from few to many.

The B3 horizon is 3 to 6 inches thick. It is mottled in shades of olive, brown, gray, and black. It is sandy clay loam or clay loam. Dark concretions range from few to many.

The C horizon is mottled in shades of gray, yellow, black, and brown. It is sandy loam, sandy clay loam, or clay loam.

Some pedons have a Cr horizon. This horizon is mottled in shades of greenish gray, olive gray, very pale

brown, yellowish brown, black, and white. It is firm saprolite that crushes to sandy loam.

Madison series

The Madison series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from quartz mica gneiss, quartz mica schist, or quartz diorite pegmatite that is high in content of feldspar and mica. These gently sloping to moderately steep soils are on broad to medium ridges and on side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 2 to 25 percent.

Madison soils are geographically associated with Cataula, Cecil, Hiwassee, Pacolet, and Wilkes soils. These soils do not have the many flakes of mica associated with Madison soils. In addition, Cecil soils have a solum that is more than 40 inches thick. Hiwassee soils have value of less than 4 throughout, Cataula soils have a dense brittle layer, and Wilkes soils have a shallow solum and mixed mineralogy.

Typical pedon of Madison sandy loam, 2 to 6 percent slopes, 8.5 miles northwest of Chester in Chester County on State Highway 97, 0.7 mile southeast of junction of State Highways 299 and 97, 25 feet northeast of highway:

Ap—0 to 4 inches; brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; medium acid; abrupt smooth boundary.

B2t—4 to 16 inches; red (2.5YR 4/8) sandy clay; moderate fine subangular blocky structure; friable; thin continuous distinct clay films on faces of most peds; common fine roots; many fine flakes of mica; few soft pebbles of feldspar (3 to 8 millimeters); strongly acid; gradual smooth boundary.

B3—16 to 26 inches; red (2.5YR 4/6) sandy clay loam; moderate fine angular blocky structure; friable; thin patchy faint clay films on faces of most peds and on surface of feldspar pebbles; common fine roots; many fine flakes of mica; common (3 to 8 millimeters) pebbles of feldspar, 5 to 10 percent by volume; strongly acid; gradual smooth boundary.

C—26 to 43 inches; red (2.5YR 5/6) sandy clay loam; many pale brown, yellowish brown, and black mottles; massive, contains original rock structure; friable; thin discontinuous faint clay films in cracks; few fine roots in upper part; common pebbles of quartz; many fine flakes of mica; common pebbles of feldspar; strongly acid; clear wavy boundary.

Cr—43 to 80 inches; mottled white (10YR 8/1) and red (2.5YR 5/6) saprolite of weathered schist that crushes to coarse sandy loam; massive; firm; few thin discontinuous faint films in cracks; common fine flakes of mica; strongly acid.

Solum thickness ranges from 24 to 40 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed. The A horizon has few to common flakes of mica, and the B and C horizons have common to many.

The A1 or Ap horizon is 3 to 6 inches thick. The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 4 or 6. In some areas, erosion has removed much of the surface layer and plowing has mixed the B horizon with the A horizon. In these areas hue is 5YR or 7.5YR, value is 4 or 5, and chroma is 4 or 6. The A1 or Ap horizon typically is sandy loam but, in eroded areas it is sandy clay loam.

The B2t horizon is 12 to 24 inches thick. It has hue of 10R to 5YR, value of 4 to 6, and chroma of 6 or 8. It is clay loam, sandy clay, or clay. Pebbles of feldspar range from none to common.

Most pedons have a B3 horizon. This horizon is as much as 14 inches thick. It is similar in color to the B2t horizon. It is sandy clay loam, or clay loam. Pebbles of feldspar range from none to common.

The C horizon is red, or it is mottled in shades of red and yellow. It is sandy loam, sandy clay loam or clay loam. Pebbles of feldspar range from none to common.

The Cr horizon is mottled in shades of red and white. It is firm saprolite that crushes to loamy sandy or sandy loam.

Mecklenburg series

The Mecklenburg series consists of deep, well drained, slowly permeable clayey soils that formed in material weathered from hornblende schist, hornblende gneiss, and other basic rocks. These gently sloping to sloping soils are on narrow to broad ridges and their associated side slopes of the Piedmont Upland. Slopes range from 2 to 10 percent.

Mecklenburg soils are geographically associated with Cecil, Hiwassee, Iredell, Madison, Wilkes, and Winnsboro soils. Cecil, Madison, and Hiwassee soils have base saturation of less than 35 percent. Iredell and Winnsboro soils have hue of 7.5YR or yellower. In addition, Iredell soils are montmorillonitic, and Winnsboro soils have base saturation of more than 60 percent. Wilkes soils have a solum that is less than 20 inches thick, and they are on steeper side slopes.

Typical pedon of Mecklenburg fine sandy loam, 2 to 6 percent slopes, 6.8 miles south of Great Falls on State Highway 200 in Fairfield County, 4,100 feet northeast of junction of State Highways 901 and 200, 150 feet southwest of field road in pasture:

Ap—0 to 7 inches; reddish brown (5YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

B1—7 to 11 inches; dark red (2.5YR 3/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few manga-

nese concretions (less than 5 millimeters); neutral; clear smooth boundary.

B21t—11 to 18 inches; reddish brown (2.5YR 4/4) clay; moderate medium angular blocky structure; friable, slightly plastic, slightly sticky; common fine and few medium roots; few manganese concretions (less than 5 millimeters); neutral; gradual smooth boundary.

B22t—18 to 28 inches; yellowish red (5YR 5/6) clay; few fine faint strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm, plastic, sticky; neutral; gradual smooth boundary.

B3—28 to 39 inches; mottled yellowish red (5YR 5/6) and strong brown (7.5YR 5/8) clay loam; weak medium subangular blocky structure; firm, slightly plastic, slightly sticky; neutral; gradual smooth boundary.

C—39 to 72 inches; mottled strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/4) loam; massive, contains original rock structure; friable; neutral.

Solum thickness ranges from 30 to 40 inches. Reaction is medium acid to neutral throughout.

The A horizon is 4 to 8 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is fine sandy loam, or in eroded areas, it is sandy clay loam.

Most pedons have a B1 horizon. This horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 or 6.

The B2t horizon is 15 to 33 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. The lower part has few to common mottles of strong brown, yellowish brown, reddish yellow, reddish brown, yellowish red, and red. Flakes of mica and pebbles of quartz range from none to few.

The B3 horizon is 3 to 11 inches thick. It is mottled in shades of brown, yellow, red, and white. It is clay loam or sandy clay loam. Manganese concretions and pebbles of quartz are few to common.

The C horizon is highly mottled in shades of gray, yellow, red, and brown. It is sandy loam, loam, or sandy clay loam.

Molena Variant

The Molena Variant is a deep, somewhat excessively drained moderately rapid to rapidly permeable loamy soil that formed in alluvial deposits. This gently sloping soil is on broad upland river terraces adjacent to the Broad River in Chester County. Slopes range from 1 to 4 percent.

The Molena Variant is geographically associated with Durham, Hiwassee, Mecklenburg, Wilkes, and Toccoa soils. Durham soils have a fine-loamy control section. Hiwassee and Mecklenburg soils have a clayey control section. Wilkes soils are on steeper side slopes, and they have a solum that is less than 20 inches thick. Toccoa soils are on flood plains, and they do not have a Bt horizon.

Typical pedon of Molena Variant sand, 1 to 4 percent slopes, 16.8 miles northwest of Chester in Chester County, 2.1 miles northwest of junction of State Highways 307 and 742, 1.3 miles east of Broad River, 1.2 miles southwest of junction of State Highway 742 and unmarked field road leading southwest, 10 feet north of unmarked field road:

Ap—0 to 6 inches; dark reddish brown (5YR 3/2) sandy loam; weak medium granular structure; very friable; common fine and medium roots; neutral; clear smooth boundary.

B1—6 to 11 inches; dark reddish brown (5YR 3/3) loamy sand; weak fine subangular blocky structure; very friable; few fine and medium roots; few fine flakes of mica; neutral; clear wavy boundary.

B21t—11 to 19 inches; reddish brown (5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; neutral; gradual wavy boundary.

B22t—19 to 44 inches; strong brown (7.5YR 5/8) loamy sand; weak fine subangular blocky structure; very friable; few fine roots; neutral; gradual wavy boundary.

C—44 to 64 inches; very pale brown (10YR 7/3) fine sand; weak fine granular structure; loose; few fine flakes of mica; neutral; clear wavy boundary.

Solum thickness ranges from 40 inches to more than 60 inches. Reaction is slightly acid to neutral throughout.

The A horizon is 5 to 20 inches thick. It has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is dominantly sand but ranges to loamy sand.

Most pedons have a B1 horizon. This horizon is as much as 19 inches thick. It has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6.

The B2t horizon is 10 to 33 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loamy sand or sandy loam.

The C horizon is very pale brown, yellowish red, or strong brown fine sand, sand, or loamy sand to a depth of more than 60 inches.

Pacolet series

The Pacolet series consists of deep, well drained, moderately permeable clayey soils that formed in material weathered from granite gneiss or granite schist. These strongly sloping to moderately steep soils are on broad or narrow side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 10 to 25 percent.

Pacolet soils are geographically associated with Cataula, Cecil, Hiwassee, Madison, Wilkes, Rion, and Wateree soils. Cecil and Hiwassee soils have a solum that is more than 40 inches thick. In addition, Hiwassee soils have value of less than 4. Cataula soils have a dense brittle layer. Madison soils have common to many flakes of mica throughout the solum. Wilkes soils have a solum

that is less than 20 inches thick, and they have mixed mineralogy. Rion soils do not have hue of 2.5YR or redder. Wateree soils have a coarse-loamy control section.

Typical pedon of Pacolet sandy loam, 10 to 25 percent slopes, 3.4 miles south of Chester in Chester County; 1.3 miles south of junction of State Highways 16 and 350, 3,700 feet northeast of junction of State Highways 16 and 171, 0.9 mile northeast of junction of unpaved State Highway 394 and unmarked county road leading west, 2,400 feet north of junction of unmarked county road and unpaved private road leading north, 35 feet northeast of unpaved private road:

A1—0 to 3 inches; brown (7.5YR 5/4) sandy loam; few fine distinct yellowish red (5YR 5/8) mottles; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

B21t—3 to 23 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, slightly sticky; thin continuous faint clay films on faces of peds; common fine and medium roots; common very fine pores; medium acid; gradual wavy boundary.

B22t—23 to 29 inches; red (2.5YR 4/6) clay; common fine distinct reddish yellow (7.5YR 7/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky; thin continuous faint clay films on faces of peds; common very fine pores; few fine flakes of mica; medium acid; gradual wavy boundary.

B3—29 to 37 inches; red (2.5YR 4/6) clay loam; many medium distinct reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

C1—37 to 52 inches; mottled red (2.5YR 4/6) and reddish yellow (7.5YR 7/8) clay loam; massive; friable; thin discontinuous distinct clay films in cracks; few fine flakes of mica; 75 percent soft saprolite that crushes easily; strongly acid; gradual wavy boundary.

C2—52 to 70 inches; light yellowish brown (10YR 6/4) loam; common medium distinct red (2.5YR 4/6) and strong brown (7.5YR 5/8) mottles; massive; friable; 90 percent soft saprolite that crushes easily; strongly acid.

Solum thickness ranges from 25 to 40 inches. Reaction ranges from medium acid to very strongly acid throughout unless the surface layer has been limed.

The Ap or A1 horizon is 2 to 7 inches thick. The Ap horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. The A1 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The B2t horizon is 14 to 28 inches thick. It has hue of 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay loam, sandy clay, or clay. Some pedons have few mottles in shades of yellow or brown. Flakes of mica range from none to few.

Most pedons have a B3 horizon. This horizon is as much as 13 inches thick. It has hue of 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay or clay loam. Mottles of yellowish red are few or common. Flakes of mica range from none to common. Pebbles of feldspar range from none to common.

The C horizon is 6 inches to more than 35 inches thick. It is mottled in shades of red, yellowish red, and white. It is loamy sand, sandy loam, loam, clay loam, or sandy clay loam. Flakes of mica range from few to common. Pebbles of feldspar range from none to common.

Rion series

The Rion series consists of deep, well drained soils that formed in loamy material weathered from granite. These sloping to steep soils are on side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 6 to 40 percent.

