Issued December 1967

SOIL SURVEY

Carroll County, Virginia

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

Major fieldwork for this soil survey was done in the period 1957–62. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1962. This survey was made cooperatively by the Soil Conservation Service and the Virginia Agricultural Experiment Station; it is part of the technical assistance furnished to the New River Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

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

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

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the interpretative groupings.

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

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Soil Interpretations for Wildlife Habitat."

Community planners and others concerned with nonfarm development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Soil Interpretations for Nonfarm Uses."

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

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

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

Newcomers in Carroll County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County."

Cover picture: Stripcropping on Chester-Glenelg loams, sloping. The wooded area is Myersville stony loam, thin solum, steep.

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EXPLANATION

Series Year and Series Number

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

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

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

SOIL SURVEY OF CARROLL COUNTY, VIRGINIA

BY W. E. THOMAS, JR., L. E. WILLIAMSON, D. L. SMITH, R. L. HODGES, F. W. HURSEY, AND G. V. WILSON, SOIL CONSERVATION SERVICE

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

CARROLL COUNTY is in the southwestern part of Virginia (fig. 1). The area totals about 496 square miles. A large part of the county is in the Blue Ridge Mountains, but small parts extend south into the Piedmont Plateau and north into the Ridge and Valley province. The population in 1960 was 23,178 persons. Hillsville is the county seat.

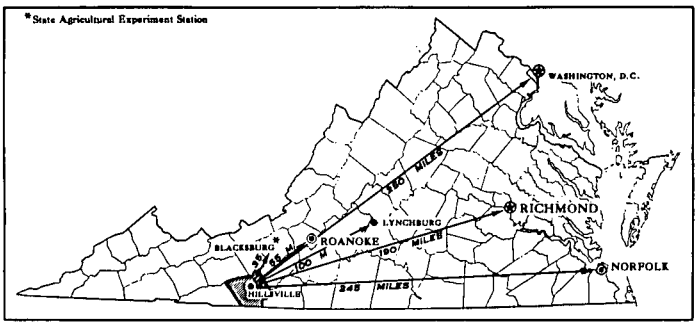

Figure 1.—Location of Carroll County in Virginia.

The county is mainly agricultural. More than half the acreage in farms is used as woodland, and about 60 percent of the acreage cleared is used as pasture. Most farm income is from livestock, mainly beef and dairy cattle. A few sheep, hogs, and poultry are also raised. Well-suited crops include hay, which is the crop most extensively grown, and pasture and orchards. Apples are an important crop.

The chief industries are lumbering, furniture manufacturing, and textile manufacturing.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Carroll County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug or bored many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Chester and Wickham, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

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

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Wickham fine sandy loam, gently sloping, is one of three phases of Wickham fine sandy loam, a soil type that includes both sloping and gently sloping phases.

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

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in individual areas of such small size that it is not practical to show them separately on the map. They show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily a soil complex is named for the major kinds of soil in it, for example, Chester-Glenelg loams, gently sloping. Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example of an undifferentiated group is Hiwassee and Turbeville loams, gently sloping.

On most soil maps it is necessary to show areas that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on the map like other mapping units, but they are given descriptive names, such as Gullied land and Stony colluvial land, and are called land types rather than soils.

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

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

General Soil Map

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

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

The eleven associations in Carroll County are described in this section. More detailed information about the individual soils in each association can be obtained by studying the detailed soil map and by reading the section "Descriptions of the Soils."

1. Manor-Talladega-Watauga association

Shallow to moderately deep, well-drained to excessively drained, micaceous, sloping to very steep soils on strongly dissected uplands

This association is in the northeastern corner of the county, mainly along Greasy Creek. It is dissected by intermittent and permanent streams that have steep gradients and are close together. Most of the area is steep, but there are a few sloping to moderately steep ridgetops. This association makes up about 2.5 percent of the county.

Manor soils, which make up about 45 percent of association 1, are sloping to very steep, micaceous throughout, and somewhat excessively drained. The depth to weathered micaceous rock is 15 to 20 inches, and the depth to hard bedrock is 5 to 15 feet in most places. The surface layer is brown to dark-brown loam. The subsoil is thin. Manor soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good. The available moisture capacity is low.

Talladega soils, which make up about 35 percent of the acreage, are micaceous throughout, excessively drained, and sloping to steep. The depth to the weathered micaceous rock is 10 to 20 inches, and the depth to hard bedrock is 3 to 6 feet. The surface layer is brown to dark-brown silt loam, and the subsoil is yellowish-brown silt loam. Talladega soils are strongly acid, their fertility is low, and their content of organic matter is low. Tilth is good. The available moisture capacity is low.

Watauga soils, which make up about 10 percent of the acreage, are micaceous throughout, well drained, and

sloping to steep. The depth to bedrock is 5 to 10 feet. The surface layer is brown to dark-brown silt loam, and the subsoil is brown to yellowish-brown silty clay loam. Watauga soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good.

The remaining 10 percent of this association consists of Hatboro, Myersville, Porters, Tusquitee, Wickham, Elioak, and other soils, and Rock land, gneiss and schist.

About 60 percent of this association is used as woodland, 5 percent is used for crops, and 35 percent is used as pasture. About 10 percent is suitable for cultivation. The main crops are corn and a hay mixture of orchardgrass and clover. Raising beef cattle is the main farming enterprise.

2. *Ramsey-Weikert-Hazel association*

Shallow to moderately deep, excessively drained, very stony and channery, sloping to very steep soils on strongly dissected uplands

This association occupies a strip about 2 miles wide along the northern boundary of the county. It is dissected by intermittent and permanent streams that have steep gradients and are close together. Most of this association is steep or very steep. This association makes up about 14.7 percent of the county.

Two small areas are characterized by ridges that have sloping tops and short steep side slopes. In these two areas the geology and the soils are unlike those in the rest of the association. The larger of these areas occupies about 4,700 acres around Sylvatus and includes soils that formed from crystalline rocks and are predominantly sandy. The smaller area occupies about 2,200 acres in a strip extending northwest from Shorts Creek and includes soils influenced by crystalline and limestone rocks.

Ramsey soils, which make up about 35 percent of association 2, are steep and very steep, excessively drained, and in most places shallow. They have many coarse fragments throughout the profile. The surface layer is yellowish-brown to olive-brown loam. The subsoil where present is heavy fine sandy loam. Ramsey soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is poor.

Weikert soils, which make up about 35 percent of the acreage, are sloping to very steep, shallow, and excessively drained. The surface layer is grayish-brown very shaly silt loam. The subsoil is yellowish-brown shaly silt loam. Weikert soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is fair. The available moisture capacity is low.

Hazel soils, which make up about 10 percent of the acreage, are sloping to very steep, shallow to moderately deep, and excessively drained. In places they contain many channery fragments of phyllite. The surface layer is dark-brown to light yellowish-brown silt loam. The underlying material is brown to dark yellowish-brown silt loam. Hazel soils are strongly acid, low in natural fertility, and low in organic-matter content. Tilth is fair.

The remaining 20 percent of this association consists of Worsham, Hayesville, Hatboro, Louisburg, Edneyville, Hiwassee, Turbeville, Shelocta, and other soils.

About 80 percent of this association is used as woodland, 15 percent is used as pasture, and 5 percent is used for crops. From 5 to 7 percent is suitable for cultivation. The main crops are corn and a hay mixture of orchardgrass and clover. Dairying and raising of beef cattle are the only farm enterprises. Farming is confined mostly to the areas around Sylvatus and northwest of Shorts Creek.

3. *Hazel-Manor-Gilpin association*

Shallow to moderately deep, well-drained to excessively drained, sloping to very steep soils on dissected uplands

This association occupies two narrow strips in the northern part of the county. It is dissected by intermittent and permanent streams that are moderately steep and close together. This association makes up about 2 percent of the county.

Hazel soils, which make up about 60 percent of association 3, are sloping to very steep, generally shallow, and excessively drained. In places they contain channery fragments of phyllite. The surface layer is dark-brown to light yellowish-brown silt loam. The underlying material is silt loam that contains numerous coarse fragments. Hazel soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is fair. The available moisture capacity is low.

The Manor soils, which make up about 20 percent of the acreage, are sloping to very steep, shallow, micaceous, and somewhat excessively drained. The depth to weathered micaceous material is 15 to 20 inches. The depth to hard bedrock is 6 to 15 feet. The surface layer is dark-brown to brown loam. The subsoil is thin and micaceous. Manor soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good. The available moisture capacity is low.

Gilpin soils, which make up about 10 percent of the acreage, are sloping to moderately steep, well drained, and moderately deep to bedrock. The surface layer is dark yellowish-brown silt loam. The subsoil is heavy silt loam to light silty clay loam. Gilpin soils are strongly acid, low in fertility, and low or medium in organic-matter content. Tilth is good.

The remaining 10 percent of the association consists of Tusquitee, Chester, Glenelg, Hayesville, and Hatboro soils.

About 70 percent of this association is used as woodland, 10 percent is used for crops, and 20 percent is used as pasture. About 20 percent is suitable for cultivation. The crops commonly grown are corn, orchardgrass, and clover.

4. *Madison-Wickham-Talladega association*

Deep, well-drained and excessively drained, gently sloping and sloping soils on colluvial slopes and deep to shallow, sloping to steep soils on uplands

This association occupies a strip about a mile and a half wide at the base of the Blue Ridge Mountains. It is dissected by intermittent and permanent streams. Broad ridges are between the streams. This association makes up about 2.8 percent of the county.

Madison soils, which make up about 50 percent of association 4, are sloping to steep, deep, and well drained. The surface layer is dark grayish-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red to red clay loam to clay. Madison soils are

strongly acid, low in fertility, and low in organic-matter content. Tilth is good.

Wickham soils, which make up about 20 percent of the association, are gently sloping and sloping, deep, and well drained. The surface layer is dark grayish-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red to dark reddish-brown clay loam to silty clay loam. Wickham soils are strongly acid, generally low in fertility, and low in content of organic matter. Tilth is good.

Talladega soils, which make up about 20 percent of the acreage, are sloping to steep and excessively drained. The surface layer is dark-brown to brown silt loam. The underlying soil material is reddish-brown to yellowish-red heavy silt loam. The solum is shallow over weathered micaceous material. Talladega soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good.

Cecil soils are extensive on some of the wide, gently sloping and sloping ridges, especially around Cana. These soils are deep and well drained and have a reddish clay loam to clay subsoil.

The rest of this association consists chiefly of Starr, Tusquitee, Hatboro, Codorus, Hiwassee, and Turbeville soils.

About 40 percent of this association is used as woodland, 20 percent is used for crops, and 40 percent is used as pasture. The crops grown are corn, peaches, apples, flue-cured tobacco, and lespedeza, alfalfa, orchardgrass, and clover for hay.

5. *Madison-Talladega association*

Deep to shallow, well-drained and excessively drained, gently sloping to steep soils on uplands

This association occupies most of the Piedmont section of Carroll County. It is strongly dissected by intermittent and permanent streams, both large and small. It includes some broad ridgetops, flood plains, and stream terraces. This association makes up about 6.4 percent of the county.

Madison soils, which make up about 65 percent of association 5, are gently sloping to steep, deep, and well drained. The surface layer is dark grayish-brown to yellowish-brown fine sandy loam. The subsoil is yellowish-red to red clay loam to clay. Madison soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good.

Talladega soils, which make up about 22 percent of the acreage, are sloping to steep and are excessively drained. Their surface layer is brown to dark-brown silt loam. The subsoil is yellowish-red heavy silt loam. Talladega soils are shallow over weathered micaceous material. They are strongly acid, low in fertility, and low in organic-matter content. Tilth is good.

The remaining 13 percent of this association consists of Fletcher, Comus, State, Turbeville, Hiwassee, and other soils.

About 50 percent of this association is used as woodland, 20 percent is used for crops, and 30 percent is used as pasture. The crops grown are corn, flue-cured tobacco, peaches, apples, and alfalfa, orchardgrass, lespedeza, and clover for hay.

6. *Chester-Glenelg-Manor association*

Deep and moderately deep, well-drained or somewhat excessively drained soils on dissected uplands

This association occupies four separate areas in the county. The largest area is a band 4 miles wide that extends from the Grayson County line near Galax eastward beyond U.S. Highway 52 and south of Hillsville. This association makes up about 26.4 percent of the county.

Chester and Glenelg soils, which together make up about 50 percent of association 6, are deep, well-drained, and dominantly sloping and moderately steep. Both are on broad ridgetops and short, steep side slopes. The surface layer is dark-brown to dark yellowish-brown loam. The subsoil is yellowish-red silty clay loam or clay loam. The Chester and Glenelg soils are acid, low to medium in fertility, and low to medium in content of organic matter. Tilth is good.

Manor soils, which make up about 30 percent of the acreage, are sloping to very steep, micaceous, and somewhat excessively drained. They are mainly on steep slopes adjacent to intermittent and permanent streams. The depth to weathered material is 15 to 20 inches, and the depth to bedrock is generally 5 to 15 feet. The surface layer is brown to dark-brown loam. The subsoil is thin and micaceous. Manor soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good. The available moisture capacity is low.

Myersville soils, which make up about 8 percent of the acreage, are gently sloping to steep, well drained, and moderately deep and deep. The surface layer is dark yellowish-brown to dark-brown loam. The subsoil is silty clay loam. Myersville soils are medium acid or strongly acid, medium in fertility, and medium in organic-matter content. Tilth is good.

The remaining 12 percent of this association consists of Hatboro, Porters, Tusquitee, Starr, and Hayesville soils and Stony land, Porters materials, and Rock land, gneiss and schist.

About 40 percent of this association is used as woodland, 20 percent is used for crops, and 40 percent is used as pasture. About 30 percent is suitable for cultivation. The main crops are corn and alfalfa, orchardgrass, and clover grown for hay. This area is used for dairying and raising beef cattle.

7. *Porters-Chester-Glenelg-Manor association*

Deep to shallow, well-drained or somewhat excessively drained, gently sloping to very steep soils on strongly dissected uplands

This association is dissected by intermittent and permanent streams that have steep gradients and are close together. It has the highest peaks in the county. Most of the area is moderately steep and steep, but there are a few gently sloping or sloping narrow ridgetops. This association occupies four widely separated areas and makes up about 5 percent of the county. The largest area is in the southwestern part of the county along the Blue Ridge Parkway.

Porters soils, which make up about 40 percent of association 7, are sloping to very steep and are mostly

moderately deep and well drained. The surface layer is very dark grayish-brown to brown loam. The subsoil is heavy loam to light clay loam. Porters soils are acid, medium in fertility, and medium in content of organic matter. Tilth is good.

Chester and Glenelg soils, which together make up about 20 percent of the acreage, are deep and well drained. Both range from gently sloping to steep, and both are dominantly sloping. The surface layer is dark-brown to dark yellowish-brown loam. The subsoil is silty clay loam or clay loam. These soils are acid, low to medium in fertility, and low to medium in organic-matter content. Tilth is good.

Manor soils, which make up about 20 percent of the acreage, are deep, micaceous, and somewhat excessively drained. They range from sloping to very steep, but they are mostly steep. The depth to weathered micaceous material is 15 to 20 inches. The depth to hard bedrock ranges mostly from 5 to 15 feet. The surface layer is brown to dark-brown loam. The subsoil is loamy and micaceous. Manor soils are strongly acid, low in fertility, and low in organic-matter content. The available moisture capacity is low. Tilth is good.

Stony land, Porters materials, areas of which make up about 10 percent of the acreage, is excessively drained. This land type ranges from sloping to very steep but is mostly steep. It consists of stones and dark brown, very dark brown, or very dark grayish-brown soil material of loam texture. The depth to bedrock is 10 to 18 inches. The soil material is acid, medium in fertility, and medium in content of organic matter. Tilth is poor.

The remaining 10 percent of the acreage consists of Hatboro, Tusquitee, Starr, Toxaway, Hayesville, and other soils.

About 40 percent of this association is used as woodland, 10 percent is used for crops, and 50 percent is used as pasture. The main crops are corn, alfalfa, orchardgrass, and clover for hay. Raising beef cattle is the main farming enterprise.

8. *Chester-Glenelg-Manor-Porters association*

Deep and moderately deep, well drained to excessively drained soils on uplands

This association is strongly dissected by permanent and intermittent drainageways. Most of the area is moderately steep and steep, but there are a few gently sloping and sloping narrow ridgetops. This association occupies three separate areas and makes up about 7 percent of the county. The largest area is along Big Reed Island Creek south of U.S. Highway 221.

Chester and Glenelg soils, which together make up about 45 percent of association 8, are deep and well drained. Both range from gently sloping to steep, and both are dominantly sloping. The surface layer is dark-brown to yellowish-brown loam. The subsoil is silty clay loam or clay loam. These soils are acid, low or medium in natural fertility, and low or medium in organic-matter content. Tilth is good.

Manor soils, which make up about 30 percent of the acreage, are micaceous and excessively drained. They range from sloping to very steep, but they are dominantly steep. The depth to weathered micaceous material is 16 to 20 inches. The depth to hard rock is 5 to 15 feet. The surface layer is brown to dark-brown loam. The subsoil is thin and micaceous. Manor soils are strongly acid, low in fertility, and low in content of organic matter. Tilth is good. The available moisture capacity is low.

Porters soils, which make up about 18 percent of the acreage, are moderately deep and well drained. They range from sloping to steep, but they are dominantly steep. The surface layer is very dark grayish-brown to brown loam. The subsoil is heavy loam to light clay loam. Porters soils are acid, medium in fertility, and medium in organic-matter content.

The remaining 7 percent of the association consists of Hatboro, Tusquitee, Starr, Watauga, and Myersville soils and Stony land, Porters materials, and Rock land, gneiss and schist.

About 40 percent of this association is used as woodland, 10 percent is used for crops, and 50 percent is used as pasture. The main crops are corn, alfalfa, orchardgrass, and clover. The main farming enterprise is raising beef cattle.

9. *Stony land-Manor-Rock land association*

Gently sloping to very steep, excessively drained, stony and rocky soils

This association is along the mountain escarpment adjacent to the Piedmont. Water from the entire association drains into the Atlantic. The acreage makes up 7.2 percent of the county.

Stony land, Porters materials, areas of which make up 35 percent of association 9, is shallow and excessively drained. This land type ranges from sloping to very steep, but it is dominantly steep and very steep. It consists of stones and dark brown, very dark brown, or very dark grayish-brown soil material of loam texture. Stones 2½ to 5 feet apart cover 3 to 15 percent of the surface. This soil material is acid, medium in natural fertility, and medium in organic-matter content.

Manor soils, which make up about 35 percent of the acreage, are excessively drained. They range from sloping to very steep, but they are dominantly steep. The depth to weathered micaceous material is 15 to 20 inches. The depth to hard bedrock ranges from 6 to 15 feet. The surface layer is brown to dark-brown very stony loam. The subsoil is thin and micaceous. Manor soils are strongly acid, low in natural fertility, and low in organic-matter content. Tilth is mostly good. The available moisture capacity is limited.

Rock land, gneiss and schist, which makes up about 15 percent of the acreage, is scattered over the entire association. This land type is gently sloping to steep. It consists of outcrops of granite gneiss and schist and soil material of loam or silt texture. It ranges from a few inches to several feet in thickness. Loose stones about 10 to 30 feet apart cover 25 to 50 percent of the surface of this land type.

The remaining 15 percent of this association consists of Porters, Tusquitee, Starr, Hatboro, and Codorus soils.

About 95 percent of this association is used as woodland, 2 percent is used for crops, and 3 percent is used

as pasture. The crops grown are apples and, in a few areas, mixed hay. The area is well suited to apple orchards and trees grown for timber.

10. Chester-Glenelg-Hayesville-Myersville association

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

This association is on broad sloping ridgetops and short steep slopes adjacent to permanent and intermittent streams. It occupies four areas and makes up about 14.3 percent of the county. The largest area, a strip 2 to 6 miles wide, extends along U.S. Highway 221 from Galax to Hillsville.

Chester and Glenelg soils, which together make up about 45 percent of association 10, are gently sloping to steep and well drained. The depth to hard bedrock is generally more than 6 feet. The surface layer of both soils is dark-brown to yellowish-brown loam. The subsoil is silty clay loam or clay loam. These soils are acid, low or medium in natural fertility, and low or medium in content of organic matter. Tilth is good.

Hayesville soils, which make up about 24 percent of the acreage, are well drained. They contain some mica throughout. These soils range from gently sloping to moderately steep, but they are dominantly sloping. The depth to bedrock ranges from 4 to more than 6 feet. The surface layer is dark-brown to dark reddish-brown loam. The subsoil is clay loam to clay. Hayesville soils are acid, medium in fertility, and medium in content of organic matter. Tilth is good.

Myersville soils, which make up about 20 percent of the acreage, are gently sloping to steep and well drained. The depth to bedrock is 4 to 6 feet. The surface layer is dark-brown to dark yellowish-brown loam. The subsoil is silty clay loam. Myersville soils are medium acid or strongly acid, medium in fertility, and medium in organic-matter content. Tilth is good.

The remaining 11 percent of the association consists of Hiwassee, Turbeville, Hatboro, Porters, Tusquitee, Starr, and other soils and Rock land, gneiss and schist.

About 35 percent of this association is used as woodland, 20 percent is used for crops, and 45 percent is used as pasture. The main crops are corn, alfalfa, clover, and orchardgrass. A small acreage is used for burley tobacco. Dairying and raising beef cattle are the main farming enterprises.

11. Myersville-Chester-Glenelg association

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

This association is on rolling ridgetops and steep slopes. It occupies several scattered areas and makes up about 11.7 percent of the county. The largest area is in the eastern part of Carroll County on the Floyd County line.

Myersville soils, which make up about 40 percent of association 11, are gently sloping to steep and are well drained. The depth to bedrock is 4 to 6 feet. The surface layer is dark-brown to dark yellowish-brown loam. The subsoil is silty clay loam. Myersville soils are medium acid to strongly acid, medium in fertility, and medium in organic-matter content. Tilth is good.

Chester and Glenelg soils, which together make up about 40 percent of the acreage, are gently sloping to steep and are well drained. Both are on broad ridgetops and short steep slopes. The depth to bedrock is generally more than 7 feet. The surface layer is dark-brown to yellowish-brown loam. The subsoil is silty clay loam or clay loam. These soils are acid, low or medium in fertility, and low or medium in organic-matter content Tilth is good.

Porters soils which make up about 10 percent of the acreage, are mostly well drained. They range from sloping to very steep, but they are dominantly steep. The depth to bedrock is 18 to 48 inches. The surface layer is very dark grayish-brown to brown loam. The subsoil is heavy loam to light clay loam. Porters soils are acid, medium in fertility, and medium in organic-matter content. Tilth is good.

The remaining 10 percent of the acreage consists of Hatboro, Codorus, Tusquitee, Starr, Hayesville, Manor, and other soils, and Rock land, gneiss and schist.

About 40 percent of this association is used as woodland, 20 percent is used for crops, and 40 percent is used as pasture. The main crops are corn, alfalfa, orchardgrass, and clover. Raising beef cattle is the main farming enterprise.

Descriptions of the Soils

In this section the soils of Carroll County are described in detail. The procedure is to describe first each soil series and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs.

The description of the soil series includes (1) a brief introductory statement that mentions drainage, depth, position on the landscape, and other significant features common to all the soils of the series; (2) a summary description of the color and texture of the surface layer, of the finest textured part of the subsoil, and of the material beneath the subsoil; (3) a detailed description of a profile that is considered representative of the soils of the series; and (4) a summary of the allowable range in variation from the representative profile. If the profile of a given mapping unit differs significantly from the representative profile, the differences are stated in the description of the mapping unit, unless they are apparent from the name of the mapping unit. The colors described are for moist soil, unless otherwise noted. Many of the more common terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 1. At the back of the survey is the "Guide to Mapping Units," which lists the mapping units in the county and shows the capability unit and the woodland suitability group each mapping unit is in and the page where each of these groups is described.