Rion soils are geographically associated with Appling, Cataula, Cecil, Durham, Pacolet, Vance, Wateree, and Wilkes soils. Appling, Cataula, Cecil, Pacolet, and Vance soils have a clayey control section. In addition, Appling, Cataula, Cecil, and Durham soils have a solum that is more than 40 inches thick. Also, Cataula soils have a dense brittle layer. Cecil and Pacolet soils have a red Bt horizon. Vance and Wilkes soils have mixed mineralogy, and Wilkes soils have a solum that is less than 20 inches thick. Wateree soils have a coarse-loamy control section, and they have mixed mineralogy.

South of Winnsboro, Rion soils are also geographically associated with Georgeville and Herndon soils. Both these soils have a solum that is more than 40 inches thick, and in addition, in both soils, the Bt horizon is more than 30 percent silt or more than 40 percent silt and very fine sand.

Typical pedon of Rion loamy sand, 15 to 40 percent slopes, 6.2 miles southeast of Winnsboro in Fairfield County, 1.4 miles northwest of junction of U.S. Highway 21 and State Highway 21, 1,900 feet southwest of Good Hope Church, 200 feet south of State Highway 21:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; loose; many fine and few medium roots; common pebbles of quartz; strongly acid; abrupt smooth boundary.

A2—3 to 7 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; loose; common fine and few medium roots; common pebbles of quartz; medium acid; clear smooth boundary.

B1—7 to 12 inches; brownish yellow (10YR 6/6) sandy loam; weak fine granular structure; very friable; few fine roots; common fine and very fine pores; few pebbles of quartz; strongly acid; clear smooth boundary.

B21t—12 to 17 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky struc-

ture; friable; thin patchy faint clay films on faces of peds and in pores; many very fine and few fine pores; common coarse pebbles of quartz; very strongly acid; abrupt smooth boundary.

B22t—17 to 26 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct red (2.5YR 4/6) and grayish brown (10YR 5/2) mottles; weak medium angular blocky structure; friable; thin patchy faint clay films on faces of peds and in pores; many very fine and few fine pores; common pebbles of quartz; few pebbles of feldspar; grayish brown mottles are relic weathered rock material and are not a result of wetness; very strongly acid; clear smooth boundary.

B23t—26 to 31 inches; reddish yellow (7.5YR 6/8) sandy clay loam; common medium distinct very pale brown (10YR 7/4) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; common pebbles of quartz; common pebbles of feldspar; pockets of white clay; light brownish gray mottles and pockets of white clay are relic weathered rock material and are not a result of wetness; very strongly acid; gradual smooth boundary.

B3—31 to 38 inches; mottled white (10YR 8/1), brownish yellow (10YR 6/8), and light brownish gray (10YR 6/2) sandy clay loam; massive; friable; common pebbles of feldspar; common pebbles of quartz; white and light brownish gray mottles are relic weathered rock material and are not a result of wetness; very strongly acid; gradual smooth boundary.

C—38 to 60 inches; mottled white, gray, and brownish yellow sandy loam; massive; friable; few pockets of gray clay; 90 percent granite saprolite; very strongly acid.

Solum thickness ranges from 20 to 40 inches. Depth to rock is more than 60 inches. Reaction is medium acid to very strongly acid throughout.

The A1 horizon is 2 to 7 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 2 or 3. It commonly is loamy sand, but ranges to sandy loam and fine sandy loam.

Most pedons have an A2 horizon. This horizon is as much as 7 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is loamy sand, sandy loam, or fine sandy loam.

Most pedons have a B1 horizon. This horizon is as much as 6 inches thick. It has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is sandy loam or sandy clay loam. Pebbles of quartz range from none to common throughout this horizon.

The B2t horizon is 9 to 17 inches thick. It has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 or 8. It is sandy clay loam, clay loam, or sandy clay that averages less than 35 percent clay. Mottles in shades of brown and red commonly are in the lower part of the B2t horizon and, in some pedons, in the upper part of the B2t horizon. Coarse pebbles of quartz and feldspar range from none to common.

Most pedons have a B3 horizon. This horizon is as much as 12 inches thick. It is reddish yellow mottled in shades of brown and gray, or it is mottled in shades of brown, yellow, red, or white. It is sandy clay loam or sandy loam. Coarse pebbles of quartz and feldspar range from none to common.

Most pedons have a C horizon. This horizon commonly is mottled in shades of red, brown, yellow, or white. It is loamy sand, sandy loam, or sandy clay loam.

Some pedons have a Cr horizon. This horizon is mottled in shades of brown, yellow, red, or white. It is highly weathered, firm quartz that crushes to loamy sand, sandy loam, or sandy clay loam. Pebbles of feldspar range from none to common.

Toccoa series

The Toccoa series consists of deep, well drained, moderately rapidly permeable soils that formed in thick loamy alluvium. These nearly level soils are on flood plains along the streams of the Piedmont. Slopes are less than 1 percent.

Toccoa soils are geographically associated with Chewacla soils. Chewacla soils are more than 18 percent clay in the control section.

Typical pedon of Toccoa loam from an area of Toccoa soils; 13.8 miles southwest of Chester in Chester County on State Highway 72; 200 feet east of Broad River; 250 feet north of State Highway 72; 500 feet northwest of Fish Dam Battleground monument:

O1—2 inches to 0; partly decomposed hardwood leaves and litter.

A11—0 to 2 inches; brown (7.5YR 4/4) loam; weak fine granular structure; friable; many fine and common medium roots; many very fine pores; few worm holes; many fine flakes of mica; strongly acid; abrupt smooth boundary.

A12—2 to 8 inches; dark reddish brown (5YR 3/4) sandy loam; weak fine granular structure; very friable; common fine and medium and few large roots; many very fine pores; many fine flakes of mica; strongly acid; clear smooth boundary.

C1—8 to 32 inches; reddish brown (5YR 4/4) sandy loam; massive; very friable; many very fine pores; many fine flakes of mica; few thin strata of brown sand; medium acid; clear wavy boundary.

C2—32 to 50 inches; brown (7.5YR 4/4) sandy loam; structureless; very friable; many very fine pores; many fine flakes of mica; medium acid.

C3—50 to 56 inches; strong brown (7.5YR 5/6) loam; structureless; firm; many very fine pores; many fine flakes of mica; few lenses of sand; medium acid; gradual wavy boundary.

C4—56 to 74 inches; brown (7.5YR 4/4) sandy loam; few thin strata of strong brown (7.5YR 5/6) sand;

structureless; friable; common very fine pores; many fine flakes of mica; medium acid; gradual wavy boundary.

These soils are slightly acid to strongly acid throughout. All pedons have at least one subhorizon that is medium acid or slightly acid. Flakes of mica range from few to many throughout.

The Ap or A1 horizon ranges from 4 to 12 inches thick. It has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. It is loam, sandy loam, or fine sandy loam.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. It is sandy loam, but thin strata of sand, loamy sand, fine sandy loam, loam, sandy clay loam, or clay loam are in most pedons. Some pedons have mottles of chroma 2 or less below a depth of 20 inches.

Vance series

The Vance series consists of deep, well drained, slowly permeable clayey soils that formed in material weathered from granite or gneiss influenced by basic rocks. These gently sloping to sloping soils are on broad ridges and short breaks adjacent to drainageways of the Piedmont Upland. Slopes range from 2 to 10 percent.

Vance soils are geographically associated with Appling, Cataula, Cecil, Durham, Helena, Rion, and Wilkes soils. Appling, Cataula, and Cecil soils have kaolinitic mineralogy. In addition, Appling soils have a solum that is more than 40 inches thick, Cataula soils have a dense brittle layer, and Cecil soils have hue of 2.5YR and redder and have a solum that is more than 40 inches thick. Helena soils have mottles of chroma 2 or less in the upper 24 inches of the Bt horizon, and Durham soils have a fine-loamy control section. Wilkes and Rion soils are on steeper side slopes. Also, Wilkes soils have a thinner solum, and Rion soils have a fine-loamy control section.

Typical pedon of Vance sandy loam, 2 to 6 percent slopes, 1.5 miles northwest of White Oak in Fairfield County, 400 feet southwest of junction of U.S. Highway 321 and unmarked dirt road leading toward telephone cable right-of-way, 4,625 feet northeast of junction of dirt road and telephone cable right-of-way:

Ap—0 to 4 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; many fine and few medium and large roots; medium acid; abrupt smooth boundary.

B21t—4 to 12 inches; strong brown (7.5YR 5/6) clay; common medium prominent red (2.5YR 4/6), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) mottles; moderate coarse angular blocky structure; very firm, plastic; common fine and few medium roots; thin continuous faint clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—12 to 29 inches; mottled brownish yellow (10YR 6/6), very pale brown (10YR 7/3), and red (10R 4/6) clay; moderate coarse angular blocky structure; very firm, plastic; few fine roots; thin continuous faint clay films on faces of peds; strongly acid; gradual wavy boundary.

B23t—29 to 37 inches; mottled pale yellow (5Y 7/4), strong brown (7.5YR 5/6), light brownish gray (10YR 6/2), red (2.5YR 4/6), and yellowish red (5YR 5/8) clay; moderate medium angular blocky structure; very firm, plastic; few fine roots; thick continuous faint clay films on faces of peds; very strongly acid; clear wavy boundary.

C—37 to 43 inches; mottled pale yellow (2.5Y 8/4), white (10YR 8/1), yellowish brown (10YR 5/8), gray (10YR 5/1), and yellowish red (5YR 5/6) sandy loam; massive, contains original rock structure; friable; very strongly acid; clear wavy boundary.

Cr—43 to 60 inches; mottled pale yellow (2.5Y 8/4), yellowish brown (10YR 5/8), and yellowish red (5YR 5/6) firm saprolite of granite which crushes to loamy sand; massive; hard; few discontinuous distinct clay films in cracks; very strongly acid.

Solum thickness ranges from 24 to 40 inches. Reaction is strongly acid or very strongly acid throughout unless the surface layer has been limed.

The A horizon is 4 to 9 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is sandy loam or sandy clay loam.

The B1 horizon, where present, is as much as 10 inches thick. It has hue of 5YR to 10YR, value of 5, and chroma of 6 or 8.

The B2t horizon is 12 to 36 inches thick. It has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. It is clay or sandy clay. Most pedons have few to common mottles in shades of red, yellow, and brown.

The B3 horizon, where present, is as much as 12 inches thick. It is mottled in shades of strong brown, red, yellowish red, yellowish brown, and gray. It is sandy clay loam, clay loam, or sandy clay. The gray mottles are relic weathered rock material.

The C horizon is 6 inches to more than 20 inches thick. It is mottled in shades of red, yellowish red, reddish brown, yellowish brown, white, olive gray, and gray sandy loam or sandy clay loam. The gray mottles are relic weathered rock material.

The Cr horizon is mottled in shades of yellow, brown, red, and white. It is firm saprolite of granite that crushes to sandy loam or loamy sand.

Vaucluse series

The Vaucluse series consists of deep, well drained, slowly permeable loamy soils that formed in marine sediment. These gently sloping to sloping soils are on narrow ridges and their accompanying side slopes. They have a dense brittle layer that restricts root penetration

and water movement. Slopes range from 2 to 10 percent.

Vaucluse soils are geographically associated with Blanton, Georgeville, Herndon, and Rion soils. These soils are only in the southeastern part of Fairfield County, where the Sand Hills and Piedmont join. None of these associated soils have the dense brittle layer of Vaucluse soils. In addition, Blanton soils have a sandy A horizon that is more than 40 inches thick. Georgeville and Herndon soils are more than 30 percent silt or more than 40 percent silt and very fine sand in the control section. Rion soils have a solum that is less than 40 inches thick.

Typical pedon of Vaucluse sand, 2 to 6 percent slopes, 7.4 miles southeast of Ridgeway in Fairfield County; 5,000 feet southeast of junction of State Highways 34 and 196; 250 feet southwest of junction of State Highway 34 and unmarked dirt road, 30 feet south of State Highway 34 in area of planted loblolly pine:

A1—0 to 4 inches; light yellowish brown (10YR 6/4) sand; weak fine granular structure; loose; many fine and medium roots; common fine pebbles of quartz; strongly acid; clear smooth boundary.

B1—4 to 16 inches; yellowish brown (10YR 5/6) sandy loam; few medium prominent red (2.5YR 4/6) mottles; weak fine granular structure; very friable; many fine and medium roots; coarse fine and very fine pores; few fine pebbles of quartz; strongly acid; clear smooth boundary.