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

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
AlB	Altavista silt loam, gently sloping	155	(1)	HuC	Hiwassee and Turbeville cobbly fine sandy loams, sloping	267	0. 1
At	Atkins loam	88	(1)	HuD	Hiwassee and Turbeville cobbly fine sandy loams, moderately steep	206	. 1
BoE	Bolton loam, steep	152	(1)	HvC	Hiwassee and Turbeville fine sandy loams, sloping	427	. 1
BrC	Braddock cobbly fine sandy loam, sloping	152	(1)	LcE	Louisa complex, steep	3, 035	1. 0
Bu	Buncombe loamy fine sand	133	(1)	LoD	Louisburg complex, moderately steep	755	. 2
CeB	Cecil fine sandy loam, gently sloping	422	0. 1	LoE	Louisburg complex, steep	1, 126	. 4
CeB2	Cecil fine sandy loam, gently sloping, eroded	209	. 1	MaC	Madison cobbly fine sandy loam, sloping	248	. 1
CeC	Cecil fine sandy loam, sloping	316	. 1	MaC2	Madison cobbly fine sandy loam, sloping, eroded	117	(1)
CeC2	Cecil fine sandy loam, sloping, eroded	202	. 1	MaD	Madison cobbly fine sandy loam, moderately steep	491	. 2
CgB	Chester-Glenelg cobbly loams, gently sloping	134	(1)	MaD2	Madison cobbly fine sandy loam, moderately steep, eroded	300	. 1
CgC	Chester-Glenelg cobbly loams, sloping	3, 046	1. 0	MaE	Madison cobbly fine sandy loam, steep	750	. 2
CgC2	Chester-Glenelg cobbly loams, sloping, eroded	1, 850	. 6	MdB	Madison fine sandy loam, gently sloping	189	. 1
CgE	Chester-Glenelg cobbly loams, steep	4, 062	1. 3	MdB2	Madison fine sandy loam, gently sloping, eroded	207	. 1
CgE2	Chester-Glenelg cobbly loams, steep, eroded	4, 013	1. 3	MdC	Madison fine sandy loam, sloping	2, 320	. 7
ChB	Chester-Glenelg loams, gently sloping	1, 394	. 4	MdC2	Madison fine sandy loam, sloping, eroded	1, 409	. 4
ChB2	Chester-Glenelg loams, gently sloping, eroded	254	. 1	MdD	Madison fine sandy loam, moderately steep	2, 270	. 7
ChC	Chester-Glenelg loams, sloping	19, 657	6. 2	MdD2	Madison fine sandy loam, moderately steep, eroded	793	. 2
ChC2	Chester-Glenelg loams, sloping, eroded	6, 200	2. 0	MdE	Madison fine sandy loam, steep	2, 221	. 7
ChE	Chester-Glenelg loams, steep	18, 470	5. 8	MdE2	Madison fine sandy loam, steep, eroded	477	. 2
ChE2	Chester-Glenelg loams, steep, eroded	5, 721	1. 8	MnC	Manor loam, sloping	3, 199	1. 0
ClC	Clymer fine sandy loam, sloping	541	. 2	MnD	Manor loam, moderately steep	11, 243	3. 5
ClD	Clymer fine sandy loam, moderately steep	243	. 1	MnE	Manor loam, steep	36, 731	11. 6
Co	Codorus silt loam	1, 757	. 6	MnF	Manor loam, very steep	3, 825	1. 2
Cs	Codorus-Hatboro silt loams	840	. 3	MoC	Manor very stony loam, sloping	223	. 1
Cu	Comus fine sandy loam	1, 005	. 3	MoE	Manor very stony loam, steep	3, 503	1. 1
CyE	Corydon rocky soils, steep	162	(1)	MoF	Manor very stony loam, very steep	1, 546	. 5
EdC	Edneyville fine sandy loam, sloping	206	. 1	MrB	Myersville loam, gently sloping	373	. 1
EkC	Elioak silt loam, sloping	247	. 1	MrC	Myersville loam, sloping	5, 421	1. 7
EkC2	Elioak silt loam, sloping, eroded	170	. 1	MrC2	Myersville loam, sloping, eroded	2, 371	. 7
EkD	Elioak silt loam, moderately steep	229	. 1	MrE	Myersville loam, steep	10, 169	3. 2
EkD2	Elioak silt loam, moderately steep, eroded	126	(1)	MrE2	Myersville loam, steep, eroded	5, 176	1. 6
FcC	Fletcher loam, sloping	260	. 1	MsC	Myersville loam, thin solum, sloping	273	. 1
FcD	Fletcher loam, moderately steep	143	(1)	MsE	Myersville loam, thin solum, steep	1,031	.3
GnC	Gilpin silt loam, sloping	677	. 2	MyC	Myersville stony loam, thin solum, sloping	903	.2
GnC2	Gilpin silt loam, sloping, eroded	227	. 1	MyE	Myersville stony loam, thin solum, steep	9,818	3.1
GnD	Gilpin silt loam, moderately steep	375	. 1	PoC	Porters loam, sloping	1,513	.5
Gr	Gravelly alluvial land	237	. 1	PoD	Porters loam, moderately steep	4,129	1.3
Gu	Gullied land	71	(1)	PoE	Porters loam, steep	8,521	2.7
Ha	Hatboro silt loam	9, 341	2. 9	PoF	Porters loam, very steep	861	.3
Hb	Hatboro-Toxaway silt loams	674	. 2	RaC	Rabun silt loam, sloping	595	.2
HcC	Hayesville cobbly loam, sloping	132	(1)	RaD	Rabun silt loam, moderately steep	333	.1
HcD2	Hayesville cobbly loam, moderately steep, eroded	93	(1)	RaD2	Rabun silt loam, moderately steep, eroded	121	(1)
HeB	Hayesville loam, gently sloping	635	. 2	RaE	Rabun silt loam, steep	147	(1)
HeB2	Hayesville loam, gently sloping, eroded	263	. 1	RmE	Ramsey very stony loam, steep	9,271	2.9
HeC	Hayesville loam, sloping	3, 942	1. 2	RmF	Ramsey very stony loam, very steep	6,703	2.1
HeC2	Hayesville loam, sloping, eroded	4, 881	1. 5	Rg	Rock land, gneiss and schist	6,792	2.1
HeD	Hayesville loam, moderately steep	476	. 1	Rl	Rock land, limestone	61	(1)
HeD2	Hayesville loam, moderately steep, eroded	532	. 2	Rr	Rock land, quartzite	1,262	.4
HmE	Hazel channery complex, steep	2, 536	. 8	ScD	Shelocta cobbly fine sandy loam, moderately steep	436	.1
HmF	Hazel channery complex, very steep	1, 461	. 5	ShB	Shelocta fine sandy loam, gently sloping	283	.1
HnC	Hazel complex, sloping	1, 028	. 3				
HnE	Hazel complex, steep	4, 690	1. 5				
HtB	Hiwassee and Turbeville loams, gently sloping	206	. 1				
HtC	Hiwassee and Turbeville loams, sloping	798	. 3				
HtD	Hiwassee and Turbeville loams, moderately steep	368	. 1				

See footnote at end of table.

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

Map symbol	Soil	Area	Extent	Map symbol	Soil	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
ShC	Shelocta fine sandy loam, sloping	465	.1	WaE	Watauga cobbly silt loam, steep	262	.1
ShD	Shelocta fine sandy loam, moderately steep	101	(1)	WgC	Watauga silt loam, sloping	2,318	.7
SrB	Starr loam, gently sloping	906	.3	WgD	Watauga silt loam, moderately steep	4,894	1.5
SrC	Starr loam, sloping	1,296	.4	WgE	Watauga silt loam, steep	989	.3
SsA	State fine sandy loam, nearly level	198	.1	WhC	Weikert channery silt loam, sloping	601	.2
SsB	State fine sandy loam, gently sloping	230	.1	WhD	Weikert channery silt loam, moderately steep	1,240	.4
St	Stony colluvial land	131	(1)	WhE	Weikert channery silt loam, steep	4,180	1.3
SuC	Stony land, Porters materials, sloping	684	.2	WkD	Weikert very shaly silt loam, moderately steep	1,158	.4
SuE	Stony land, Porters materials, steep	9,495	3.0	WkE	Weikert very shaly silt loam, steep	4,054	1.3
SuF	Stony land, Porters materials, very steep	4,033	1.3	WkF	Weikert very shaly silt loam, very steep	767	.2
TaC	Talladega soils, sloping	145	(1)	WmB	Wickham loam, gently sloping	277	.1
TaD	Talladega soils, moderately steep	916	.3	WmC	Wickham loam, sloping	353	.1
TaE	Talladega soils, steep	4,919	1.5	WsB	Wickham fine sandy loam, gently sloping	482	.2
To	Toxaway silt loam, thick surface	527	.2	WsC	Wickham fine sandy loam, sloping	826	.3
TsC	Tusquitee cobbly loam, sloping	718	.2	WsC2	Wickham fine sandy loam, sloping, eroded	130	(1)
TuB	Tusquitee loam, gently sloping	1,528	.5	WtB	Worsham loam, gently sloping	131	(1)
TuC	Tusquitee loam, sloping	5,139	1.6		Made land	48	(1)
TuD	Tusquitee loam, moderately steep	461	.1		Quarries and mines	150	(1)
TvC	Tusquitee very stony loam, sloping	262	.1		Water	600	.2
TvD	Tusquitee very stony loam, moderately steep	263	.1		Total	317,440	100.0
WaC	Watauga cobbly silt loam, sloping	233	.1				
WaD	Watauga cobbly silt loam, moderately steep	687	.2				

[1] Less than 0.05 percent.

Altavista Series

The Altavista series consists of deep, moderately well drained soils on terraces, generally a few feet above the present flood plains. These soils developed in sediments washed from upland soils underlain by igneous and metamorphic rocks. They have a surface layer of dark grayish-brown silt loam and a subsoil of yellowish-brown clay loam. Generally, they are underlain by deposits of sand and gravel. The native vegetation consists of mixed hardwoods and pine and an understory of huckleberry.

These soils are strongly acid, low or medium in fertility, and low or medium in organic-matter content. They are moderately permeable and have good available moisture capacity.

Altavista soils are closely associated with Wickham and State soils, which are well drained. They differ from Wickham soils in having a yellowish-brown subsoil that is mottled in the lower part, and from State soils in having a clearly defined subsoil.

Soils of this series occur along the larger streams in the Piedmont Plateau and the Blue Ridge Mountain sections of Carroll County.

Representative profile of Altavista silt loam, gently sloping (2 to 7 percent slopes), in a cultivated field:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; friable; abundant fine roots; gradual, smooth boundary.

B1—9 to 19 inches, yellowish-brown (10YR 5/6) clay loam; weak, medium and fine, subangular blocky structure; friable; few faint clay films; few fine roots; gradual, smooth boundary.

B2t—19 to 28 inches, yellowish-brown (10YR 5/6) clay loam; moderate, medium, subangular blocky structure; friable; distinct clay films on ped surfaces; few fine roots; gradual, smooth boundary.

B3—28 to 37 inches, yellowish-brown (10YR 5/6) light clay loam; common, medium, distinct mottles of yellowish red (5YR 4/6); moderate, medium, subangular blocky structure; friable; few faint clay films on ped surfaces; gradual, smooth boundary.

IIC1g—37 to 43 inches, light-gray (2.5Y 7/0) sandy soil material; few, medium, distinct mottles of yellowish brown (10YR 5/4).

IIIC2—43 inches +, compacted layer of sand, gravel, and cobblestones as much as 10 inches in diameter.

The surface layer is 6 to 12 inches thick. The subsoil is brownish yellow to yellow and 18 to 32 inches thick. The solum is 30 to 48 inches thick. The depth to bedrock is generally more than 5 feet.

Altavista silt loam, gently sloping (2 to 7 percent slopes) (AlB).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam and a small acreage of nearly level silt loam. (Capability unit IIe–4; woodland suitability group 10)

Atkins Series

The Atkins series consists of moderately deep to deep, nearly level, poorly drained soils on flood plains. These soils developed in sediments washed mainly from soils derived from weathered sandstone, quartzite, and shale. They have a surface layer of dark grayish-brown loam and a subsoil of dark grayish-brown fine sandy clay loam to silty clay loam. These soils are mottled to the surface, are flooded frequently, and have a seasonal high water

table. The native vegetation consists of alders, willows, and post oak.

These soils are strongly acid, low in fertility, and medium in organic-matter content. Permeability is moderately slow.

Atkins soils are associated with Comus soils, which are along the larger streams. They differ from Comus soils in being poorly drained and having mottles throughout the profile.

Most areas of Atkins soils in Carroll County have been cleared. Some have been allowed to return to forest.

Representative profile of Atkins loam (0 to 2 percent slopes), in a pasture field along Brush Creek, 2,000 feet east of Highway 94:

A1—0 to 2 inches, brown to dark-brown (10YR 4/3) loam; weak, fine, granular structure; friable; few, fine, faint mottles of dark yellowish brown (10YR 4/4); abundant fine roots; clear, smooth boundary.

A2—2 to 8 inches, dark grayish-brown (10YR 4/2) loam; many, medium, distinct mottles of dark yellowish brown (10YR 4/4); weak, coarse, subangular blocky structure to massive; friable; few fine pores; few fine fragments of sandstone and shale; few polished sand grains; plentiful fine roots; gradual, smooth boundary.

C1g—8 to 20 inches, dark grayish-brown (10YR 4/2) fine sandy clay loam; many, fine and medium, prominent mottles of reddish brown (5YR 4/3); massive; friable; few fine fragments; few fine roots; gradual, smooth boundary.

C2g—20 to 26 inches, very dark grayish-brown (10YR 3/2) silty clay loam; few, fine, prominent mottles of reddish brown (5YR 4/3); friable; abundant dead roots; abrupt, smooth boundary.

C3g—26 to 31 inches, very dark brown (10YR 2/2) fine sandy clay soil material that is slightly sticky and plastic; contains streaks of black (N 2/0) decayed organic matter; few, coarse, prominent mottles of reddish brown (5YR 4/3); about 50 percent sand, gravel, and fragments of sandstone and shale; few, fine, dead roots.

R—31 inches +, hard sandstone and quartzite.

The surface layer is dark-brown to dark grayish-brown loam or silt loam. The subsurface layer is very dark brown to grayish-brown fine sandy clay loam to silty clay loam.

Atkins loam (0 to 2 percent slopes) (At).—The profile of this soil is like the one described as representative of the series. Approximately a quarter of the acreage has been cleared and is used for pasture and hay crops. (Capability unit IVw–1; woodland suitability group 4)

Bolton Series

The Bolton series consists of soils that are deep and well drained. These soils developed in material weathered from sandy dolomitic limestone. They have a surface layer of dark-brown loam and a subsoil of reddish-brown fine sandy clay loam or clay loam. The native vegetation consists of hardwoods and a few scattered pines.