B21t—16 to 22 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine prominent red (2.5YR 4/6) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine and very fine pores; strongly acid; gradual smooth boundary.

B22t—22 to 28 inches; brownish yellow (10YR 6/6) sandy clay; common coarse faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pebbles of quartz; few pockets (15 to 50 millimeters) of clay; thin patchy faint clay films on faces of peds; common weakly cemented peds; strongly acid; clear wavy boundary.

Bx1—28 to 40 inches; mottled red (2.5YR 5/8) and reddish yellow (7.5YR 6/8) sandy clay loam and very pale brown (10YR 7/3) sandy clay; thick platy structure parting to moderate or strong fine angular blocky; weakly cemented sandy clay loam, extremely firm sandy clay; few fine roots in cracks between brittle peds; few fine pebbles of quartz; few fine pores; few discontinuous distinct clay films between firm and brittle peds; strongly acid; gradual smooth boundary.

Bx2—40 to 50 inches; mottled red (2.5YR 4/8) and strong brown (7.5YR 5/8) sandy clay loam and very pale brown (10YR 7/3) sandy clay; massive; weakly cemented sandy clay loam, extremely firm sandy clay; few fine roots in cracks; brittle; strongly acid; gradual smooth boundary.

C—50 to 70 inches; mottled strong brown (7.5YR 5/8), light reddish brown (5YR 6/4), and light gray (10YR 7/1) sandy clay loam; massive; friable; few streaks of strong brown (7.5YR 5/8) clay (2 to 6 centimeters thick); very strongly acid.

Solum thickness ranges from 40 to more than 65 inches. Depth to the dense brittle layer ranges from 19 to 36 inches. Reaction is strongly acid or very strongly acid in the A, B1, and B2t horizons unless the surface layer has been limed. It is strongly acid to extremely acid in the Bx and C horizons.

The A1 or Ap horizon is 4 to 8 inches thick. It has hue of 10YR, value of 4 to 8, and chroma of 2 to 4. It is commonly sand but it ranges to loamy sand.

The A2 horizon, where present, is as much as 13 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 3 or 4. It is sand or loamy sand.

Most pedons have a B1 horizon. This horizon is 6 to 12 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 4 or 6.

The B2t horizon is 6 to 36 inches thick. It has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. It commonly is sandy clay loam, but some pedons have a subhorizon of sandy clay. Some pedons have common to many mottles in shades of red and brown.

The Bx horizon is 6 to 46 inches thick. It is mottled in shades of red, yellow, and brown. It is sandy clay loam or sandy clay. About 25 to 40 percent of the lower part of the Bx horizon is brittle and slightly cemented.

The C horizon is mottled in shades of yellow, red, brown, and gray. It is sandy loam, silt loam, or sandy clay loam.

Wateree series

The Wateree series consists of moderately deep, well drained, moderately rapidly permeable loamy soils that formed in material weathered from granite and gneiss. These sloping to steep soils are on narrow to broad slopes adjacent to drainageways. Slope is dominantly 6 to 20 percent but ranges to 40 percent.

Wateree soils are geographically associated with Appling, Cecil, Durham, Pacolet, Rion, and Wilkes soils. All these associated soils have an argillic horizon. Appling, Cecil, and Durham soils are on gently sloping to sloping, medium to broad ridgetops.

Typical pedon of Wateree sandy loam from an area of Wateree-Rion complex, 6 to 15 percent slopes, in Fairfield County, 11.5 miles north of Ridgeway, 4.2 miles east of junction of U.S. Highway 21 and State Highway 41; 3.3 miles west of junction of State Highways 317 and 101 on unpaved road; 400 feet due north of unpaved road:

A1—0 to 3 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; many fine and common medium roots; strongly acid; clear wavy boundary.

B21—3 to 13 inches; brownish yellow (10YR 6/6) sandy loam; weak fine subangular blocky structure; very friable; many fine and common medium roots; few fine flakes of mica; few pebbles of quartz; medium acid; gradual smooth boundary.

B22—13 to 22 inches; light yellowish brown (10YR 6/4) sandy loam; few fine faint strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; very friable; few fine roots; common fine flakes of mica; common pebbles of quartz; medium acid; gradual smooth boundary.

C—22 to 27 inches; mottled yellowish brown (10YR 5/4), strong brown (7.5YR 5/8), yellowish red (5YR 5/6), and white (5YR 8/1) sandy loam; massive; friable; many fine flakes of mica; common pebbles of quartz; medium acid; gradual smooth boundary.

Cr—27 to 54 inches; mottled yellowish brown (10YR 5/4), red (2.5YR 4/8), strong brown (7.5YR 5/8), yellowish red (5YR 5/6), and white (5YR 8/1) saprolite that crushes to sandy loam; massive; friable; many fine flakes of mica; common pebbles of quartz; few fine and medium roots in small cracks with thick clay films; medium acid; abrupt wavy boundary.

R—54 inches; white granite rock.

Solum thickness ranges from 14 to 24 inches. Depth to paralithic contact ranges from 20 to 40 inches. Reaction is very strongly acid to medium acid in the A horizon and extremely acid to medium acid in the B and C horizons.

The A1 horizon is 1 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 2 to 4.

The A2 horizon, where present, is as much as 6 inches thick. It has hue of 10YR, value of 4 to 7, and chroma of 3 or 4. It is loamy sand or sandy loam.

The B horizon is 6 to 21 inches thick. It has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8.

The C horizon is mottled in shades of brown, yellow, white, and black. It is sand, loamy sand, or sandy loam.

The Cr horizon is mottled in shades of brown, white, and black. It is weathered granite and gneiss that crushes to sand, loamy sand, or sandy loam.

Wilkes series

The Wilkes series consists of moderately deep, well drained, moderately slowly permeable clayey soils that formed in material weathered from hornblende schist, hornblende gneiss, diorite, or gabbro. These sloping to steep soils are on narrow to broad slopes adjacent to drainageways. Slopes range from 6 to 40 percent.

Wilkes soils are geographically associated with Cataula, Cecil, Madison, Mecklenburg, Pacolet, Vance, Wateree, and Winnsboro soils. Cataula, Cecil, Madison, Mecklenburg, Pacolet, Vance, and Winnsboro soils have a solum that is more than 20 inches thick. In addition, Cataula, Cecil, Madison, and Pacolet soils have kaolinitic mineralogy. Wateree soils have a coarse-loamy control section.

Typical pedon of Wilkes sandy loam, 6 to 15 percent slopes, 6.8 miles northeast of Winnsboro in Fairfield County, 0.9 mile northwest of junction of State Highways 200 and 20; 1,200 feet north of junction of State Highway 20 and unmarked dirt road leading north, 10 feet west of dirt road:

O1—1 inch to 0; partly decomposed mixed hardwood and pine litter.

A1—0 to 7 inches; pale brown (10YR 6/3) sandy loam; moderate medium granular structure; very friable; common fine and medium roots; few fine pores; medium acid; gradual smooth boundary.

B21t—7 to 10 inches; mottled yellowish red (5YR 5/8) and yellowish brown (10YR 5/4) clay; moderate medium angular blocky structure; very firm, sticky, plastic; thick continuous distinct clay films on faces of peds; few fine and medium roots; few fine pores; slightly acid; clear smooth boundary.

B22t—10 to 13 inches; yellowish brown (10YR 5/4) sandy clay; common medium distinct very pale brown (10YR 7/4) mottles and few fine distinct black mottles; moderate medium angular blocky structure; firm, slightly sticky, slightly plastic; thin discontinuous distinct clay films on faces of peds and in cracks; common fine fragments of weathered rock material; slightly acid; clear smooth boundary.

B3—13 to 19 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct white (10YR 8/1) and black (N 2/0) mottles; weak medium angular blocky structure; firm, slightly sticky; thin discontinuous distinct clay films on faces of peds and in cracks; few fine roots; common fine fragments of weathered rock material; neutral; gradual smooth boundary.

C—19 to 23 inches; mottled yellowish brown (10YR 5/4), white (5Y 8/1), and black (5Y 2/2) sandy loam; massive, contains original rock structure; moderately thick discontinuous distinct clay films in cracks; few fine roots along some cracks; friable; 90 percent soft saprolite; slightly acid; abrupt irregular boundary.

Cr—23 to 51 inches; light gray (5Y 7/2) and black (5Y 2/2) firm weathered rock material that crushes to sandy loam; few medium distinct yellowish brown (10YR 5/4) mottles; massive; hard; slightly acid.

R—51 inches, mottled black (5Y 2/2) and white (10YR 8/1) hard rock.

Solum thickness ranges from 10 to 19 inches. Reaction is strongly acid to slightly acid in the A horizon and slightly acid to mildly alkaline in the B and C horizons. Depth to rock ranges from 40 inches to more than 60 inches.

The A horizon ranges from 3 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It commonly is sandy loam but ranges to fine sandy loam and loam.

The B1 horizon, where present, is as much as 5 inches thick. It has hue of 7.5YR or 10YR, value of 5, and chroma of 4 or 6. It is sandy loam or sandy clay loam.

The B2t horizon ranges from 4 to 10 inches in thickness. It has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is clay, clay loam, or sandy clay. Mottles in shades of brown, yellow, and red range from few to common.

Most pedons have a B3 horizon. This horizon is as much as 5 inches thick. It has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. It is sandy clay loam or clay loam. Some pedons have few to common very dark grayish brown, dark olive gray, yellow, or very pale brown mottles.

The C horizon is mottled in shades of brown, gray, black, olive, white, or yellow. It is sandy loam, loam, or sandy clay loam.

The Cr horizon is mottled in shades of black, brown, olive, yellow, gray, or white. It is firm saprolite that crushes to loamy sand or sandy loam.

These soils differ from the defined range for the series in that the depth to paralithic material is more than 20 inches and they have a clayey B2t horizon. Because these differences do not alter use or behavior, they are considered taxadjuncts to the series.

Winnsboro series

The Winnsboro series consists of deep, well drained, slowly permeable clayey soils that formed in material weathered from gneiss and schist containing intrusions of diorite, hornblende, or gabbro. These gently sloping to moderately steep soils are on medium and broad ridges and side slopes adjacent to drainageways of the Piedmont Upland. Slopes range from 2 to 25 percent.

Winnsboro soils are geographically associated with Armenia, Cataula, Cecil, Helena, Iredell, Mecklenburg, Pacolet, and Wilkes soils. In the southern part of Fairfield County, Winnsboro soils are also associated with Georgeville and Herndon soils. Armenia soils are on flood plains or in depressions, and the chroma of the matrix is 2 or less. Cataula, Cecil, Georgeville, Mecklenburg, and Pacolet soils have hue of 2.5YR or redder. Herndon soils have more than 30 percent silt or 40 percent silt and very fine sand in the control section. Helena and Iredell soils have mottles of chroma 2 or less in the lower part of the B2t horizon. Also, Iredell soils have montmorillonitic mineralogy. Wilkes soils have a solum thinner than 20 inches.

Typical pedon of Winnsboro sandy loam, 2 to 6 percent slopes, 7.8 miles southeast of Winnsboro in Fairfield County, 2,700 feet east of junction of State Highways 115 and 30; 850 feet southwest of junction of State Highway 30 and unmarked dirt road leading south; 150 feet west of unmarked dirt road:

Ap—0 to 5 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine roots; common medium (5 to 6 millimeters) dark concretions; common angular pebbles of quartz; medium acid; abrupt smooth boundary.

A2—5 to 9 inches; light olive brown (2.5Y 5/4) sandy loam; weak fine granular structure; very friable; common fine roots; common angular pebbles of quartz; few medium (5 to 6 millimeters) dark concretions; slightly acid; abrupt smooth boundary.

B21t—9 to 16 inches; yellowish brown (10YR 5/6) clay; moderate coarse angular blocky structure; very firm, plastic; thick continuous distinct clay films on faces of peds; common fine roots; many very fine pores; few fine dark concretions; slightly acid; clear wavy boundary.

B22t—16 to 20 inches; yellowish brown (10YR 5/6) clay; common coarse distinct black (10YR 2/1) discrete bodies within peds; moderate coarse angular blocky structure; very firm, plastic; thick continuous distinct clay films on faces of peds; few fine roots; common very fine pores; slightly acid; clear wavy boundary.

B31—20 to 30 inches; mottled yellowish brown (10YR 5/6), black (10YR 2/1), and dark greenish gray (5G 4/1) loam; weak medium angular blocky structure; firm; thin patchy distinct clay films on faces of peds; slightly sticky; few fine roots; common very fine pores; most ped interiors are remnant rock material; common fine flakes of mica; slightly acid; gradual wavy boundary.