These soils are strongly acid, medium in fertility, and medium in organic-matter content. They are moderately permeable and have good available moisture capacity. They can be worked within a fairly wide range of moisture content. Tilth is good in uneroded areas. Crops respond well to good management.

Bolton soils are associated with Corydon soils. They differ from Corydon soils in being deeper, having a surface layer of loam, and having a thicker and more friable subsoil.

Soils of this series occur in the northwestern part of Carroll County.

Representative profile of Bolton loam, steep (15 to 45 percent slopes), at the county line west of Highway 636 in a pasture field:

A1—0 to 2 inches, brown to dark-brown (7.5YR 4/2) loam; weak, fine to moderate, medium, granular structure; friable; few manganese concretions up to 1/16 inch in diameter; abundant fine roots; clear, smooth boundary.

A2—2 to 9 inches, brown to dark-brown (7.5YR 4/4) loam; moderate, medium, granular structure; friable; few angular rock fragments up to ¼ inch in diameter; few manganese concretions 1/16 inch in diameter; few fine roots; clear, smooth boundary.

B1—9 to 14 inches, reddish-brown (5YR 4/4) fine sandy clay loam; weak, fine, subangular blocky structure; friable; few angular fragments of quartz ¼ inch in diameter; few manganese concretions ¼ inch in diameter; few, faint, patchy clay films, mainly in pores; common fine pores; few fine roots; gradual, smooth boundary.

B21t—14 to 21 inches, reddish-brown (5YR 5/4) fine sandy clay loam or clay loam; moderate, fine and medium, subangular blocky structure; friable; common fine pores; thin, patchy clay films on ped surfaces and in pores; slightly finer textured than B1 horizon; few concretions ¼ inch in diameter; few fragments ½ inch in diameter; few fine roots; gradual, smooth boundary.

B22t—21 to 31 inches, reddish-brown (5YR 5/4) clay loam; moderate, medium, subangular blocky structure; friable; few manganese concretions ¼ inch in diameter; few rock fragments ½ inch in diameter; common, thin, patchy clay films on ped surfaces and in pores; common fine pores; few fine roots; gradual, smooth boundary.

B23t—31 to 48 inches, reddish-brown (2.5YR 4/4) clay loam; yellowish red (5YR 4/6) when crushed; moderate, medium, angular and subangular blocky structure; friable; few fine roots; gradual, smooth boundary.

C—48 to 58 inches +, yellowish-red (5YR 5/6), pink (5YR 7/4), and grayish-brown (10YR 5/2) silty clay loam; reddish brown (5YR 5/4) crushed; rock-controlled structure; firm.

The subsoil is reddish-brown fine sandy clay loam or clay loam. The thickness of the solum ranges from 36 to 48 inches. The depth to hard rock is 4 to 7 feet.

Bolton loam, steep (15 to 45 percent slopes) (BoE).—The profile of this soil is like the one described as representative of the series. The depth to bedrock is generally more than 5 feet. Included in the areas mapped are small spots where the surface layer is silt loam and small areas where the subsoil is silty clay.

About 75 percent of the acreage has been cleared. It is used for and is well suited to native bluegrass pasture. (Capability unit VIe–1; woodland suitability group 13)

Braddock Series

The Braddock series consists of deep, well-drained soils on old colluvial fans and slopes and at the foot of the Blue Ridge Mountains. These soils developed in colluvium derived from Hayesville, Chester, Glenelg, and Manor soils. They have a surface layer of dark-brown cobbly fine sandy loam and a subsoil of yellowish-brown to red clay loam to clay. Scattered throughout the profile and concentrated in layers are subangular and rounded quartz

fragments ½ inch to 6 inches in diameter. The native vegetation consists of white oak, red oak, scarlet oak, other hardwoods, a little white pine, and an understory of rhododendron and mountain-laurel.

These soils are strongly acid, low in fertility, and low in organic-matter content. They have moderate permeability. Tilth is good.

Braddock soils are associated with Cecil, Hiwassee, and Tusquitee soils. They lack the clearly defined subsoil that is typical of the Cecil soils. Their subsoil is lighter colored than that of the Hiwassee soils. Braddock soils developed in colluvium that is older than that in which the Tusquitee soils developed, and their subsoil contains more clay and is more clearly defined.

The Braddock soils in Carroll County occur in the Blue Ridge Mountains at elevations of about 1,300 and 2,800 to 2,900 feet. The areas are as much as three-quarters of a mile in length and a quarter of a mile in width.

Representative profile of Braddock cobbly fine sandy loam, sloping (2 to 15 percent slopes), in a wooded area 400 yards north of the intersection of Highways 691 and 882, along Highway 882:

O2—1 inch to 0, black, decomposed leaves and twigs.
A1—0 to 6 inches, dark yellowish-brown (10YR 4/4) cobbly fine sandy loam; weak, fine, granular structure; friable; 15 to 30 percent quartz cobblestones up to 6 inches in diameter; gradual, smooth boundary.
A2—6 to 11 inches, dark yellowish-brown (10YR 4/4) cobbly fine sandy loam; few, fine, distinct mottles of strong brown (7.5YR 5/6); weak, fine, granular structure; friable; 15 to 30 percent quartz cobblestones; gradual, smooth boundary.
B1—11 to 19 inches, yellowish-red (5YR 4/6) light sandy clay loam; moderate, medium, subangular blocky structure; friable; few quartz cobblestones and pebbles; gradual, smooth boundary.
B21t—19 to 27 inches, yellowish-red (5YR 4/6) clay loam; moderate, medium, subangular blocky structure; friable; few quartz cobblestones and pebbles; gradual, wavy boundary.
IIB22—27 to 36 inches +, yellowish-red (5YR 4/6) clay loam; rounded and angular quartz pebbles and cobblestones; moderate, medium, subangular blocky structure; horizon is approximately 75 percent cobblestones.

The surface layer is dark grayish brown to dark yellowish brown and is 6 to 11 inches thick. The subsoil is yellowish-red to red clay loam to clay and is 15 to 30 inches thick. The depth to the gravel or cobblestone layer, which is a few inches to several feet thick, ranges from 25 to 40 inches.

Braddock cobbly fine sandy loam, sloping (2 to 15 percent slopes) (BrC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are areas of gently sloping soils and small areas of moderately steep soils.

This soil is not well suited to cultivated crops, because of the cobblestones. It is used mainly for pasture and forest. (Capability unit IVe–5; woodland suitability group 7)

Buncombe Series

The Buncombe series consists of deep, excessively drained soils on first bottoms. These soils are frequently flooded. They developed in sandy sediments derived chiefly from material weathered from granite and gneiss and to a lesser extent from schist. The surface layer consists of loose loamy fine sand, and the subsoil of loamy fine sand. The native vegetation consists of sycamore, water oak, gum, and beech and an understory of reeds, vines, and grass.

These soils are strongly acid, low in fertility, and low in organic-matter content. Tilth is good. Permeability is rapid or very rapid.

Buncombe soils are associated with Comus soils, which are well drained, and with Hatboro soils, which are poorly drained.

Soils of this series are on flood plains along the larger streams in the Blue Ridge Mountain and Piedmont Plateau sections of Carroll County. They occur in narrow bands immediately adjacent to the stream channels. The total acreage in this county is small but is important agriculturally.

Representative profile of Buncombe loamy fine sand (0 to 2 percent slopes), in a pasture field, one-half mile east of the intersection of Highways 620 and 712 along Crooked Creek on Highway 620:

Ap—0 to 5 inches, light yellowish-brown (10YR 6/4) loamy fine sand; structureless; loose; finely divided mica flakes, increasing in quantity with depth; clear, smooth boundary.
C1—5 to 24 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; weak, fine, granular structure; very friable; abundant fine and medium roots; finely divided mica flakes increase in quantity with depth; clear, smooth boundary.
C2—24 to 40 inches, yellowish-brown (10YR 5/6) loamy fine sand; weak, fine, granular structure to single grain; very friable; mica flakes increase in quantity with depth; gradual, smooth boundary.
C3—40 to 54 inches +, dark-brown (10YR 4/3) loamy fine sand; structureless; loose; few fine roots; mica flakes increase in quantity with depth.

The surface layer is grayish brown to light yellowish brown, and the C horizon is yellowish brown to dark brown. The depth to stream-deposited coarse sand or gravel ranges from 40 to 100 inches.

Buncombe loamy fine sand (0 to 2 percent slopes) (Bu).—The profile of this soil is like the one described as representative of the series. Thin layers of sandy loam, silt loam, or loam occur erratically in the profile. Included in the areas mapped are small spots of Hatboro soils, small areas of Gravelly alluvial land, and, in narrow bands or on escarpments along Lovills Creek, areas of Buncombe soils that have slopes of as much as 15 percent.

Approximately half the acreage has been cleared and is used for pasture. (Capability unit IIIs–2; woodland suitability group 1)

Cecil Series

The Cecil series consists of deep, well-drained soils that developed from material weathered from acid, igneous and metamorphic rocks. These soils have a surface layer of yellowish-brown fine sandy loam and a subsoil of heavy clay loam to clay. The native vegetation consists of oak, hickory, and pine, and an understory of mountain-laurel and huckleberry.

These soils are strongly acid, low in fertility, and low in organic-matter content. Permeability is moderate,

and the available moisture capacity is good. Tilth is good in areas that are only slightly eroded.

Cecil soils are closely associated with Braddock and Louisa soils. They do not contain the layers of stones and the large amounts of coarse fragments that are typical of Braddock soils. Cecil soils have a more clearly defined subsoil than Braddock and Louisa soils; their subsoil is fine textured. They have a thicker solum than Louisa soils, and they contain less mica or micalike material.

Soils of this series occur in the southern part of Carroll County at elevations of 1,100 to 1,300 feet.

Representative profile of Cecil fine sandy loam, gently sloping (2 to 7 percent slopes), in a hayfield at the intersection of Highways 620 and 794:

Ap—0 to 8 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; friable; common fine pores; few quartzite pebbles up to 2 inches in diameter; abundant fine roots; clear, smooth boundary.

B1—8 to 11 inches, yellowish-red (5YR 4/8) clay loam; moderate, fine and medium, subangular blocky structure; firm; few fine pores; thin, faint, continuous clay films on ped surfaces and in pores; few krotovinas up to ½ inch in diameter; few fragments of quartzite up to ½ inch in diameter; few fine roots; gradual, smooth boundary.

B21t—11 to 21 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; firm; common fine pores; thin, distinct, continuous clay films on ped surfaces and in pores; few finely divided mica flakes; few quartzite pebbles up to ½ inch in diameter; few fine roots; gradual, smooth boundary.

B22t—21 to 32 inches, red (2.5YR 4/8) clay; moderate, medium and coarse, subangular blocky structure; firm; few fine pores; thin, distinct or prominent, continuous clay films on some ped surfaces and in some pores; few quartzite pebbles up to ½ inch in diameter; few finely divided mica flakes; few fine roots; gradual, smooth boundary.

B3—32 to 48 inches, yellowish-red (5YR 4/8) light fine sandy clay loam; weak, fine and medium, subangular blocky structure; friable; few fine pores; thin, faint clay films on ped surfaces and in pores; few finely divided mica flakes, but slightly more than in B22t horizon; few pebbles of quartz and quartz mica gneiss up to ½ inch in diameter; few fine roots; gradual, smooth boundary.

C—48 to 58 inches, yellowish-red (5YR 4/6) loamy soil material; about 75 percent weathered quartz mica gneiss that is difficult to dig out with spade, but, when dug out, is easily crushed with the fingers.

The surface layer is 6 to 12 inches thick. The subsoil is heavy clay loam to clay and is 30 to 50 inches thick. The upper part is yellowish red, and the lower part is red. The solum is 36 to 60 inches thick. The depth to hard rock is 5 to 8 feet.

Cecil fine sandy loam, gently sloping (2 to 7 percent slopes) (CeB).—The profile of this soil is like the one described as representative of the series.

This soil is well suited to all the common crops. Most of the acreage has been cleared and is used for cultivated crops, orchards, and pasture. A small acreage is in second-growth mixed hardwoods and pines. (Capability unit IIe–3; woodland suitability group 7)

Cecil fine sandy loam, gently sloping, eroded (2 to 7 percent slopes) (CeB2).—The surface layer of this soil is thinner than that of the soil described as representative of the series. The plow layer is dark brown to dark yellowish brown because small amounts of subsoil material have been mixed with the remnants of the original surface layer during tillage.

This soil is well suited to crops. Erosion-control practices are needed. (Capability unit IIe–3; woodland suitability group 7)

Cecil fine sandy loam, sloping (7 to 15 percent slopes) (CeC).—This soil is similar to the one described as representative of the series. It is suited to all the common crops. (Capability unit IIIe–4; woodland suitability group 7)

Cecil fine sandy loam, sloping, eroded (7 to 15 percent slopes) (CeC2).—The surface layer of this soil is thinner than that of the representative soil. The plow layer is redder and finer textured, because small amounts of subsoil material have been mixed with the original surface material. Small spots of the reddish-yellow to yellowish-red subsoil are exposed in cultivated fields.

This soil has good available moisture capacity, but it absorbs less moisture than the representative soil, because of the slope and the finer surface texture.