B32—30 to 38 inches; mottled strong brown (7.5YR 5/6), dark greenish gray (5G 4/1), black (10YR 2/1), brownish yellow (10YR 6/6), and olive gray (5Y 4/2) loam; weak medium angular blocky structure; firm; thin patchy distinct clay films on faces of peds; few fine roots; most ped interiors are remnant rock material; common very fine pores; slightly acid; clear wavy boundary.

C—38 to 51 inches; mottled dark greenish gray (5G 4/1), white (10YR 8/1), and black (10YR 2/1) sandy loam; massive; thin continuous distinct clay films in cracks and seams; neutral; abrupt wavy boundary.

Cr—51 to 65 inches; dark greenish gray and white weathered rock that crushes to sandy loam.

Solum thickness ranges from 22 to 40 inches. Reaction is strongly acid to slightly acid in the A horizon and slightly acid to mildly alkaline in the B and C horizons.

The A horizon ranges from 4 to 9 inches thick. It has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. It commonly is sandy loam but ranges to fine sandy loam, sandy clay loam, and loam.

Most pedons have an A2 horizon. This horizon is similar in color to the A1 horizon. It is sandy loam or loam.

The B1 horizon, where present, is as much as 6 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 4 or 6. It is sandy clay loam or clay loam.

The B2t horizon ranges from 10 to 32 inches thick. It has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. Fine manganese concretions range from none to common.

Most pedons have a B3 horizon. This horizon is as much as 8 inches thick. It is mottled in shades of yellow, brown, and olive. It is loam, clay loam, sandy clay loam, or sandy clay. Schist fragments and manganese concretions range from none to common.

The C horizon is mottled in shades of yellow, brown, olive, and gray. It is sandy loam, loam, sandy clay loam, or sandy clay.

The Cr horizon is mottled in shades of yellow, brown, gray, olive, white, and black. It is saprolite that crushes to sandy loam or loam.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

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.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

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.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

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.

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.

Depth to rock. Bedrock is too near the surface for the specified use.

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.

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.

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.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

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.

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.

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.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

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.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

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, slope, differences in slope, stoniness, and thickness.

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.

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.

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 groundwater 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.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil science, saprolite is any unconsolidated residual material underlying the soil and grading to hard bedrock below.

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.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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.

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.

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.

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).

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.

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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the low lands along 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.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

Month	Temperature[1]						Precipitation[1]				
	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[2]	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----	54.4	29.5	42.0	76	6	29	4.05	2.59	5.36	8	1.7
February---	57.7	31.6	44.7	77	10	36	4.07	2.49	5.48	7	1.1
March------	65.3	37.6	51.5	84	17	145	4.95	3.40	6.37	8	1.0
April------	75.4	47.0	61.2	91	26	336	3.92	2.57	5.14	6	.0
May--------	82.3	55.4	68.9	95	36	586	3.59	1.77	5.07	6	.0
June-------	88.1	62.9	75.6	100	47	768	3.97	1.93	5.62	7	.0
July-------	90.8	66.9	78.9	101	55	896	4.52	2.28	6.34	8	.0
August-----	90.0	66.2	78.1	100	54	871	4.53	2.12	6.48	6	.0
September--	84.9	60.1	72.5	98	42	675	4.03	1.37	6.18	5	.0
October----	75.3	48.4	61.8	90	25	371	2.93	.89	4.56	5	.0
November---	65.3	37.6	51.4	84	15	101	2.61	1.13	3.79	5	.0
December---	56.3	31.3	43.8	77	8	69	3.75	2.05	5.13	7	.9
Year-----	73.8	47.9	60.9	103	4	4,883	46.92	40.02	53.52	78	4.7

[1]Recorded in the period 1951-73 at Chester, S.C.

[2]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 6	April 18	April 28
2 years in 10 later than--	March 29	April 11	April 22
5 years in 10 later than--	March 12	March 29	April 10
First freezing temperature in fall:			
1 year in 10 earlier than--	October 22	October 22	October 15
2 years in 10 earlier than--	October 30	October 26	October 19
5 years in 10 earlier than--	November 15	November 3	October 27

[1]Recorded in the period 1951-73 at Chester, S.C.

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	207	195	176
8 years in 10	221	203	184
5 years in 10	247	219	199
2 years in 10	274	234	215
1 year in 10	287	242	223

[1]Recorded in the period 1951-73 at Chester, S.C.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Chester County	Fairfield County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
ApB	Appling loamy sand, 2 to 6 percent slopes	10,635	7,375	18,010	2.2
ApC	Appling loamy sand, 6 to 10 percent slopes	6,055	5,810	11,865	1.4
Ar	Armenia loam	2,080	30	2,110	0.3
BaB	Blanton sand, 2 to 6 percent slopes	0	310	310	*
CaB	Cataula sandy loam, 2 to 6 percent slopes	4,880	3,005	7,885	1.0
CaC	Cataula sandy loam, 6 to 10 percent slopes	230	2,120	2,350	0.3
CcC2	Cataula sandy clay loam, 6 to 10 percent slopes, eroded	8,480	18,535	27,015	3.3
CeB	Cecil sandy loam, 2 to 6 percent slopes	20,250	18,075	38,325	4.7
CnB2	Cecil sandy clay loam, 2 to 6 percent slopes, eroded	10,410	4,790	15,200	1.9
CnC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	27,505	23,615	51,120	6.2
Cw	Chewacla loam	12,480	12,235	24,715	3.0
DuB	Durham loamy sand, 2 to 6 percent slopes	265	410	675	0.1
GeB	Georgeville loam, 2 to 6 percent slopes	0	15,125	15,125	1.8
GeC	Georgeville loam, 6 to 10 percent slopes	0	21,025	21,025	2.6
HaB	Helena sandy loam, 2 to 6 percent slopes	2,390	2,360	4,750	0.6
HnB	Herndon loam, 2 to 6 percent slopes	0	8,060	8,060	1.0
HnD	Herndon loam, 6 to 15 percent slopes	0	6,100	6,100	0.7
HsB	Hiwassee sandy loam, 2 to 6 percent slopes	1,190	4,070	5,260	0.6
HsC	Hiwassee sandy loam, 6 to 10 percent slopes	1,085	1,275	2,360	0.3
HwB2	Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	1,490	2,905	4,395	0.5
HwC2	Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	2,060	6,350	8,410	1.1
IdB	Iredell fine sandy loam, 1 to 6 percent slopes	21,775	3,155	24,330	3.0
MaB	Madison sandy loam, 2 to 6 percent slopes	13,175	2,990	16,165	2.0
MdC2	Madison sandy clay loam, 6 to 10 percent slopes, eroded	22,950	6,575	29,525	3.6
MdE2	Madison sandy clay loam, 10 to 25 percent slopes eroded	16,175	13,725	29,900	3.6
MeB	Mecklenburg fine sandy loam, 2 to 6 percent slopes	8,835	1,765	10,600	1.3
MkC2	Mecklenburg sandy clay loam, 6 to 10 percent slopes, eroded	9,915	7,360	17,275	2.1
MoB	Molena Variant sand, 1 to 4 percent slopes	305	0	305	*
PaE	Pacolet sandy loam, 10 to 25 percent slopes	40,880	40,610	81,490	9.9
RnF	Rion loamy sand, 15 to 40 percent slopes	5,660	11,090	16,750	2.0
To	Toccoa loam	13,820	20,550	34,370	4.2
UD	Udorthents, loamy and clayey	380	330	710	0.1
VaB	Vance sandy loam, 2 to 6 percent slopes	960	2,020	2,980	0.4
VnC2	Vance sandy clay loam, 6 to 10 percent slopes, eroded	1,630	2,865	4,495	0.5
VuB	Vaucluse sand, 2 to 6 percent slopes	0	2,490	2,490	0.3
VuC	Vaucluse sand, 6 to 10 percent slopes	0	460	460	0.1
WaD	Wateree-Rion complex, 6 to 15 percent slopes	1,295	9,095	10,390	1.3
WaF	Wateree-Rion complex, 15 to 40 percent slopes	4,575	20,815	25,390	3.1
WkD	Wilkes sandy loam, 6 to 15 percent slopes	35,655	28,260	63,915	7.8
WkF	Wilkes sandy loam, 15 to 40 percent slopes	35,225	59,065	94,290	11.5
WnB	Winnsboro sandy loam, 2 to 6 percent slopes	8,255	13,345	21,600	2.6
WnC	Winnsboro sandy loam, 6 to 10 percent slopes	11,910	21,270	33,180	4.0
WnE	Winnsboro sandy loam, 10 to 25 percent slopes	7,180	9,400	16,580	2.0
	Water	1,960	6,185	8,145	1.0
	Total	374,000	447,000	821,000	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Soybeans	Cotton lint	Wheat	Grain sorghum	Legume hay	Tall fescue
	Bu	Bu	Lb	Bu	Bu	Ton	AUM*
ApB---------- Appling	95	35	650	45	50	4.0	8.0
ApC---------- Appling	80	30	600	40	45	3.5	7.5
Ar---------- Armenia	70	30	700	---	55	2.5	7.0
BaB---------- Blanton	60	25	350	25	40	3.5	---
CaB---------- Cataula	70	25	700	50	35	3.2	6.0
CaC---------- Cataula	60	20	600	45	35	3.0	6.0
CcC2---------- Cataula	---	---	---	---	---	2.2	5.0
CeB---------- Cecil	95	25	750	50	35	3.2	7.0
CnB2---------- Cecil	70	20	500	45	30	2.4	6.5
CnC2---------- Cecil	60	20	500	40	30	2.2	6.0
Cw---------- Chewacla	100	35	900	60	60	5.0	8.0
DuB---------- Durham	85	35	700	45	50	3.4	8.0
GeB---------- Georgeville	90	25	700	50	60	3.0	6.0
GeC---------- Georgeville	80	20	625	45	55	2.8	5.5
HaB---------- Helena	75	25	575	45	50	3.5	6.5
HnB---------- Herndon	90	25	700	50	55	3.0	8.0
HnD---------- Herndon	70	18	500	40	40	2.5	7.0
HsB---------- Hiwassee	95	30	550	40	60	4.0	8.0
HsC---------- Hiwassee	85	25	500	35	55	3.2	7.5
HwB2---------- Hiwassee	75	25	450	35	50	3.0	6.5
HwC2---------- Hiwassee	70	20	375	30	45	2.5	6.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Cotton lint	Wheat	Grain sorghum	Legume hay	Tall fescue
	Bu	Bu	Lb	Bu	Bu	Ton	AUM*
IdB---------- Iredell	65	30	900	30	40	3.0	7.0
MaB---------- Madison	90	40	700	40	55	3.2	6.5
MdC2---------- Madison	80	25	600	30	50	2.4	6.0
MdE2---------- Madison	---	---	---	---	---	2.0	5.5
MeB---------- Mecklenburg	90	40	550	40	55	3.5	7.0
MkC2---------- Mecklenburg	55	25	450	35	40	3.0	6.5
MoB---------- Molena Variant	75	25	600	40	40	3.5	8.0
PaE---------- Pacolet	---	---	---	---	---	2.0	5.5
To---------- Toccoa	90	30	900	50	65	4.0	6.5
VaB---------- Vance	80	35	500	60	40	2.8	6.5
VnC2---------- Vance	70	25	400	50	35	2.2	5.5
VuB---------- Vaucluse	60	25	500	35	35	4.0	5.0
VuC---------- Vaucluse	50	20	400	30	30	3.0	4.0
WaD---------- Wateree-Rion	---	---	---	---	---	2.0	4.1
WkD---------- Wilkes	---	---	---	---	---	2.5	7.0
WnB---------- Winnsboro	85	35	700	45	40	3.5	7.0
WnC---------- Winnsboro	75	30	600	40	35	2.8	6.5
WnE---------- Winnsboro	---	---	---	---	---	2.0	5.5

* 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.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I:					
Chester County	---	---	---	---	---
Fairfield County	---	---	---	---	---
II:					
Chester County	100,590	86,770	13,820	---	---
Fairfield County	97,280	76,730	20,550	---	---
III:					
Chester County	51,655	36,790	14,560	305	---
Fairfield County	77,165	64,590	12,265	310	---
IV:					
Chester County	64,290	64,290	---	---	---
Fairfield County	55,445	55,445	---	---	---
V:					
Chester County	---	---	---	---	---
Fairfield County	---	---	---	---	---
VI:					
Chester County	93,490	93,490	---	---	---
Fairfield County	105,900	105,900	---	---	---
VII:					
Chester County	61,635	61,635	---	---	---
Fairfield County	104,695	104,695	---	---	---
VIII:					
Chester County	---	---	---	---	---
Fairfield County	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for other species]

Soil name and map symbol	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
ApB, ApC: Appling	3o	Slight	Slight	Slight	Loblolly pine	81	Eastern redcedar, loblolly pine, yellow-poplar.
					Shortleaf pine	65	
					Scarlet oak	68	
					Southern red oak	76	
					Virginia pine	74	
					White oak	71	
					Yellow-poplar	90	
Ar: Armenia	4w	Slight	Moderate	Moderate	Loblolly pine	67	Loblolly pine, eastern redcedar.
					Shortleaf pine	58	
					Post oak	44	
					White oak	47	
					Water oak	---	
					Sweetgum	---	
BaB: Blanton	3s	Slight	Moderate	Moderate	Slash pine	80	Loblolly pine.
					Loblolly pine	80	
					Longleaf pine	70	
CaB, CaC: Cataula	3o	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, yellow-poplar, white oak, southern red oak.
					Shortleaf pine	66	
					Scarlet oak	84	
					White oak	81	
					Yellow-poplar	88	
CcC2: Cataula	5c	Moderate	Moderate	Moderate	Loblolly pine	65	Loblolly pine, Virginia pine.
					Shortleaf pine	55	
CeB: Cecil	3o	Slight	Slight	Slight	Eastern white pine	80	Loblolly pine, yellow-poplar.
					Loblolly pine	80	
					Shortleaf pine	69	
					Virginia pine	73	
					Black oak	66	
					Northern red oak	82	
					Post oak	65	
					Scarlet oak	80	
CnB2, CnC2: Cecil	4c	Moderate	Moderate	Moderate	Loblolly pine	72	Loblolly pine, Virginia pine.
					Shortleaf pine	66	
					Virginia pine	65	
Cw: Chewacla	1w	Slight	Moderate	Moderate	Loblolly pine	96	Loblolly pine, American sycamore, yellow-poplar, sweetgum, green ash.
					Yellow-poplar	104	
					American sycamore	90	
					Sweetgum	97	
					Water oak	86	
					Eastern cottonwood	100	
					Green ash	97	
					Southern red oak	90	
DuB: Durham	3o	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, yellow-poplar.
					Post oak	70	
					Shortleaf pine	72	
					Southern red oak	80	
					Sweetgum	80	
					White oak	70	
					Yellow-poplar	80	
GeB, GeC: Georgeville	3o	Slight	Slight	Slight	Loblolly pine	81	Loblolly pine, Virginia pine, eastern redcedar, black walnut, yellow-poplar.
					Longleaf pine	67	
					Shortleaf pine	63	
					White oak	69	
					Scarlet oak	70	
					Southern red oak	67	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Woodland suitability group	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
HaB---------- Helena	3w	Slight	Moderate	Slight	Loblolly pine------- Shortleaf pine------ White oak---------- Yellow-poplar-------	80 63 64 87	Loblolly pine, Virginia pine, yellow-poplar.
HnB, HnD---------- Herndon	3o	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ White oak---------- Southern red oak---- Yellow-poplar-------	80 61 65 72 91	Loblolly pine, Virginia pine, eastern redcedar, yellow-poplar.
HsB, HsC---------- Hiwassee	3o	Slight	Slight	Slight	Loblolly pine------- Northern red oak---- Shortleaf pine------ White oak---------- Yellow-poplar-------	75 70 70 70 85	Loblolly pine, yellow-poplar.
HwB2, HwC2--------- Hiwassee	4c	Moderate	Moderate	Moderate	Loblolly pine------- Shortleaf pine------	70 60	Loblolly pine, eastern redcedar, Virginia pine.
IdB---------- Iredell	4c	Slight	Moderate	Moderate	Loblolly pine------- Shortleaf pine------ Post oak---------- White oak----------	67 58 44 47	Loblolly pine, eastern redcedar.
MaB, MdC2---------- Madison	3o	Slight	Slight	Slight	Loblolly pine------- Longleaf pine------- Shortleaf pine------ Southern red oak---- Yellow-poplar-------	73 63 66 81 96	Loblolly pine, longleaf pine, yellow-poplar.
MdE2---------- Madison	3r	Moderate	Moderate	Slight	Loblolly pine------- Short leaf pine----- Longleaf pine------- Virginia pine-------	72 66 60 66	Loblolly pine, longleaf pine, yellow-poplar.
MeB, MkC2---------- Mecklenburg	4o	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak---- Sweetgum---------- White oak---------- Yellow-poplar------- Eastern redcedar----	75 67 75 82 71 89 ---	Loblolly pine, Virginia pine, yellow-poplar, eastern redcedar.
MoB---------- Molena Variant	3s	Slight	Moderate	Moderate	Loblolly pine------- Southern red oak---- White oak---------- Eastern redcedar----	85 90 70 ---	Loblolly pine.
PaE---------- Pacolet	3r	Moderate	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Yellow-poplar-------	78 70 90	Loblolly pine, shortleaf pine, yellow-poplar.
RnF---------- Rion	3r	Moderate	Moderate	Moderate	Loblolly pine------- Post oak---------- Shortleaf pine------ Southern red oak---- Sweetgum---------- White oak---------- Yellow-poplar-------	80 70 70 80 80 70 80	Loblolly pine, shortleaf pine, yellow-poplar.
To---------- Toccoa	1o	Slight	Slight	Slight	Loblolly pine------- Yellow-poplar------- Sweetgum---------- Southern red oak----	90 107 100 ---	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
VaB, VnC2---------- Vance	3o	Slight	Slight	Slight	Loblolly pine------- Northern red oak---- Shortleaf pine------ White oak----------	76 --- --- ---	Loblolly pine, Virginia pine, yellow-poplar.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Woodland suitability group	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
VuB, VuC Vaucluse	3o	Slight	Slight	Slight	Loblolly pine	76	Loblolly pine.
WaD*:							
Wateree	3r	Slight	Slight	Slight	Loblolly pine	77	Loblolly pine, Virginia pine, yellow-poplar.
					Shortleaf pine	69	
					Southern red oak	72	
					Yellow-poplar	84	
					Virginia pine	71	
					White oak	68	
Rion	3r	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, shortleaf pine, yellow-poplar.
					Post oak	70	
					Shortleaf pine	70	
					Southern red oak	80	
					Sweetgum	80	
					White oak	70	
					Yellow-poplar	80	
WaF*:							
Wateree	3r	Moderate	Moderate	Moderate	Loblolly pine	77	Loblolly pine, Virginia pine, yellow-poplar.
					Shortleaf pine	69	
					Southern red oak	72	
					Yellow-poplar	84	
					Virginia pine	71	
					White oak	68	
Rion	3r	Moderate	Moderate	Moderate	Loblolly pine	80	Loblolly pine, shortleaf pine, yellow-poplar.
					Post oak	70	
					Shortleaf pine	70	
					Southern red oak	80	
					Sweetgum	80	
					White oak	70	
					Yellow-poplar	80	
WkD Wilkes	4o	Slight	Slight	Slight	Loblolly pine	75	Eastern redcedar, loblolly pine, Virginia pine.
					Post oak	79	
					Shortleaf pine	63	
					Southern red oak	76	
					Sweetgum	82	
WkF Wilkes	4r	Moderate	Moderate	Slight	Loblolly pine	75	Eastern redcedar, loblolly pine, Virginia pine.
					Post oak	79	
					Shortleaf pine	63	
					Southern red oak	76	
					Sweetgum	82	
WnB, WnC Winnsboro	4o	Slight	Slight	Slight	Loblolly pine	73	Eastern redcedar, loblolly pine.
					Shortleaf pine	63	
					Virginia pine	63	
					Post oak	55	
					Red maple	70	
					Southern red oak	84	
					Sweetgum	78	
					White oak	69	
					Yellow-poplar	88	
WnE Winnsboro	4r	Moderate	Moderate	Slight	Loblolly pine	73	Eastern redcedar, loblolly pine.
					Shortleaf pine	63	
					Virginia pine	63	
					Post oak	55	
					Red maple	70	
					Southern red oak	84	
					Sweetgum	78	
					White oak	69	
					Yellow-poplar	88	

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 8.--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
ApB Appling	Slight	Slight	Moderate: slope.	Slight.
ApC Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Ar Armenia	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
BaB Blanton	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
CaB Cataula	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
CaC Cataula	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
CcC2 Cataula	Moderate: percs slowly, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.
CeB Cecil	Slight	Slight	Moderate: slope.	Slight.
CnB2 Cecil	Slight	Moderate: too clayey.	Moderate: slope.	Moderate: too clayey.
CnC2 Cecil	Moderate: slope.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
Cw Chewacla	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods.
DuB Durham	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope.	Moderate: too sandy.
GeB Georgeville	Slight	Slight	Moderate: slope.	Slight.
GeC Georgeville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HaB Helena	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: percs slowly, wetness.	Moderate: wetness.
HnB Herndon	Slight	Slight	Moderate: slope.	Slight.
HnD Herndon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HsB Hiwassee	Slight	Slight	Moderate: slope.	Slight.
HsC Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HwB2 Hiwassee	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope.	Moderate: too clayey.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
HwC2 Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.
IdB Iredell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
MaB Madison	Slight	Slight	Moderate: slope.	Slight.
MdC2 Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.
MdE2 Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MeB Mecklenburg	Slight	Slight	Moderate: slope, small stones.	Slight.
MkC2 Mecklenburg	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MoB Molena Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
PaE Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
RnF Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
To Toccoa	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
UD*. Udorthents				
VaB Vance	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
VnC2 Vance	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight.
VuB Vaucluse	Moderate: percs slowly, too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Slight.
VuC Vaucluse	Moderate: percs slowly, too sandy.	Moderate: too sandy.	Severe: slope.	Slight.
WaD*:				
Wateree	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.
Rion	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.
WaF*:				
Wateree	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WkD Wilkes	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
WkF---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WnB---------- Winnsboro	Moderate: percs slowly.	Slight----------	Moderate: slope, small stones, percs slowly.	Slight.
WnC---------- Winnsboro	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
WnE---------- Winnsboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ApB---------- Appling	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
ApC---------- Appling	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Ar---------- Armenia	Fair	Good	Fair	Fair	Fair	---	Fair	Good	Fair	Fair	Fair.
BaB---------- Blanton	Poor	Fair	Fair	Poor	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
CaB---------- Cataula	Fair	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
CaC---------- Cataula	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
CcC2---------- Cataula	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
CeB---------- Cecil	Good	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
CnB2, CnC2--------- Cecil	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
Cw---------- Chewacla	Poor	Fair	Fair	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
DuB---------- Durham	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
GeB, GeC---------- Georgeville	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
HaB---------- Helena	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
HnB---------- Herndon	Good	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
HnD---------- Herndon	Fair	Good	Fair	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
HsB---------- Hiwassee	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
HsC---------- Hiwassee	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
HwB2---------- Hiwassee	Fair	Fair	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Very poor.
HwC2---------- Hiwassee	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
IdB---------- Iredell	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
MaB---------- Madison	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
MdC2---------- Madison	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MdE2 Madison	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Fair	Very poor.
MeB Mecklenburg	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
MkC2 Mecklenburg	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
MoB Molena Variant	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
PaE Pacolet	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
RnF Rion	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
To. Toccoa											
UD*. Udorthents											
VaB Vance	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
VnC2 Vance	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
VuB, VuC Vaucluse	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
WaD*:											
Wateree	Poor	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Rion	Poor	Fair	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
WaF*:											
Wateree	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Rion	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
WkD Wilkes	Poor	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
WkF Wilkes	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
WnB Winnsboro	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
WnC Winnsboro	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
WnE Winnsboro	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 10.--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	Lawns and landscaping
ApB---------- Appling	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: too sandy.
ApC---------- Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
Ar---------- Armenia	Severe: floods, wetness, too clayey.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: low strength, wetness, floods.	Severe: wetness.
BaB---------- Blanton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: too sandy.
CaB---------- Cataula	Moderate: cemented pan.	Moderate: low strength, shrink-swell.	Moderate: cemented pan, low strength.	Moderate: low strength, slope, shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
CaC, CcC2--------- Cataula	Moderate: slope, cemented pan.	Moderate: low strength, slope, shrink-swell.	Moderate: cemented pan, low strength, slope.	Severe: slope.	Moderate: low strength, shrink-swell.	Moderate: slope.
CeB, CnB2--------- Cecil	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Moderate: low strength, shrink-swell.	Slight.
CnC2---------- Cecil	Moderate: too clayey, slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Moderate: low strength, slope, shrink-swell.	Moderate: slope.
Cw---------- Chewacla	Severe: wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: wetness, floods, low strength.	Severe: floods.
DuB---------- Durham	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: too sandy.
GeB---------- Georgeville	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
GeC---------- Georgeville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
HaB---------- Helena	Severe: too clayey.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, low strength.	Moderate: wetness.
HnB---------- Herndon	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
HnD---------- Herndon	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
HsB---------- Hiwassee	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: slope.	Moderate: low strength.	Slight.
HsC---------- Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HwB2 Hiwassee	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: slope.	Moderate: low strength.	Slight.
HwC2 Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
IdB Iredell	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.	Moderate: wetness.
MaB Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
MdC2 Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MdE2 Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MeB Mecklenburg	Severe: too clayey.	Severe: low strength.	Moderate: shrink-swell.	Severe: low strength.	Severe: low strength.	Slight.
MkC2 Mecklenburg	Severe: too clayey.	Severe: low strength.	Moderate: slope, shrink-swell.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
MoB Molena Variant	Moderate: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: too sandy.
PaE Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RnF Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
To Toccoa	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
UD*. Udorthents						
VaB Vance	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
VnC2 Vance	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
VuB Vaucluse	Slight	Slight	Slight	Moderate: slope.	Slight	Severe: too sandy.
VuC Vaucluse	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: too sandy.
WaD*:						
Wateree	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: thin layer, slope.
Rion	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
WaF*:						
Wateree	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WkD---------- Wilkes	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope.	Moderate: slope.	Moderate: slope.
WkF---------- Wilkes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WnB---------- Winnsboro	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
WnC---------- Winnsboro	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
WnE---------- Winnsboro	Severe: too clayey, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell, slope.	Severe: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 11.--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
ApB---------- Appling	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
ApC---------- Appling	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Ar---------- Armenia	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: wetness.
BaB---------- Blanton	Slight----------	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy, seepage.
CaB---------- Cataula	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
CaC, CcC2---------- Cataula	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
CeB, CnB2---------- Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight----------	Fair: too clayey.
CnC2---------- Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, seepage.	Moderate: slope.	Fair: too clayey, slope.
Cw---------- Chewacla	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
DuB---------- Durham	Slight----------	Moderate: slope, seepage.	Slight----------	Slight----------	Good.
GeB---------- Georgeville	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Poor: too clayey.
GeC---------- Georgeville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
HaB---------- Helena	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
HnB---------- Herndon	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight----------	Poor: too clayey.
HnD---------- Herndon	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
HsB---------- Hiwassee	Moderate: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Fair: too clayey.
HsC---------- Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.