This soil is suited to all the common crops. (Capability unit IIIe–4; woodland suitability group 7)

Chester Series

The Chester series consists of soils that are deep and well drained. These soils developed in material weathered from gneiss, schist, and some granite. They have a dark yellowish-brown surface layer and a subsoil of strong-brown clay loam or silty clay. They are micaceous below a depth of about 7 inches. The native vegetation consists of mixed hardwoods and some white pines.

These soils are medium acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Chester soils are associated with Glenelg soils, which are more micaceous. They are also associated with Hayesville soils, which are deeper and redder; with Myersville soils, which are browner and finer textured; with Watauga soils, which are more micaceous and have a less well defined subsoil; and with Edneyville soils, which are less brown and are coarser textured.

The Chester soils in Carroll County are gently sloping to steep and occur at elevations of 2,300 to 3,500 feet. They are mapped only as part of a complex with Glenelg soils. About 75 percent of each mapped area is Chester soils, and the rest is Glenelg soils.

Representative profile of Chester loam, sloping (7 to 15 percent slopes), in a wooded area, 0.1 mile west of the junction of Highways 685 and 697 on Highway 697:

O1—1½ inches to ½ inch, loose oak leaves and twigs.

O2—½ inch to 0, partly decayed leaves and twigs.

A1—0 to 2 inches, dark yellowish-brown (10YR 3/4) loam; weak, fine, granular structure; friable; few quartz pebbles up to ½ inch in diameter; abundant fine and medium roots; clear, smooth boundary.

A2—2 to 7 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine, granular structure; friable; few quartz fragments up to 2 inches in diameter; abundant fine and medium roots; gradual, smooth boundary.

B1—7 to 11 inches, brown or dark-brown (7.5YR 4/4) light clay loam; weak, fine, subangular blocky structure; friable; few finely divided mica flakes; few, thin, faint patchy clay films; few quartz pebbles up to

½ inch in diameter; abundant fine and medium roots, and few large roots; clear, smooth boundary.

B2t—11 to 26 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine, and moderate, medium, subangular blocky structure; friable; common, faint, patchy clay films; 10 percent finely divided mica flakes; abundant fine, medium, and large roots; gradual, wavy boundary.

B3—26 to 31 inches, strong-brown (7.5YR 5/6) loam; weak, fine and medium, subangular blocky structure; friable; few, faint, patchy clay films in pores and crevices; few fragments of weathered quartz mica gneiss; 15 percent mica flakes; few fine roots; gradual, wavy boundary.

C1—31 to 39 inches, strong-brown (7.5YR 5/8) weathered quartz mica gneiss; films of clayey soil material in cracks; 20 to 30 percent mica; few fine roots; gradual, wavy boundary.

C2—39 to 58 inches +, brown (7.5YR 4/4) weathered quartz mica gneiss and silty soil material; common finely divided mica; no roots present.

The surface layer consists of brown to dark yellowish-brown loam or cobbly loam and is 6 to 10 inches thick. The subsoil consists of loam, silty clay loam, or clay loam. It is commonly strong brown but ranges to nearly yellowish red. It is 16 to 24 inches thick. The solum is 24 to 40 inches thick. The depth to hard rock ranges from 60 to more than 75 inches.

Chester-Glenelg cobbly loams, gently sloping (2 to 7 percent slopes) (CgB).—The Chester soil in this complex is similar to the one described as representative of the Chester series. The Glenelg soil is similar to that described under the heading "Glenelg Series."

Cobblestones cover 15 to 25 percent of the surface of these soils. The available moisture capacity is lower than in similar soils that do not contain cobblestones. Spots of the subsoil are exposed in cultivated fields where the surface layer has been lost through erosion.

Most of the acreage is used for pasture (fig. 2) and forest. The cobblestones interfere with cultivation. (Capability unit IIIs–1; woodland suitability group 7)

Chester-Glenelg cobbly loams, sloping (7 to 15 percent slopes) (CgC).—The Chester soil in this complex is similar to the one described as representative of the Chester series. A Glenelg loam is described under the heading "Glenelg Series."

Cobblestones as much as 10 inches in diameter cover 15 to 25 percent of the surface of these soils. The available moisture capacity is lower than that of soils that are similar but do not contain cobblestones.

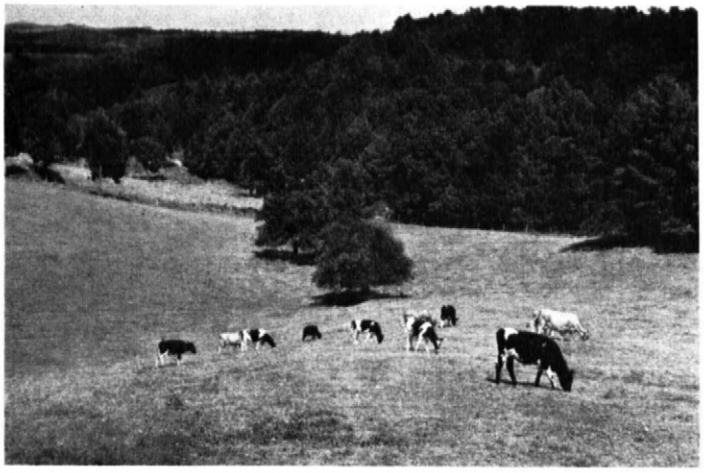

Figure 2.—Improved pasture on Chester-Glenelg cobbly loams.

Most of the acreage is used for pasture and forest. The cobblestones interfere with cultivation. (Capability unit IVe–5; woodland suitability group 7)

Chester-Glenelg cobbly loams, sloping, eroded (7 to 15 percent slopes) (CgC2).—The Chester soil in this complex is similar to the one described as representative of the Chester series, but it has a thinner surface layer. A Glenelg loam is described under the heading "Glenelg Series."

Cobblestones as much as 10 inches in diameter cover 15 to 25 percent of the surface of these soils. The subsoil, which is strong brown or yellowish red, is exposed in a few spots.

These soils are used for pasture and forest. (Capability unit IVe–5; woodland suitability group 7)

Chester-Glenelg cobbly loams, steep (15 to 45 percent slopes) (CgE).—The Chester soil in this complex is similar to the soil described as representative of the Chester series, but it is somewhat droughty. A Glenelg loam is described under the heading "Glenelg Series."

Cobblestones cover 15 to 25 percent of the surface of these soils. Slopes of 15 to 25 percent predominate.

These soils are used mainly for pasture and forest. (Capability unit VIe–3; woodland suitability group 7)

Chester-Glenelg cobbly loams, steep, eroded (15 to 45 percent slopes) (CgE2).—The Chester soil in this complex is similar to the one described as representative of the Chester series, but it has a thinner surface layer. A Glenelg loam is described under the heading "Glenelg Series."

Cobblestones cover 15 to 25 percent of the surface of these soils. The subsoil, which is strong brown or yellowish red, is exposed in a few spots. Slopes of 15 to 25 percent predominate.

These soils are used for pasture and forest. (Capability unit VIe–3; woodland suitability group 7)

Chester-Glenelg loams, gently sloping (2 to 7 percent slopes) (ChB).—The Chester soil in this complex is similar to the one described as representative of the Chester series. The Glenelg soil is similar to the one described under the heading "Glenelg Series." A few spots in this unit are cobbly; these spots are shown on the soil map by symbols.

Most of the acreage has been cleared and is used for crops. (Capability unit IIe–3; woodland suitability group 7)

Chester-Glenelg loams, gently sloping, eroded (2 to 7 percent slopes) (ChB2).—The Chester soil in this complex is similar to the one described as representative of the Chester series, but it has a thinner surface layer. A Glenelg loam is described under the heading "Glenelg Series."

The plow layer of these soils is yellowish brown because small amounts of subsoil material have been mixed with the original surface layer during tillage. The subsoil, which is strong brown or yellowish red, is exposed in places.

Most of the acreage is used for crops. (Capability unit IIe–3; woodland suitability group 7)

Chester-Glenelg loams, sloping (7 to 15 percent slopes) (ChC).—The Chester soil in this complex is similar to the one described as representative of the Chester series. The Glenelg soil is similar to the one described under the heading "Glenelg Series."

About 70 percent of the acreage has been cleared and is used for cultivated crops, hay, and pasture. (Capability unit IIIe–4; woodland suitability group 7)

Chester-Glenelg loams, sloping, eroded (7 to 15 percent slopes) (ChC2).—The Chester soil in this complex is similar to the one described as representative of the Chester series, but it has a thinner surface layer. A Glenelg loam is described under the heading "Glenelg Series." The plow layer of the soils in this complex is yellowish brown because small amounts of subsoil material have been mixed with the original surface layer during tillage.

These soils are well suited to crops. About a third of their acreage is used for cultivated crops, a third for forage crops, and a third for pasture. (Capability unit IIIe–4; woodland suitability group 7)

Chester-Glenelg loams, steep (15 to 45 percent slopes) (ChE).—The Chester soil in this complex is similar to the one described as representative of the Chester series. The Glenelg soil is similar to the one described under the heading "Glenelg Series." Slopes of 15 to 25 percent predominate.

These soils are used for cultivated crops, hay, and pasture. (Capability unit IVe–2; woodland suitability group 7)

Chester-Glenelg loams, steep, eroded (15 to 45 percent slopes) (ChE2).—The Chester soil in this complex is similar to the one described as representative of the Chester series, but it has a thinner surface layer and a thinner solum. A Glenelg loam is described under the heading "Glenelg Series." The subsoil, which is strong brown, is exposed in places because part of the original surface layer has been removed by erosion. Slopes of 15 to 25 percent predominate.

These soils are used for cultivated crops, hay, pasture, and woodland. (Capability unit IVe–2; woodland suitability group 7)

Clymer Series

The Clymer series consists of soils that are deep and well drained. These soils developed in material weathered from sandstone, quartzite, shale, and conglomerate. They have a surface layer of dark grayish-brown fine sandy loam and a subsoil of yellowish-brown fine sandy clay loam. The native vegetation consists of white oak, black oak, hickory, other hardwoods, and an understory consisting mainly of rhododendron, mountain-laurel, and huckleberry.

These soils are medium acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability.

Clymer soils are associated with Ramsey soils. They are deeper than Ramsey soils, and they have a more clearly defined profile and are generally less steep.

Soils of this series occur in the Blue Ridge Mountains of Carroll County, at elevations of 2,400 to 2,800 feet.

Representative profile of Clymer fine sandy loam, sloping (7 to 15 percent slopes), in a wooded area a quarter of a mile northeast of the Grayson County line and 30 yards east of Highway 94:

O1—1½ inches to ½ inch, loose leaves and twigs.
O2—½ inch to 0, partly decayed leaves and twigs.
A1—0 to 2 inches, grayish-brown (2.5Y 5/2) fine sandy loam; weak, fine, granular structure; very friable; a few quartz fragments less than ⅛ inch in diameter and a few polished sand grains; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 8 inches, yellowish-brown (10YR 5/4) fine sandy loam; moderate, fine, granular structure; friable; plentiful very fine pores; thin films in root channels and pores; few polished sand grains and quartz fragments less than ⅛ inch in diameter; plentiful fine and medium roots, and few large roots; clear, smooth boundary.
B1—8 to 12 inches, yellowish-brown (10YR 5/4) light fine sandy clay loam; weak, fine, subangular blocky structure; friable; plentiful fine pores; thin, faint clay films in pores; thin, patchy clay films on surfaces of coarse sand grains; common worm channels up to 1/16 inch in diameter; 2 percent gravel, up to 1½ inches in diameter, weathered from sandstone conglomerate; a few quartz fragments less than ⅛ inch in diameter; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B21t—12 to 24 inches, yellowish-brown (10YR 5/6) fine sandy clay loam; weak, very fine, subangular blocky structure mixed with moderate, fine, subangular blocky structure; friable; common fine pores; thin, faint, patchy clay films on ped surfaces and in pores; 1 to 3 percent gravel, up to 1½ inches in diameter, weathered from sandstone conglomerate; few fine and medium roots; gradual, smooth boundary.
B22t—24 to 29 inches, dark-brown (7.5YR 3/4) light fine sandy clay loam; weak, very fine, subangular blocky structure to moderate, fine, subangular blocky; friable; common fine pores; thin, faint clay films in pores; thin, faint, patchy clay films on ped surfaces; 2 to 5 percent gravel, up to 2 inches in diameter, weathered from sandstone conglomerate; few quartz fragments; common polished sand grains; few fine and medium roots; clear, smooth boundary.
B3t—29 to 35 inches, yellowish-brown (10YR 5/6) light fine sandy clay loam; weak, fine, subangular blocky structure; friable; few fine pores; thin, faint clay films in pores; 50 percent gravel, up to 2 inches in diameter, weathered from sandstone conglomerate; few fine roots; clear, smooth boundary.
C1—35 to 52 inches, yellowish-red (5YR 4/6) and reddish-yellow (7.5YR 6/6), partly weathered sandstone conglomerate that is difficult to dig out but crushes to sandy soil material; rock-controlled structure; few fine pores; thin, patchy clay films on rock surfaces; few fine roots; 95 to 99 percent parent rock.
R—52 to 60 inches +, pink (5YR 7/3), partly weathered sandstone conglomerate.