TABLE 11.--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
HwB2 Hiwassee	Moderate: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Fair: too clayey.
HwC2 Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
IdB Iredell	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: thin layer.
MaB Madison	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
MdC2 Madison	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
MdE2 Madison	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
MeB Mecklenburg	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Slight	Poor: thin layer.
MkC2 Mecklenburg	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope.	Poor: thin layer.
MoB Molena Variant	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
PaE Pacolet	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
RnF Rion	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
To Toccoa	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
UD*, Udorthents					
VaB Vance	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
VnC2 Vance	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
VuB Vaucluse	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
VuC Vaucluse	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
WaD*:					
Wateree	Severe: depth to rock.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: thin layer, small stones, slope.
Rion	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: thin layer, slope.

See footnote at end of table.

TABLE 11.--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
WaF*:					
Wateree	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
Rion	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
WkD Wilkes	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer.
WkF Wilkes	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, seepage, slope.	Severe: slope, seepage.	Poor: thin layer.
WnB Winnsboro	Severe: percs slowly.	Moderate: slope.	Severe: depth to rock.	Slight	Fair: thin layer.
WnC Winnsboro	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, slope.
WnE Winnsboro	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ApB, ApC: Appling	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Ar: Armenia	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
BaB: Blanton	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
CaB, CaC, CcC2: Cataula	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
CeB, CnB2, CnC2: Cecil	Fair: low strength, shrink-swell.	Poor: excess fines.	Poor: excess fines.	Poor: thin layer.
Cw: Chewacla	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
DuB: Durham	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too sandy.
GeB, GeC: Georgeville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
HaB: Helena	Poor: shrink-swell, low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
HnB, HnD: Herndon	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
HsB, HsC, HwB2, HwC2: Hiwassee	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
IdB: Iredell	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MaB, MdC2, MdE2: Madison	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MeB, MkC2: Mecklenburg	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MoB: Molena Variant	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
PaE: Pacolet	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
RnF: Rion	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
To: Toccoa	Good	Poor: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UD*. Udorthents				
VaB, VnC2 Vance	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
VuB, VuC Vaucluse	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too sandy.
WaD*:				
Wateree	Poor: thin layer.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Fair: slope.
Rion	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, thin layer, slope.
WaF*:				
Wateree	Poor: thin layer, slope.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Poor: slope.
Rion	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
WkD Wilkes	Poor: thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WkF Wilkes	Poor: slope, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
WnB Winnsboro	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
WnC Winnsboro	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, slope.
WnE Winnsboro	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 13.--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-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
ApB: Appling	Moderate: seepage.	Moderate: low strength.	Not needed	Favorable	Favorable	Favorable.
ApC: Appling	Moderate: seepage.	Moderate: low strength.	Not needed	Slope	Slope	Favorable.
Ar: Armenia	Slight	Severe: wetness.	Percs slowly, floods.	Wetness, percs slowly, floods.	Not needed	Wetness, percs slowly.
BaB: Blanton	Severe: seepage.	Severe: piping, seepage.	Not needed	Droughty, fast intake, soil blowing.	Soil blowing, too sandy.	Droughty.
CaB, CaC, CcC2: Cataula	Slight	Severe: hard to pack, piping.	Not needed	Rooting depth, slope, percs slowly.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
CeB, CnB2, CnC2: Cecil	Moderate: seepage.	Moderate: hard to pack.	Not needed	Slope, slow intake.	Slope	Slope.
Cw: Chewacla	Moderate: seepage.	Severe: hard to pack, piping, wetness.	Poor outlets, floods.	Wetness, floods.	Not needed	Wetness.
DuB: Durham	Moderate: seepage.	Slight	Not needed	Favorable	Favorable	Favorable.
GeB: Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed	Complex slope, erodes easily.	Favorable	Favorable.
GeC: Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed	Complex slope, erodes easily.	Complex slope, erodes easily.	Slope, erodes easily.
HaB: Helena	Moderate: depth to rock.	Moderate: thin layer, hard to pack, wetness.	Percs slowly	Percs slowly, wetness.	Slope, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
HnB: Herndon	Moderate: seepage.	Severe: compressible, low strength, erodes easily.	Not needed	Complex slope, erodes easily.	Favorable	Favorable.
HnD: Herndon	Moderate: seepage.	Severe: compressible, low strength, erodes easily.	Not needed	Complex slope, erodes easily.	Complex slope	Erodes easily, slope.
HsB: Hiwassee	Moderate: seepage.	Moderate: compressible.	Not needed	Favorable	Favorable	Favorable.
HsC: Hiwassee	Moderate: seepage.	Moderate: compressible.	Not needed	Slope	Favorable	Favorable.
HwB2: Hiwassee	Moderate: seepage.	Moderate: compressible.	Not needed	Favorable	Favorable	Favorable.
HwC2: Hiwassee	Moderate: seepage.	Moderate: compressible.	Not needed	Slope	Favorable	Favorable.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
IdB: Iredell	Slight	Moderate: hard to pack.	Percs slowly, slope.	Percs slowly, slope, wetness.	Percs slowly, wetness.	Percs slowly, slope.
MaB, MdC2, MdE2: Madison	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed	Slow intake, slope.	Slope	Slope.
MeB, MkC2: Mecklenburg	Slight	Severe: hard to pack.	Not needed	Slow intake, percs slowly, slope.	Slope, percs slowly.	Percs slowly, slope.
MoB: Molena Variant	Severe: seepage.	Moderate: seepage.	Not needed	Droughty, fast intake.	Slope, too sandy.	Droughty.
PaE: Pacolet	Moderate: seepage.	Moderate: hard to pack.	Not needed	Slope	Slope	Slope.
RnF: Rion	Severe: seepage.	Moderate: thin layer.	Not needed	Fast intake, slope.	Slope, too sandy.	Slope.
To: Toccoa	Severe: seepage.	Moderate: piping.	Not needed	Floods, seepage.	Not needed	Favorable.
UD*. Udorthents						
VaB: Vance	Slight	Moderate: hard to pack.	Not needed	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
VnC2: Vance	Slight	Moderate: hard to pack.	Not needed	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
VuB, VuC: Vaucluse	Slight	Moderate: piping.	Not needed	Complex slope	Complex slope, percs slowly.	Percs slowly.
WaD*:						
Wateree	Severe: seepage.	Moderate: seepage, thin layer.	Not needed	Slope, droughty, fast intake.	Depth to rock	Droughty, depth to rock, slope.
Rion	Severe: seepage.	Moderate: thin layer.	Not needed	Fast intake, slope.	Too sandy	Slope.
WaF*:						
Wateree	Severe: seepage.	Moderate: seepage, thin layer.	Not needed	Slope, droughty, fast intake.	Depth to rock, slope.	Droughty, depth to rock, slope.
Rion	Severe: seepage.	Moderate: thin layer.	Not needed	Fast intake, slope.	Slope, too sandy.	Slope.
WkD, WkF: Wilkes	Slight	Moderate: thin layer.	Not needed	Slow intake, slope.	Depth to rock, slope.	Slope.
WnB: Winnsboro	Slight	Moderate: thin layer.	Not needed	Percs slowly	Percs slowly	Percs slowly.
WnC: Winnsboro	Slight	Moderate: thin layer.	Not needed	Percs slowly, slope.	Percs slowly	Percs slowly, slope.
WnE: Winnsboro	Slight	Moderate: thin layer.	Not needed	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