The surface layer is dark grayish brown to grayish brown and is 6 to 10 inches thick. The subsoil consists of yellowish-brown to dark yellowish-brown clay loam or light fine sandy clay loam and is 18 to 29 inches thick. The solum is 30 to 40 inches thick. The depth to hard rock is 3½ to 5 feet.

Clymer fine sandy loam, sloping (7 to 15 percent slopes) (ClC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas where the surface layer is loam and the subsoil is yellowish red or red. Small parts of this included soil are gently sloping.

The total acreage is small, but this soil is important locally because it is used for corn, small grain, hay, and pasture. (Capability unit IIIe–5; woodland suitability group 14)

Clymer fine sandy loam, moderately steep (15 to 25 percent slopes) (ClD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped is a

small acreage of a similar soil that has a surface layer of loam and a yellowish-red to red subsoil.

Most of this soil has been cleared and is used for hay and pasture. (Capability unit IVe–3; woodland suitability group 14)

Codorus Series

The Codorus series consists of nearly level, somewhat poorly drained soils on flood plains. These soils developed in sediments washed from soils derived from weathered igneous and metamorphic rocks. They are flooded frequently and are mottled with grayish brown or gray at a depth of 10 to 20 inches. The native vegetation consists of water-tolerant hardwoods, mainly oak, alder, and sycamore.

These soils are strongly acid, fairly high in fertility, and medium in organic-matter content. Permeability is moderate. Tilth is fair to good.

Codorus soils are associated with Toxaway, Hatboro, Comus, and Buncombe soils. They are better drained than Toxaway soils, which are dark colored, or Hatboro soils, which have gray, brown, and yellow mottles at the surface. They are not so well drained as Comus soils, which are well drained and free of mottling, or Buncombe soils, which are excessively drained and much sandier.

Soils of this series occur along streams in the Piedmont Plateau and Blue Ridge Mountain sections of Carroll County.

Representative profile of Codorus silt loam (0 to 2 percent slopes), in a pasture field east of the intersection of State Highway 705 and U.S. Highway 58:

A1—0 to 14 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; plentiful fine and medium roots; gradual, smooth boundary.

B1—14 to 20 inches, dark-brown (7.5YR 4/4) silt loam; few, fine, faint mottles of grayish brown (2.5YR 5/2); weak, fine, subangular blocky structure; friable; few fine roots; gradual, smooth boundary.

B2g—20 to 30 inches, dark-brown (7.5YR 4/4) silt loam; common, medium, distinct mottles of grayish brown (2.5Y 5/2); weak, medium, subangular blocky structure; friable; gradual, smooth boundary.

IIC—30 to 32 inches, very dark gray (5Y 3/1) sandy soil material containing a quantity of finely divided mica; unconsolidated.

The surface layer is pale brown to dark brown. The depth to mottling is 10 to 20 inches, and the depth to sandy soil material is 30 inches to 5 feet.

Codorus silt loam (0 to 2 percent slopes) (Co).—The profile of this soil is like the one described as representative of the series. The water table is high during much of the year. Included in the areas mapped are small spots of sandy loam to silty clay loam.

A large acreage is used for pasture (fig. 3), a lesser acreage for crops, and a small acreage for forest. (Capability unit IIIw–1; woodland suitability group 3)

Codorus-Hatboro silt loams (0 to 2 percent slopes) (Cs).—The Codorus soil in this complex is similar to the one described as representative of the Codorus series. The Hatboro soil is similar to that described under the heading "Hatboro Series."

About 60 percent of each area mapped is Codorus soils, and the rest is Hatboro soils. The water table is seasonally high. The available moisture capacity is high.

Figure 3.—Orchardgrass and Ladino clover on Codorus silt loam in foreground.

The soils in this complex are too wet for cultivation unless complete drainage systems are installed. About half the acreage has been cleared and is used for unimproved pasture. (Capability unit IVw–1; woodland suitability group 3)

Comus Series

The Comus series consists of deep, well-drained soils on flood plains. These soils developed in sediments washed from upland soils, such as Cecil, Porters, Hayesville, Chester, Glenelg, and Myersville. The native vegetation consists of sycamore, oak, gum, and beech, and an understory of reeds, vines, and grass.

These soils are medium acid or strongly acid, medium in fertility, and medium in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Comus soils are closely associated with Codorus, Hatboro, and Buncombe soils. They are better drained than Codorus and Hatboro soils, and they are free of mottles. Comus soils are finer textured than Buncombe soils.

The Comus soils in Carroll County are nearly level and occur as small areas, mostly along the larger streams in the Piedmont Plateau and Blue Ridge Mountain sections. They are subject to flooding.

Representative profile of Comus fine sandy loam (0 to 2 percent slopes), in a field along Lovills Creek, 2,000 yards south of Highway 687:

Ap—0 to 10 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; weak, fine, granular structure; loose, very friable; plentiful fine and medium roots; common finely divided mica; few cobblestones and pebbles up to 5 inches in diameter at a depth of 10 inches; gradual, smooth boundary.

C1—10 to 22 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; loose, very friable; few fine roots; few cobblestones and pebbles up to 4 inches in diameter; common finely divided mica; clear, smooth boundary.

C2—22 to 33 inches, brown (10YR 4/3) fine sandy loam containing some coarse sand; weak, fine, granular structure; very friable; few fine roots; clear, smooth boundary.

IIC3—33 to 50 inches, 25 percent loamy sand and 75 percent coarse sand and quartz gravel.

IIIC4—50 inches +, rounded quartz cobblestones.

The surface layer is 7 to 18 inches thick. The C horizon is dark brown to brown. These soils are generally underlain by unconforming material—loamy sand, gravel, and cobblestones—at a depth of 30 to 60 inches.

Comus fine sandy loam (0 to 2 percent slopes) (Cu).—The profile of this soil is like the one described as representative of the series, but the surface layer may be coarser textured than fine sandy loam in small areas parallel to and adjacent to streams. Included in the areas mapped are a few small areas of silt loam and a few small areas of soils that developed in material derived from sandstone and shale.

Most of this soil has been cleared and is used for hay and pasture and for growing corn. The use of individual areas is governed largely by the frequency of flooding. (Capability unit IIw–1; woodland suitability group 2)

Corydon Series

The Corydon series consists of soils that are shallow and well drained. These soils developed in material weathered from high-grade limestone. They have a surface layer of brown to reddish-brown silt loam to silty clay loam and a subsoil of reddish-brown silty clay loam to clay. The native vegetation consists of mixed pines and hardwoods.

These soils are neutral or slightly acid, medium in natural fertility, and medium in organic-matter content. They have moderately slow permeability and fair to good available moisture capacity.

Corydon soils are associated with Bolton and Shelocta soils. They are finer textured and thinner than either Bolton or Shelocta soils. They are darker colored than Shelocta soils, which developed in colluvium derived from quartzite and sandstone.

The Corydon soils in Carroll County have a slope range of 15 to 45 percent. Hard, bluish-gray limestone is generally within 20 inches of the surface but is at a greater depth in some areas. Most areas are rocky, and there are outcrops of hard limestone about 30 to 100 feet apart. The total acreage is not large, and the soils are of little agricultural importance.

Profile of a Corydon silty clay loam, in a field 100 yards north of the intersection of Highways 742 and 635:

Ap—0 to 6 inches, reddish-brown (5YR 4/4) light silty clay loam; moderate, medium, granular structure; friable; common fine pores; few black concretions; few limestone pebbles up to 2 inches in diameter; abundant fine roots; gradual, smooth boundary.

B2t—6 to 13 inches, reddish-brown (2.5YR 4/4) silty clay to clay; weak, fine, subangular blocky structure and moderate, medium, granular structure; friable, common fine pores; thin, faint, patchy clay films on peds and in pores; few black concretions up to 1/16 inch in diameter; few angular limestone pebbles up to 1/2 inch in diameter; plentiful fine and few medium roots; gradual, smooth boundary.

B3—13 to 20 inches, reddish-brown (2.5YR 4/4) silty clay loam; weak, fine, subangular blocky structure and moderate, medium, granular structure; friable; thin, faint, patchy clay films on peds; common limestone fragments up to 1/2 inch in diameter; few fine roots; clear, abrupt boundary.

R—20 inches +, bluish-gray, hard, massive limestone.

The color of the surface layer is brown to reddish brown. The texture of the subsoil is silty clay to clay. The solum is 10 to 24 inches thick.

Corydon rocky soils, steep (15 to 45 percent slopes) (CyE).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas of silt loam and a few small areas that have lesser slopes.

Most of this soil has been cleared and is used for native bluegrass pasture. Some areas have reverted to forest. (Capability unit VIIs–1; woodland suitability group 12)

Edneyville Series

The Edneyville series consists of deep, well-drained soils that developed in material weathered from granite gneiss and other rocks low in dark-colored minerals but relatively high in quartz and feldspar. These soils have a surface layer of light-gray to dark grayish-brown fine sandy loam and a subsoil of yellowish-brown to reddish-yellow fine sandy clay loam or sandy clay loam. The native vegetation consists of hardwoods, such as white oak and black oak, and a little white pine.

These soils are strongly acid, low in fertility, and low in organic-matter content. They are more easily leached of plant nutrients than soils that contain more clay. Permeability is moderately rapid, and the available moisture capacity is fair to good. Tilth is good.

Edneyville soils are associated with Hayesville, Chester, Glenelg, and Louisburg soils. They are coarser textured than Hayesville soils. They have a lighter colored surface layer than Chester and Glenelg soils, and their subsoil is coarser textured, lighter colored, and less clearly defined. They are thicker than Louisburg soils.

The Edneyville soils in Carroll County are gently sloping to steep and generally occur on intermountain plateaus in the Blue Ridge Mountains. Small areas of these soils occur east of Sylvatus, at elevations of 2,000 to 2,600 feet.

Representative profile of Edneyville fine sandy loam, sloping (7 to 15 percent slopes), in a cultivated field at the intersection of Highways 750 and 693:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine and medium, granular structure; friable; few coarse sand grains; a few pebbles up to ½ inch in diameter; common fine pores; plentiful fine roots; clear, smooth boundary.

B1—8 to 12 inches, reddish-yellow (7.5YR 6/6) fine sandy loam; weak, fine, subangular blocky structure and moderate, medium, subangular blocky structure; friable; common fine pores; thin, faint, patchy clay films; quartz fragments less than ⅛ inch across are common; few fine roots; gradual, smooth boundary.

B2t—12 to 20 inches, reddish-yellow (7.5YR 6/6) sandy clay loam; weak, fine, subangular blocky structure and moderate, medium, subangular blocky structure; friable; common fine pores; few, distinct and faint, patchy clay films on ped surfaces and in pores; coarse sand is common; few fine roots; gradual, smooth boundary.

B3t—20 to 30 inches, yellowish-brown (10YR 5/6) and pink (7.5YR 8/4) light sandy clay loam; weak, fine, subangular blocky structure; friable; few fine pores; few, faint, patchy clay films; abundance of coarse sand; few fine roots; gradual, wavy boundary.

C—30 to 39 inches +, reddish-yellow (7.5YR 6/6) and strong-brown (7.5YR 5/6) weathered granite; abundance of sand with a few streaks of dark grayish brown (2.5Y 4/2); material is difficult to dig out with

spade but is easily crushed to a sandy soil material with the fingers.

The surface layer is light gray to dark grayish brown. The subsoil is yellow to reddish-yellow fine sandy clay loam or sandy clay loam. The solum is 28 to 40 inches thick. The depth to bedrock ranges from 3 to 6 feet.

Edneyville fine sandy loam, sloping (7 to 15 percent slopes) (EdC).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of loam and sandy loam, of gently sloping soils, and of eroded soils that are pale yellow in some areas.

This soil is suitable for cultivation. It can be tilled throughout a wide range of moisture content. (Capability unit IIIe–5; woodland suitability group 7)

Elioak Series

The Elioak series consists of soils that are deep and well drained. These soils have a surface layer of dark-brown, friable silt loam and a subsoil of yellowish-red to red silty clay loam. They are underlain by deeply weathered micaceous material. The native vegetation consists of mixed hardwoods and pine.

These soils are strongly acid, medium in fertility, and medium in organic-matter content. They are moderately permeable and have good available moisture capacity.

Elioak soils are associated with Watauga, Talladega, and Manor soils and, less extensively, with Hayesville, Chester, and Glenelg soils. They are similar to Watauga soils in profile development and in mica content but have a redder subsoil. Elioak soils are deeper over bedrock than Talladega soils, and they have a clearly defined solum and fewer schist fragments in the profile. They are thicker to weathered micaceous material than Manor soils and have a better defined subsoil. Elioak soils contain less sand and more mica than Hayesville soils. They differ from Chester and Glenelg soils in having a red subsoil.

Elioak soils in Carroll County occur on intermountain plateaus of the Blue Ridge Mountains. They are not extensive, but they are agriculturally important in the county.