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	
ApB, ApC---------- Appling	0-8	Loamy sand------	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	8-42	Sandy clay, clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-92	51-80	41-74	15-30
	42-60	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	60-70	Variable--------	---	---	---	---	---	---	---	---	---
Ar---------- Armenia	0-7	Loam----------	ML	A-4	0-1	95-100	90-100	75-95	51-80	<30	NP-7
	7-20	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6, A-7	0-1	95-100	85-100	70-90	30-75	20-50	5-25
	20-48	Clay, silty clay, clay loam.	CH	A-7	0-1	95-100	95-100	85-100	65-95	55-100	30-70
	48-80	Sandy loam, sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	85-100	75-100	55-90	30-70	<40	NP-15
BaB---------- Blanton	0-52	Sand----------	SP-SM	A-3, A-2-4	0	100	100	65-100	5-12	---	NP
	52-68	Sandy loam, loamy sand, loamy coarse sand.	SM	A-2-4	0	100	100	65-95	13-30	---	NP
	68-80	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC, SM	A-4, A-2-4, A-2-6, A-6	0	100	100	69-95	25-50	18-23	4-12
CaB, CaC---------- Cataula	0-12	Sandy loam------	SM, SM-SC	A-2, A-4	0-3	95-100	90-100	65-85	20-40	<20	NP-7
	12-31	Clay, clay loam, sandy clay.	MH, ML, CL, CH	A-7, A-6	0	98-100	90-100	80-95	60-85	36-72	11-38
	31-51	Sandy clay loam, sandy clay, clay loam.	MH, ML	A-5, A-7	0	98-100	90-100	85-95	51-90	41-75	2-30
	51-85	Sandy clay loam, clay loam.	CL, ML, CL-ML, SC	A-4, A-6	0-1	95-100	90-100	70-100	40-70	20-40	2-20
CcC2---------- Cataula	0-12	Sandy clay loam	CL, ML, SC, SM	A-4, A-6, A-7	0-2	96-100	90-100	70-90	36-60	25-48	9-20
	12-31	Clay, clay loam, sandy clay.	MH, ML, CL, CH	A-7, A-6	0	98-100	90-100	80-95	60-85	36-72	11-38
	31-51	Sandy clay loam, sandy clay, clay loam.	MH, ML	A-5, A-7	0	98-100	90-100	85-95	51-90	41-75	2-30
	51-85	Sandy clay loam, clay loam.	CL, ML, CL-ML, SC	A-4, A-6	0-1	95-100	90-100	70-100	40-70	20-40	2-20
CeB---------- Cecil	0-5	Sandy loam------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	5-52	Clay----------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	52-72	Variable--------	---	---	---	---	---	---	---	---	---
CnB2, CnC2--------- Cecil	0-5	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0	74-100	72-100	68-95	38-81	21-35	3-15
	5-52	Clay----------	MH, ML	A-7, A-5	0	97-100	92-100	72-99	55-95	41-80	9-37
	52-72	Variable--------	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Cw---------- Chewacla	0-14	Loam----------	ML	A-4, A-5, A-6, A-7	0	98-100	95-100	70-100	55-90	36-50	4-18
	14-30	Silt loam, silty clay loam, clay loam.	ML, MH	A-4, A-5, A-6, A-7	0	96-100	95-100	80-100	51-98	36-56	4-20
	30-38	Sandy clay loam, loam, sandy loam.	SM, CL-ML, SM-SC, ML	A-4	0	96-100	95-100	60-80	36-70	<35	NP-7
	38-43	Silt loam, clay loam, silty clay loam.	ML, MH	A-4, A-5, A-6, A-7	0	75-100	65-100	60-100	51-98	32-61	4-28
	43-60	Variable--------	---	---	---	---	---	---	---	---	---
DuB---------- Durham	0-12	Loamy sand------	SM	A-2	0-3	95-100	90-100	50-85	13-30	<11	NP-3
	12-40	Sandy clay loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0	100	95-100	70-90	30-55	20-47	10-25
	40-48	Sandy clay loam, sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	95-100	50-85	18-49	<20	NP-10
	48-60	Variable--------	---	---	---	---	---	---	---	---	---
GeB, GeC---------- Georgeville	0-4	Loam----------	ML, CL-ML	A-4	0-3	90-100	85-100	65-100	51-98	<40	NP-10
	4-30	Silty clay, silty clay loam, clay loam.	MH, ML	A-7-5	0	95-100	95-100	90-100	75-98	41-75	15-35
	30-60	Silty clay loam, silt loam, clay loam.	MH	A-7-5	0	95-100	90-100	65-100	60-98	50-75	15-35
	60-70	Silt loam-------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	65-100	60-95	<30	NP-10
HaB---------- Helena	0-16	Sandy loam------	SM, SM-SC, SC	A-2, A-4	0	95-100	90-100	51-86	27-46	<30	NP-9
	16-60	Clay loam, sandy clay, clay.	CH, MH	A-7	0	95-100	95-100	73-93	56-80	50-85	24-50
	60-66	Variable--------	---	---	---	---	---	---	---	---	---
HnB, HnD---------- Herndon	0-12	Loam----------	ML, CL-ML	A-4	0	90-100	90-100	80-98	65-90	<35	NP-10
	12-36	Silty clay loam, silty clay, clay.	MH, ML	A-7	0	98-100	95-100	95-99	80-98	41-70	13-30
	36-72	Silt loam, loam, fine sandy loam.	MH, ML	A-7, A-5	0-2	90-100	85-100	80-99	70-95	41-70	9-36
HsB, HsC---------- Hiwassee	0-4	Sandy loam------	SM, SM-SC	A-4, A-2	0-2	95-100	90-100	70-95	30-50	<35	NP-7
	4-70	Clay, silty clay, clay loam.	CL, ML, MH	A-7-5, A-7-6, A-6	0-2	95-100	95-100	80-100	70-95	36-52	12-20
HwB2, HwC2--------- Hiwassee	0-4	Sandy clay loam	CL, ML, CL-ML	A-7-6, A-6, A-4	0-2	95-100	95-100	90-100	50-85	25-50	5-23
	4-70	Clay, silty clay, clay loam.	CL, ML, MH	A-7-5, A-7-6, A-6	0-2	95-100	95-100	80-100	70-95	36-52	12-20
IdB---------- Iredell	0-7	Fine sandy loam	SM	A-2-4, A-4	0-1	90-98	80-90	65-80	30-50	<35	NP-9
	7-24	Clay----------	CH	A-7	0	99-100	85-100	80-100	65-95	60-115	30-85
	24-27	Loam, sandy clay loam, clay loam.	CL, CH, SC	A-7	0-1	98-100	85-100	70-95	40-75	41-60	20-39
	27-68	Variable--------	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
MaB---------- Madison	0-4	Sandy loam------	SM	A-2, A-4	0-3	85-100	80-100	60-90	26-49	<35	NP-8
	4-26	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	26-80	Variable--------	---	---	---	---	---	---	---	---	---
MdC2, MdE2--------- Madison	0-4	Sandy clay loam	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	4-26	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	26-80	Variable--------	---	---	---	---	---	---	---	---	---
MeB---------- Mecklenburg	0-7	Fine sandy loam	ML, SM	A-4, A-6, A-7-6	0-5	90-100	80-100	65-90	36-65	<45	NP-15
	7-39	Clay----------	CH, MH	A-7	0-5	90-100	85-100	80-100	75-95	51-75	24-45
	39-72	Variable--------	---	---	---	---	---	---	---	---	---
MkC2---------- Mecklenburg	0-7	Sandy clay loam	CL	A-6, A-7-6	0-5	100	100	80-100	50-80	25-49	11-25
	7-39	Clay----------	CH, MH	A-7	0-5	90-100	85-100	80-100	75-95	51-75	24-45
	39-72	Variable--------	---	---	---	---	---	---	---	---	---
MoB---------- Molena Variant	0-6	Sand----------	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	5-15	---	NP
	6-44	Sandy loam, loamy sand.	SM, SP-SM, SM-SC	A-2	0	100	98-100	55-85	10-30	<25	NP-6
	44-64	Fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	95-100	65-95	5-15	---	NP
PaE---------- Pacolet	0-3	Sandy loam------	SM, SM-SC	A-2	0-2	85-100	80-100	60-80	20-35	<36	NP-10
	3-37	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-65	11-30
	37-70	Variable--------	---	---	---	---	---	---	---	---	---
RnF---------- Rion	0-7	Loamy sand------	SM	A-2	0-2	90-100	80-100	60-80	15-30	---	NP
	7-38	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-80	30-60	20-35	5-15
	38-60	Variable--------	---	---	---	---	---	---	---	---	---
To---------- Toccoa	0-8	Loam----------	SM, ML	A-2, A-4	0	98-100	95-100	85-100	25-60	<30	NP-4
	8-74	Sandy loam, loam	SM, ML	A-2, A-4	0	95-100	90-100	60-100	30-55	<30	NP-4
UD*. Udorthents											
VaB---------- Vance	0-4	Sandy loam------	SM, SM-SC	A-2, A-4	0-5	90-100	80-100	55-80	15-40	<27	NP-5
	4-37	Clay loam, sandy clay, clay.	CH, MH	A-7	0-5	95-100	90-100	75-95	65-80	51-80	25-48
	37-60	Variable--------	---	---	---	---	---	---	---	---	---
VnC2---------- Vance	0-4	Sandy clay loam	CL, SC	A-6	0-5	95-100	90-100	70-95	40-70	25-40	8-20
	4-37	Clay loam, sandy clay, clay.	CH, MH	A-7	0-5	95-100	90-100	75-95	65-80	51-80	25-48
	37-60	Variable--------	---	---	---	---	---	---	---	---	---
VuB, VuC---------- Vaucluse	0-4	Sand----------	SM, SP-SM	A-2, A-3	0	98-100	90-100	51-70	8-30	---	NP
	4-28	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	98-100	90-100	51-70	25-50	20-40	5-18
	28-50	Sandy clay loam, sandy loam, sandy clay.	SC, SM-SC	A-2, A-4, A-6	0	95-100	92-100	55-75	20-50	22-40	4-20
	50-70	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6, A-7	0	98-100	95-100	51-90	20-85	<50	NP-20

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
WaD*:											
Wateree	0-3	Sandy loam	SM	A-2	0-15	80-100	70-95	45-80	25-35	<30	NP-7
	3-22	Sandy loam	SM	A-2, A-4	0-15	85-100	75-98	50-80	25-40	<30	NP-7
	22-27	Sand, loamy sand, sandy loam.	SP-SM, SM	A-1, A-2, A-3	0-15	70-100	65-98	40-80	5-30	---	NP
	27-54	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rion	0-7	Loamy sand	SM	A-2	0-2	90-100	80-100	60-80	15-30	---	NP
	7-38	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-80	30-60	20-35	5-15
	38-60	Variable	---	---	---	---	---	---	---	---	---
WaF*:											
Wateree	0-3	Sandy loam	SM	A-2	0-15	80-100	70-95	45-80	25-35	<30	NP-7
	3-22	Sandy loam	SM	A-2, A-4	0-15	85-100	75-98	50-80	25-40	<30	NP-7
	22-27	Sand, loamy sand, sandy loam.	SP-SM, SM	A-1, A-2, A-3	0-15	70-100	65-98	40-80	5-30	---	NP
	27-54	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rion	0-7	Loamy sand	SM	A-2	0-2	90-100	80-100	60-80	15-30	---	NP
	7-38	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-80	30-60	20-35	5-15
	38-60	Variable	---	---	---	---	---	---	---	---	---
WkD, WkF Wilkes	0-7	Sandy loam	ML, SM, SM-SC	A-2, A-4	0-10	90-100	80-100	60-92	25-55	<35	NP-7
	7-19	Clay loam, clay, sandy clay loam.	CL, CH, MH	A-6, A-7	0-10	80-100	80-100	75-95	50-80	30-60	11-32
	19-51	Weathered bedrock.	---	---	---	---	---	---	---	---	---
WnB, WnC, WnE Winnsboro	0-9	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	60-85	25-50	<30	NP-7
	9-20	Clay, clay loam	CH	A-7	0-5	90-100	85-100	75-95	65-95	51-90	25-55
	20-51	Loam, sandy clay loam, sandy loam.	CL, SC, ML, SM	A-4, A-6	0-5	90-100	85-100	70-95	40-75	25-40	3-15
	51-65	Variable	---	---	---	---	---	---	---	---	---