Representative profile of Elioak silt loam, sloping (7 to 15 percent slopes), in a wooded area 2 miles south of the intersection of Highways 764 and 765:

O1—2 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, partly decayed leaves and twigs.
A1—0 to 2 inches, brown to dark-brown (7.5YR 4/2) silt loam; weak, fine, granular structure; very friable; plentiful finely divided mica; few fragments of mica schist and quartz, up to 1 inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 10 inches, brown to dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure and moderate, medium, granular structure; friable; abundant finely divided mica; few fragments of mica schist and quartz, up to 1 inch in diameter; gradual, smooth boundary.
B1—10 to 15 inches, reddish-brown (5YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; friable; common fine pores; thin, faint, patchy clay films in pores and on ped surfaces; abundant finely divided mica flakes; mica gives a feeling of slickness; few fine and medium roots; gradual, smooth boundary.
B2t—15 to 24 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; friable; common fine pores; thin, faint, continuous clay films in pores and on ped surfaces; abundant finely divided mica flakes; mica gives a feeling of slickness; few fine and medium roots; gradual, smooth boundary.
B3—24 to 32 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, subangular blocky structure; friable; common fine pores; thin, faint, patchy clay films; more mica flakes than in B2t horizon; mica gives a feeling of slickness; 25 percent weathered fragments of mica schist that can easily be crushed with fingers; few fine and medium roots; gradual, smooth boundary.
C1—32 to 39 inches, reddish-brown (5YR 5/4) silty soil material; about 75 percent weathered fragments of yellowish-brown (10YR 5/4) mica schist, up to 2 inches in diameter; few fine and medium roots; gradual, wavy boundary.
C2—39 to 41 inches, reddish-brown (2.5YR 5/4) weathered mica schist that is difficult to dig out with spade but can be broken down with fingers; few fine roots.

The surface layer is 6 to 10 inches thick. The upper part of the subsoil is silty clay loam, but the lower part, in which the mica content is greater, may be silt loam. The upper part of the subsoil is reddish brown, and the lower part is red or yellowish red. The subsoil is 14 to 32 inches thick, and the solum is 24 to 42 inches thick.

Elioak silt loam, sloping (7 to 15 percent slopes) (EkC).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are a few small areas of loam and small areas of gently sloping soils.

Approximately half the acreage has been cleared and is used for hay, pasture, and small grain, to all of which the soil is well suited. (Capability unit IIIe–4; woodland suitability group 7)

Elioak silt loam, sloping, eroded (7 to 15 percent slopes) (EkC2).—The profile of this soil is similar to the one described as representative of the series, but the surface layer is thinner than the one in the representative profile. The plow layer is yellowish brown because small amounts of subsoil material have been mixed with the original surface layer during tillage. Included in the areas mapped are small areas of gently sloping soil.

This soil is suited to crops. Careful management is needed to control erosion. (Capability unit IIIe–4; woodland suitability group 7)

Elioak silt loam, moderately steep (15 to 45 percent slopes) (EkD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped are a few small areas that have steep slopes.

This soil is better suited to close-growing crops than to row crops. (Capability unit IVe–2; woodland suitability group 7)

Elioak silt loam, moderately steep, eroded (15 to 45 percent slopes) (EkD2).—The profile of this soil is similar to but thinner than the one described as representative of the series. The texture is silty clay loam in places where the subsoil is exposed. Included in the areas mapped are small areas of a steep Elioak soil.

About half the acreage is in second-growth forest. Cleared areas are well suited to pasture and hay crops. (Capability unit IVe–2; woodland suitability group 7)

Fletcher Series

The Fletcher series consists of deep and moderately deep, well-drained soils on uplands. These soils devel-

oped in material weathered from chlorite and muscovite schist. They have a surface layer of dark grayish-brown to dark yellowish-brown loam and a subsoil of yellowish-red silty clay loam.

These soils are strongly acid, low in fertility, and low in organic-matter content. They are moderately permeable and have good available moisture capacity.

Fletcher soils are associated with Cecil, Louisa, and Madison soils. They have a finer textured surface layer than Cecil soils, and a thinner, lighter colored, less clayey subsoil. Fletcher soils have a more distinct and clearly defined subsoil than Louisa soils. They contain less mica than Madison soils and are finer textured throughout the profile.

The Fletcher soils in Carroll County are sloping to moderately steep.

Representative profile of Fletcher loam, sloping (2 to 15 percent slopes), in forest of mixed hardwoods and pines along Highways 687 and 679 half a mile west of the intersection with 697

O1—2 inches to 1 inch, loose leaves and pine needles.
O2—1 inch to 0, partly decomposed leaves and pine needles.
A1—0 to 1 inch, dark yellowish-brown (10YR 4/4) loam; weak, fine, granular structure; very friable; abundant fine and medium roots; abrupt, smooth boundary.
A2—1 to 4 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine and medium, granular structure; friable; plentiful fine and medium roots; few schist fragments up to 2 inches in diameter; clear, smooth boundary.
A3—4 to 7 inches, yellowish-brown (10YR 5/4) heavy loam; weak, fine and medium, granular structure; friable; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B1—7 to 12 inches, yellowish-red (5YR 5/6) light silty clay loam; weak, fine and medium, subangular blocky structure; thin, discontinuous clay films on ped surfaces; friable; few fine and large roots; gradual, smooth boundary.
B2t—12 to 26 inches, yellowish-red (5YR 4/8) silty clay loam; moderate, medium and coarse, subangular blocky structure; thin, continuous clay films; friable; few fine and large roots; gradual, wavy boundary.
B3—26 to 31 inches, yellowish-red (5YR 4/8) silt loam to light silty clay loam; weak, fine and medium, subangular blocky structure; friable; few fine roots; thin, patchy clay films; gradual, wavy boundary.
C—31 to 42 inches +, silty soil material mixed with weathered, fine-grained, vertically alined schist.

The surface layer is dark grayish brown to dark yellowish brown and is 6 to 9 inches thick. The subsoil is reddish brown to red. The solum is 20 to 32 inches thick. The depth to bedrock ranges from 32 to 50 inches.

Fletcher loam, sloping (2 to 15 percent slopes) (FcC).—This soil is like the one described as representative of the series. Included in the areas mapped are a few small areas of gently sloping Fletcher soil and small scattered areas of moderately eroded, gently sloping and moderately sloping soils.

This soil can be used for any of the crops grown in the county. (Capability unit IIIe–4; woodland suitability group 7)

Fletcher loam, moderately steep (15 to 45 percent slopes) (FcD).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small spots of fine sandy loam and silt loam, small areas of a steep Fletcher soil, and small areas of moderately steep or steep soils that are eroded to the extent that the subsoil is exposed.

This soil is used largely for forest, but it is also suited to hay and pasture. (Capability unit IVe–2; woodland suitability group 7)

Gilpin Series

The Gilpin series consists of moderately deep and deep, well-drained soils on uplands. These soils developed in material weathered from phyllite and graphitic schist. They have a surface layer of yellowish-brown silt loam and a subsoil of strong-brown heavy silt loam to light silty clay loam. The native vegetation consists of hardwoods and white pine.

These soils are strongly acid, low in fertility, and low or medium in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Gilpin soils are associated with Watauga, Chester, and Glenelg soils. They are shallower over bedrock than Watauga soils, and they have partly weathered phyllite fragments mixed throughout the lower horizons. Gilpin soils have a thinner, less well defined subsoil than Chester and Glenelg soils.

Sloping and moderately steep soils of the Gilpin series occur in the northern part of Carroll County. They form a narrow band south of the sandstone and quartz ridges, at elevations of 2,400 to 2,700 feet.

Representative profile of Gilpin silt loam, sloping (7 to 15 percent slopes), in a pasture field 100 yards north of Corinth Methodist Church, on Highway 740:

A1—0 to 2 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, fine and medium, granular structure; very friable; less than 10 percent finely divided mica flakes; few phyllite fragments up to ½ inch in diameter; abundant fine roots; clear, smooth boundary.
A2—2 to 8 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, granular structure; friable; few krotovinas up to ⅛ inch in diameter; less than 10 percent finely divided mica flakes; few phyllite fragments up to ½ inch in diameter; plentiful fine roots; gradual, smooth boundary.
B1—8 to 14 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak, fine, subangular blocky structure; friable; few, thin, faint, patchy clay films; 5 percent phyllite fragments ¼ to 1 inch in diameter; less than 10 percent finely divided mica flakes; plentiful fine roots; few medium roots; gradual, smooth boundary.
B2t—14 to 24 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few phyllite fragments up to ½ inch in diameter; few krotovinas up to ¾ inch in diameter; 10 percent finely divided mica flakes; few, thin, faint, patchy clay films; few fine and medium roots; gradual, smooth boundary.
B3—24 to 31 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, fine and medium, subangular blocky structure; friable, nonsticky; few krotovinas up to ¼ inch in diameter; 25 percent fragments of phyllite and graphite up to 1½ inches in diameter; 15 percent finely divided mica; few faint clay films in pores; few fine roots; gradual, wavy boundary.
C1—31 to 38 inches, very dark gray (10YR 3/1), weathered phyllite and graphitic schist; 5 percent dark yellowish-brown (10YR 4/4) silty soil material along crevices in parent material; few fine roots; gradual, wavy boundary.

C2—38 to 52 inches, very dark gray (7.5YR N 3/0), partly weathered phyllite and graphitic schist; difficult to dig but easily crushed with fingers.
R—52 inches +, hard phyllite mixed with graphitic schist.

The surface layer is yellowish brown to dark yellowish brown and is 6 to 9 inches thick. The subsoil is strong-brown heavy silt loam to light silty clay loam. The lower part may be yellowish brown. The solum is 18 to 33 inches thick. The depth to hard rock is 30 to 60 inches.

Gilpin silt loam, sloping (7 to 15 percent slopes) (GnC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas in plowed fields where the subsoil is exposed at the surface.

This soil is fairly easily tilled. It is used for crops, including corn, small grain, and hay. (Capability unit IIIe–5; woodland suitability group 7)

Gilpin silt loam, sloping, eroded (7 to 15 percent slopes) (GnC2).—The surface layer of this soil is thinner than that of the one described as representative of the series. Included in the areas mapped are small areas where the subsoil is exposed and the texture is light silty clay loam.

The plow layer of this soil is strong brown because small amounts of subsoil material have been mixed with the surface layer in tillage.

This soil is suited to corn, small grain, hay, and pasture. (Capability unit IIIe–5; woodland suitability group 7)

Gilpin silt loam, moderately steep (15 to 25 percent slopes) (GnD).—The profile of this soil is similar to but thinner than the one described as representative of the series. Included in the areas mapped are areas of moderately eroded soils. In these areas the plow layer is strong brown because small amounts of subsoil material have been mixed with the surface layer in tillage. Also included are small areas where the subsoil, which is light silty clay loam, is exposed.

This soil is better suited to hay and pasture than to row crops. (Capability unit IVe–3; woodland suitability group 7)

Glenelg Series

The Glenelg series consists of soils that are deep and well drained. These soils developed in material weathered from gneiss, schist, and some granite. They have a dark-brown surface layer and a subsoil of strong-brown silty clay loam. They are micaceous throughout the profile. The native vegetation consists of mixed hardwoods and some white pine.

These soils are medium acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Glenelg soils are associated with Chester soils, which are less micaceous. They are also associated with Hayesville soils, which are deeper and redder; with Myersville soils, which are browner and finer textured; with Watauga soils, which are less well defined and more micaceous; and with Edneyville soils, which are less brown and are coarser textured.

The Glenelg soils in Carroll County are gently sloping to steep and occur at elevations of 2,300 to 3,500 feet. They are mapped only in complexes with Chester soils. About 75 percent of each area is Chester soils, and the rest is Glenelg soils.

Representative profile of Glenelg loam, sloping (7 to 15 percent slopes), in an idle field on Highway 704 near the intersection of Highways 704 and 697:

A1—0 to 2 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; 15 percent finely divided mica; few black concretions 1/16 inch in diameter; few fragments of quartz mica schist as much as 1/2 inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 7 inches, dark-brown (7.5YR 4/4) loam; weak, fine, granular structure; friable; few fragments of quartz as much as 1/2 inch in diameter; 15 to 20 percent finely divided mica; common fine pores; abundant fine and medium roots, and few large roots; gradual, smooth boundary.
B1—7 to 14 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak, fine and medium, subangular blocky structure; friable; 20 to 25 percent finely divided mica; thin, faint, patchy clay films in pores and on ped surfaces; common fine pores; few fragments of quartzite as much as 1/2 inch in diameter; few coarse sand grains; plentiful fine and medium roots; gradual, smooth boundary.
B21t—14 to 23 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine, and moderate, medium, subangular blocky structure; friable; common fine pores; few fragments of quartzite and schist, as much as 1/2 inch in diameter; 20 to 30 percent mica, which imparts a slight feeling of slickness; faint, patchy clay films on ped surfaces; plentiful fine and medium roots; gradual, smooth boundary.
B22t—23 to 32 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine, subangular blocky structure; friable; few fragments of quartzite and schist, as much as 2 inches in diameter; 25 to 30 percent mica, which gives a slight feeling of slickness; faint, patchy clay films; common fine pores.
B3—32 to 40 inches, strong-brown (7.5YR 5/6) silt loam; weak, fine, subangular blocky structure; friable; 40 percent mica, which gives a slight feeling of greasiness; thin, faint, patchy clay films, mostly in pores; 30 percent weathered quartz mica gneiss and schist; few fine pores; few fine roots; gradual, wavy boundary.
C1—40 to 49 inches, yellowish-red (5YR 4/6) loamy soil material containing 40 percent mica; few fine roots; gradual, wavy boundary.
C2—49 to 72 inches +, reddish-brown (5YR 4/4), reddish-yellow (7.5YR 6/6), and black (5YR 2/1), partly weathered quartz mica gneiss and schist that is hard to dig out with spade but can be broken with fingers; few fine roots.