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[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
	In	In/hr	In/in	pH	
ApB, ApC--------- Appling	0-8	2.0-6.0	0.10-0.15	4.5-5.5	Low.
	8-42	0.6-2.0	0.15-0.17	4.5-5.5	Moderate.
	42-60	0.6-2.0	0.12-0.16	4.5-5.5	Low.
	60-70	---	---	---	---
Ar---------- Armenia	0-7	0.6-2.0	0.16-0.24	5.6-7.3	Low.
	7-20	0.06-0.6	0.12-0.20	6.1-7.8	Moderate.
	20-48	0.06-0.2	0.12-0.20	6.1-7.8	High.
	48-80	0.2-0.6	0.10-0.18	6.1-7.8	Low.
BaB---------- Blanton	0-52	6.0-20	0.03-0.07	4.5-6.0	Low.
	52-68	2.0-6.0	0.10-0.15	4.5-5.5	Low.
	68-80	0.6-2.0	0.10-0.15	4.5-5.5	Low.
CaB, CaC--------- Cataula	0-12	2.0-6.0	0.08-0.11	4.5-6.0	Low.
	12-31	0.2-0.6	0.13-0.18	4.5-6.0	Moderate.
	31-51	0.06-0.2	0.06-0.08	4.5-6.0	Low.
	51-85	0.2-0.6	0.10-0.15	4.5-6.0	Low.
CcC2---------- Cataula	0-12	0.6-2.0	0.12-0.16	4.5-6.0	Low.
	12-31	0.2-0.6	0.13-0.18	4.5-6.0	Moderate.
	31-51	0.06-0.2	0.06-0.08	4.5-6.0	Low.
	51-85	0.2-0.6	0.10-0.15	4.5-6.0	Low.
CeB---------- Cecil	0-5	2.0-6.0	0.12-0.14	4.5-6.0	Low.
	5-52	0.6-2.0	0.13-0.15	4.5-5.5	Moderate.
	52-72	---	---	---	---
CnB2, CnC2------- Cecil	0-5	0.6-2.0	0.13-0.15	4.5-6.0	Low.
	5-52	0.6-2.0	0.13-0.15	4.5-5.5	Moderate.
	52-72	---	---	---	---
Cw---------- Chewacla	0-14	0.6-2.0	0.15-0.24	4.5-6.5	Low.
	14-30	0.6-2.0	0.15-0.24	4.5-6.5	Low.
	30-38	0.6-2.0	0.12-0.20	4.5-6.5	Low.
	38-43	0.6-2.0	0.15-0.24	4.5-6.5	Low.
	43-60	---	---	---	---
DuB---------- Durham	0-12	2.0-6.0	0.06-0.10	4.5-6.0	Low.
	12-40	0.6-2.0	0.12-0.16	4.5-5.5	Low.
	40-48	0.6-2.0	0.08-0.14	4.5-5.5	Low.
	48-60	---	---	---	---
GeB, GeC--------- Georgeville	0-4	0.6-2.0	0.15-0.20	4.5-6.0	Low.
	4-30	0.6-2.0	0.13-0.18	4.5-5.5	Low.
	30-60	0.6-2.0	0.13-0.18	4.5-5.5	Low.
	60-70	0.6-2.0	0.05-0.10	4.5-5.5	Low.
HaB---------- Helena	0-16	2.0-6.0	0.10-0.12	4.5-6.0	Low.
	16-60	0.06-0.2	0.13-0.15	4.5-5.5	High.
	60-66	---	---	---	---
HnB, HnD--------- Herndon	0-12	0.6-2.0	0.14-0.20	4.5-6.5	Low.
	12-36	0.6-2.0	0.13-0.18	3.6-5.5	Low.
	36-72	0.6-6.0	0.05-0.08	3.6-5.5	Low.
HsB, HsC--------- Hiwassee	0-4	0.6-2.0	0.10-0.14	4.5-6.5	Low.
	4-70	0.6-2.0	0.12-0.15	4.5-6.5	Low.
HwB2, HwC2------- Hiwassee	0-4	0.6-2.0	0.12-0.15	4.5-6.5	Low.
	4-70	0.6-2.0	0.12-0.15	4.5-6.5	Low.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential
	In	In/hr	In/in	pH	
IdB---------- Iredell	0-7	2.0-6.0	0.12-0.15	5.6-7.3	Low.
	7-24	0.06-0.2	0.16-0.22	6.1-7.3	Very high.
	24-27	0.06-0.6	0.14-0.18	6.1-7.8	High.
	27-62	---	---	---	---
MaB---------- Madison	0-4	2.0-6.0	0.11-0.15	4.5-6.0	Low.
	4-26	0.6-2.0	0.13-0.18	4.5-5.5	Low.
	26-80	---	---	---	---
MdC2, MdE2------- Madison	0-4	0.6-2.0	0.12-0.16	4.5-6.0	Low.
	4-26	0.6-2.0	0.13-0.18	4.5-5.5	Low.
	26-80	---	---	---	---
MeB---------- Mecklenburg	0-7	0.6-2.0	0.14-0.19	5.6-7.3	Low.
	7-39	0.06-0.2	0.12-0.14	5.6-7.3	Moderate.
	39-72	---	---	---	---
MkC2---------- Mecklenburg	0-7	0.6-2.0	0.12-0.14	5.6-7.3	Low.
	7-39	0.06-0.2	0.12-0.14	5.6-7.3	Moderate.
	39-72	---	---	---	---
MoB---------- Molena Variant	0-6	6.0-20	0.05-0.07	6.1-7.3	Low.
	6-44	2.0-20	0.07-0.10	6.1-7.3	Low.
	44-64	6.0-20	0.05-0.07	6.1-7.3	Low.
PaE---------- Pacolet	0-3	2.0-6.0	0.08-0.12	4.5-6.0	Low.
	3-37	0.6-2.0	0.12-0.15	4.5-6.0	Low.
	37-70	---	---	---	---
RnF---------- Rion	0-7	2.0-6.0	0.06-0.08	4.5-6.0	Low.
	7-38	0.6-2.0	0.08-0.15	4.5-6.0	Low.
	38-60	2.0-6.0	0.06-0.12	4.5-6.0	Low.
To---------- Toccoa	0-8	2.0-6.0	0.09-0.12	5.1-6.5	Low.
	8-74	2.0-6.0	0.06-0.12	5.1-6.5	Low.
UD*. Udorthents					
VaB---------- Vance	0-4	2.0-6.0	0.10-0.14	4.5-6.0	Low.
	4-37	0.06-0.2	0.12-0.15	4.5-5.5	Moderate.
	37-60	---	---	---	---
VnC2---------- Vance	0-4	0.6-2.0	0.12-0.15	4.5-6.0	Low.
	4-37	0.06-0.2	0.12-0.15	4.5-5.5	Moderate.
	37-60	---	---	---	---
VuB---------- Vaucluse	0-4	6.0-20	0.04-0.08	4.5-5.5	Low.
	4-28	0.6-6.0	0.10-0.15	4.5-5.5	Low.
	28-50	0.06-0.2	0.05-0.08	4.0-5.5	Low.
	50-70	2.0-6.0	0.05-0.08	4.0-5.5	Low.
WaD*, WaF*:					
Wateree---------	0-3	2.0-6.0	0.08-0.12	4.5-6.0	Low.
	3-22	2.0-6.0	0.08-0.12	3.6-6.0	Low.
	22-27	2.0-6.0	0.04-0.12	3.6-6.0	Low.
	27-54	---	---	---	---
Rion----------	0-7	2.0-6.0	0.06-0.08	4.5-6.0	Low.
	7-38	0.6-2.0	0.08-0.15	4.5-6.0	Low.
	38-60	2.0-6.0	0.06-0.12	4.5-6.0	Low.

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential
	In	In/hr	In/in	pH	
WkD, WkF--------- Wilkes	0-7	2.0-6.0	0.11-0.15	5.1-6.5	Low.
	7-19	0.2-0.6	0.15-0.20	6.1-7.8	Moderate.
	19-51	---	---	---	---
WnB, WnC, WnE---- Winnsboro	0-9	2.0-6.0	0.11-0.15	5.1-6.5	Low.
	9-20	0.06-0.2	0.15-0.20	6.1-7.8	High.
	20-51	0.2-0.6	0.15-0.20	6.1-7.8	Moderate.
	51-65	---	---	---	---

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Flooding			High water table			Bedrock		Risk of corrosion	
	Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
				Ft			In			
ApB, ApC: Appling	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Ar: Armenia	Occasional	Brief	Dec-Apr	0.5-1.5	Apparent	Dec-Apr	>60	---	High	Low.
BaB: Blanton	None	---	---	>6.0	---	---	>60	---	High	High.
CaB, CaC, CcC2: Cataula	None	---	---	>6.0	---	---	>60	---	High	High.
CeB, CnB2, CnC2: Cecil	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Cw: Chewacla	Common	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
DuB: Durham	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
GeB, GeC: Georgeville	None	---	---	>6.0	---	---	>60	---	High	High.
HaB: Helena	None	---	---	1.0-2.5	Perched	Jan-Mar	>60	---	High	High.
HnB, HnD: Herndon	None	---	---	>6.0	---	---	>60	---	High	High.
HsB, HsC, HwB2, HwC2: Hiwassee	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
IdB: Iredell	None	---	---	1.0-2.0	Perched	Nov-Mar	>60	---	High	Low.
MaB, MdC2, MdE2: Madison	None	---	---	>6.0	---	---	>60	---	High	Moderate.
MeB, MkC2: Mecklenburg	None	---	---	>6.0	---	---	>60	---	High	Moderate.
MoB: Molena Variant	None	---	---	>6.0	---	---	>60	---	Low	Low.
PaE: Pacolet	None	---	---	>6.0	---	---	>60	---	High	High.
RnF: Rion	None	---	---	>6.0	---	---	>60	---	Moderate	High.
To: Toccoa	Occasional	Brief	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---	Low	Moderate.
UD*. Udorthents										
VaB, VnC2: Vance	None	---	---	>6.0	---	---	>60	---	High	High.
VuB, VuC: Vaucluse	None	---	---	>6.0	---	---	>60	---	Low	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Flooding			High water table			Bedrock		Risk of corrosion	
	Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
				Ft			In			
WaD*, WaF*:										
Wateree	None	---	---	>6.0	---	---	40-60	Hard	Low	High.
Rion	None	---	---	>6.0	---	---	>60	---	Moderate	High.
WkD, WkF Wilkes	None	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate.
WnB, WnC, WnE Winnsboro	None	---	---	>6.0	---	---	>60	---	High	Low.

* See map unit description for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution								Liquid limit	Plasticity index
			Percentage passing sieve					Percentage smaller than--				
	AASHTO	Unified	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm		
											Pct	
Appling loamy sand:[1] (S73SC039-007)												
Ap---------- 0 to 8	A-2-4(00)	SM	100	100	95	75	18	--	10	--	--	NP
B21t---------- 8 to 20	A-6(05)	CL	100	100	95	82	55	--	46	--	36	13
Georgeville loam:[2] (S73SC039-002)												
Ap---------- 0 to 4	A-4(00)	ML	96	92	88	84	70	--	21	--	--	NP
B21t---------- 4 to 12	A-7-5(21)	MH	100	92	80	79	76	--	62	--	61	24
Herndon fine sandy loam:[3] (S73SC039-003)												
A11---------- 0 to 2	A-2-4(00)	SM	93	86	79	64	35	--	14	--	--	NP
B22t----------11 to 19	A-7-5(20)	MH	100	91	77	74	67	--	57	--	63	30
Hiwassee sandy loam:[4] (S73SC039-006)												
Ap---------- 0 to 4	A-2-4(00)	SM	100	100	97	72	30	--	16	--	--	NP
B22t----------10 to 16	A-7-6(10)	CL	100	100	97	84	63	--	56	--	44	18
Iredell fine sandy loam:[5] (S73SC039-001)												
A11---------- 0 to 2	A-4(00)	SM	100	100	92	62	38	--	12	--	--	NP
B21t----------11 to 17	A-7-5(17)	CH	95	83	64	61	56	--	46	--	64	34
Mecklenburg fine sandy loam:[6] (S73SC023-001)												
Ap---------- 0 to 4	A-6(01)	SC	98	94	83	67	39	--	33	--	32	13
B21t---------- 4 to 12	A-7-5(29)	MH	100	100	93	88	77	--	70	--	67	34

[1] 14.5 miles northeast of Winnsboro; 2,300 feet northeast of junction of county highway 55 and State Highway 200; 100 feet south of State Highway 200.

[2] 8.9 miles southwest of Winnsboro; 1,250 feet north of junction of county highways 30 and 227; 20 feet west of county highway 227.

[3] 9 miles southeast of Winnsboro toward Ridgeway; 200 feet northeast of street adjacent to Geiger School.

[4] 15 miles southwest of Winnsboro; 2 miles south of junction of county highways 99 and 57; 120 feet west of county highway 57.

[5] 7 miles southeast of Winnsboro; 4,300 feet east of junction of U.S. Highway 321 and county highway 30; 90 feet north of county highway 30.

[6] 15 miles east of Chester; 800 feet east of junction of county highway 444 and State Highway 9; 1,500 feet north on field road; 200 feet northwest. Taxadjunct - the solum is 6 inches thicker than allowed in the series.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of the characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Armenia	Fine, montmorillonitic, thermic Typic Argiaquolls
Blanton	Loamy, siliceous, thermic Grossarenic Paleudults
Cataula	Clayey, kaolinitic, thermic Typic Fragiudults
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Durham	Fine-loamy, siliceous, thermic Typic Hapludults
Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Helena	Clayey, mixed, thermic Aquic Hapludults
Herndon	Clayey, kaolinitic, thermic Typic Hapludults
Hiwassee	Clayey, kaolinitic, thermic Typic Rhodudults
Iredell	Fine, montmorillonitic, thermic Typic Hapludalfs
Madison	Clayey, kaolinitic, thermic Typic Hapludults
Mecklenburg	Fine, mixed, thermic Ultic Hapludalfs
Molena Variant	Coarse-loamy, mixed, thermic Ultic Hapludalfs
Pacolet	Clayey, kaolinitic, thermic Typic Hapludults
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Vance	Clayey, mixed, thermic Typic Hapludults
Vaucluse	Fine-loamy, siliceous, thermic Typic Fragiudults
Wateree	Coarse-loamy, mixed, thermic Typic Dystrochrepts
*Wilkes	Loamy, mixed, thermic, shallow Typic Hapludalfs
Winnsboro	Fine, mixed, thermic Typic Hapludalfs

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