The surface layer consists of brown to dark-brown loam and cobbly loam and is 6 to 10 inches thick. The subsoil consists of strong-brown to yellowish-red loam, silty clay loam, or clay loam and is 16 to 33 inches thick. The thickness of the solum ranges from 18 to 40 inches. The depth to bedrock is commonly more than 75 inches but is as little as 25 inches in a few places. The amount of mica is greater in the deeper layers.

Gravelly Alluvial Land

Gravelly alluvial land (Gr) occurs on first bottoms where fresh alluvium is deposited from time to time. The soil material contains 10 to 20 percent fragments of quartz, schist, and gneiss. The slope range is 0 to 2 percent. Included in the areas mapped are small areas that are not gravelly. Most areas include a few rock outcrops.

The surface soil material is dark brown to grayish brown in color and fine sandy loam to silt loam in texture. The subsurface soil material is brown to yellowish

brown in color and fine sandy loam to light silty clay loam in texture. The depth to bedrock is 3 to 4 feet.

This land type is strongly acid, medium in fertility, and medium in organic-matter content. Permeability is moderately rapid.

Gravelly alluvial land in Carroll County is well drained but occurs along streams and is frequently flooded. It is closely associated with Comus and Hatboro soils.

Most of the acreage is used for corn and for pasture, but a small part is in second-growth forest. (Capability unit IIs–1; woodland suitability group 7)

Gullied Land

Gullied land (Gu) is made up of very severely eroded and gullied Manor, Louisburg, and Myersville soils. Gullies as much as 4 feet deep occupy half the acreage. Much of the original soil has been eroded down to hard rock, but small areas between the gullies retain part of the original soil and support a scant growth of various plants. The hazard of further erosion is very high. Included in the areas mapped are a few small, scattered areas of sloping to very steep, severely eroded Watauga, Chester, and Glenelg soils.

This land is useless for pasture or crops and is poorly suited to timber. Most of the acreage has reverted to scrub pine, and some areas have been planted to white pine. (Capability unit VIIe–1; woodland suitability group 11)

Hatboro Series

The Hatboro series consists of nearly level, poorly drained soils on flood plains. These soils developed in sediment derived from upland soils underlain mainly by igneous and metamorphic rocks. The native vegetation consists of birch, sycamore, water oak, and an understory of swamp grass, rushes, and alders.

These soils are strongly acid, medium or high in fertility, medium or high in organic-matter content, and moderately permeable. They are flooded frequently.

Hatboro soils are commonly mapped near or adjacent to Comus, Codorus, and Toxaway soils. They are finer textured than Comus soils, and they are poorly drained and mottled throughout. Hatboro soils are more poorly drained than Codorus soils, and they are mottled to the surface. They contain less organic matter than Toxaway soils, and they have a grayish surface layer.

Soils of this series occur on the flood plains along many streams in the Piedmont Plateau and Blue Ridge Mountain sections of Carroll County.

Representative profile of Hatboro silt loam (0 to 2 percent slopes), in a pasture field on the northeast side of U.S. Highway 58, along Little Reed Island Creek:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint mottles of dark brown (7.5YR 4/4); medium, fine, granular structure; friable; abundant finely divided mica flakes; some organic matter staining; abundant fine grass roots; gradual, smooth boundary.

B1g—5 to 24 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of yellowish red (5YR 4/6); moderate, medium, subangular blocky structure; plastic; plentiful finely divided mica flakes; few medium and fine roots; gradual, smooth boundary.

B2g—24 to 48 inches, gray (10YR 5/1) silty clay loam; massive; very plastic; considerable organic staining; abundant finely divided mica flakes; gradual, smooth boundary.

IIC1g—48 to 70 inches, strong-brown (7.5YR 5/6) fine sandy loam; common, coarse, distinct mottles of gray (N 5/0); structureless; gradual, smooth boundary.

IIIC2—70 inches +, stream-deposited quartz pebbles mixed with a small amount of sandy soil material.

The surface layer is 4 to 10 inches thick. The subsoil is dark-gray to gray and is 15 to 60 inches thick. The solum is underlain by fine sandy loam, and this, in turn, is underlain by stream-deposited gravel and sandy soil material in many places.

Hatboro silt loam (0 to 2 percent slopes) (Ha).—The profile of this soil is like the one described as representative of the series. In places where this soil is associated with Toxaway soils, the surface layer is much darker colored than it is in other places. Included in the areas mapped are a few small areas of Toxaway silt loam, Codorus silt loam, and Gravelly alluvial land.

In places there are cobblestones in the profile.

Most of this soil has been cleared and used for pasture, but a large part has reverted to alders and to submarginal pasture. (Capability unit IVw–1; woodland suitability group 4)

Hatboro-Toxaway silt loams (0 to 2 percent slopes) (Hb).—The Hatboro soil in this complex is similar to the one described as representative of the Hatboro series. The Toxaway soil is similar to that described under the heading "Toxaway Series."

The water table is at the surface most of the year. Permeability is moderate to moderately slow.

These soils are used mainly for pasture and forest. Complete drainage systems are necessary before cultivated crops can be grown. (Capability unit IVw–1; woodland suitability group 4)

Hayesville Series

The Hayesville series consists of deep, well-drained soils on uplands. These soils developed in material weathered from mica schist, mica gneiss, granite, and other igneous and metamorphic rocks. They have a surface layer of dark yellowish-brown or dark-brown loam and a subsoil of red clay loam to clay. The native vegetation consists of hardwoods and white pine and an understory of rhododendron and other shrubs.

These soils are strongly acid, medium in fertility, and medium in organic-matter content. They are moderately permeable and have good available moisture capacity. Tilth is good.

Hayesville soils are associated with Watauga, Chester, Glenelg, and Myersville soils. They have a slightly coarser textured surface layer than Watauga soils, and they have a thicker, less micaceous solum and a well-defined subsoil. Hayesville soils have a redder, more clearly defined subsoil than Chester and Glenelg soils. They have a redder, slightly coarser textured subsoil than Myersville soils, which were derived from basic rocks.

The Hayesville soils in Carroll County are gently sloping to moderately steep and occur as rather large areas throughout the smooth intermountain plateaus in the

Blue Ridge Mountains, at elevations of 2,200 to 3,000 feet.

Representative profile of Hayesville loam, sloping (7 to 15 percent slopes), in a wooded area:

O1—2 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, partly decayed leaves and twigs.
A1—0 to 2 inches, dark-brown (7.5YR 3/2) loam; weak, fine, granular structure; friable; common fine pores; few quartz fragments less than 1/4 inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 6 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine, granular structure and moderate, medium, granular; friable; few finely divided mica flakes; few quartz fragments less than 1/4 inch in diameter; plentiful fine and medium roots and a few large roots; gradual, smooth boundary.
B1—6 to 13 inches, yellowish-red (5YR 5/6) clay loam; weak, fine, subangular blocky structure and moderate, medium, subangular blocky; friable; plentiful fine pores; thin, faint, patchy clay films in pores and on peds; few finely divided mica flakes; few fine, medium, and large roots; gradual, smooth boundary.
B21t—13 to 19 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm; few fine pores; thin, faint, patchy clay films in pores and on peds; few finely divided mica flakes; few fine and medium roots; gradual, smooth boundary.
B22t—19 to 28 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm; few fine pores; thin, distinct, continuous clay films on peds and in pores; few finely divided mica flakes; scattered krotovinas up to ½ inch in diameter; few fine and medium roots; gradual, smooth boundary.
B3—28 to 41 inches, yellowish-red (5YR 4/8) silt loam; weak, fine and medium, subangular blocky structure; friable; few fine pores; thin, faint, patchy clay films on peds and in pores; plentiful finely divided mica flakes; 15 percent weathered quartz mica gneiss that can be easily crushed to loamy soil material; few fine roots; gradual, smooth boundary.
C1—41 to 59 inches, yellowish-red (5YR 4/8) loamy soil material mixed with weathered quartz mica gneiss that contains some biotite mica; few fine and medium roots; gradual, smooth boundary.
C2—59 to 86 inches, reddish-yellow (7.5YR 7/6) and pinkish-gray (7.5YR 7/2), weathered quartz mica gneiss containing some streaks of black (5YR 2/1) biotite mica; can be dug out with spade.

The surface layer is loam or cobbly loam. It is brown to dark yellowish brown and 6 to 10 inches thick in cultivated areas. The subsoil is clay loam to clay. The solum is 30 to 41 inches thick. The mica content varies and is greater in the deeper layers. The depth to bedrock is generally more than 5 feet.

Hayesville cobbly loam, sloping (7 to 15 percent slopes) (HcC).—The profile of this soil is similar to the profile described as representative of the series, but the surface layer is about 20 percent cobblestones. Included in the areas mapped are small areas of moderately eroded soils and some areas of gently sloping cobbly soils.

Most of this soil has been cleared and is used for crops and pasture. The cobblestones interfere with cultivation and reduce the available moisture capacity. (Capability unit IVe–5; woodland suitability group 7)

Hayesville cobbly loam, moderately steep, eroded (15 to 45 percent slopes) (HcD2).—The profile of this soil is similar to the profile described as representative of the series, but it is thinner and the surface layer is 20 percent cobblestones. Included in the areas mapped are small areas of uneroded soil and areas of steep soil.

This soil has been cleared. Part of the acreage has reverted to forest, and the rest is used for pasture. (Capability unit IVe–5; woodland suitability group 7)

Hayesville loam, gently sloping (2 to 7 percent slopes) (HeB).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam.

Most of this soil has been cleared and is used for corn, small grain, and hay, to all of which it is well suited. (Capability unit IIe–3; woodland suitability group 7)

Hayesville loam, gently sloping, eroded (2 to 7 percent slopes) (HeB2).—The surface layer of this soil is thinner than that of the soil described as representative of the series. Included in the areas mapped are small areas of fine sandy loam.

The plow layer is strong brown because small amounts of subsoil material have been mixed with the original surface layer in tillage. The yellowish-red subsoil is exposed in places.

This soil is suited to all crops grown in the county. (Capability unit IIe–3; woodland suitability group 7)

Hayesville loam, sloping (7 to 15 percent slopes) (HeC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam.

Most of this soil has been cleared and is used for cultivated crops and pasture, but some small areas are in second-growth hardwoods and white pine. (Capability unit IIIe–4; woodland suitability group 7)

Hayesville loam, sloping, eroded (7 to 15 percent slopes) (HeC2).—The surface layer of this soil is thinner than that of the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam.

The plow layer is strong brown because small amounts of subsoil material have been mixed with the original surface layer in tillage. Small spots of the yellowish-red subsoil are exposed.

Most of this soil has been cleared and is used for cultivated crops, hay, or pasture. (Capability unit IIIe–4; woodland suitability group 7)

Hayesville loam, moderately steep (15 to 45 percent slopes) (HeD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped are small areas of steep soils.

This soil is better suited to forage crops than to row crops. (Capability unit IVe–2; woodland suitability group 7)

Hayesville loam, moderately steep, eroded (15 to 25 percent slopes) (HeD2).—The profile of this soil is similar to but thinner than the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam and spots on steeper slopes where the yellowish-red subsoil is exposed.

This soil is better suited to close-growing forage crops than to row crops. (Capability unit IVe–2; woodland suitability group 7)

Hazel Series

The Hazel series consists of shallow or moderately deep, well-drained soils on uplands. These soils devel-

oped in material weathered from hard phyllite. They have a surface layer of dark-brown silt loam and a subsoil of dark-brown to yellowish-brown silt loam. The native vegetation consists of white pine and hardwoods, chiefly oak, and an understory of rhododendron and mountain-laurel.

These soils are strongly acid, low in fertility, and low in organic-matter content. Permeability is moderately rapid, and the available moisture capacity is low.

Hazel soils are closely associated with Talladega and Manor soils, but they contain more coarse fragments than those soils and are underlain by hard phyllite instead of deeply weathered micaceous schist and gneiss. They have a subsoil that lacks the yellowish-red color typical of the subsoil in Talladega soils and the strong-brown color typical of the subsoil in Manor soils.

The Hazel soils in Carroll County are sloping to very steep. They occupy narrow ridges in the rugged intermountain sections of the Blue Ridge Mountains, in the northwestern and northeastern parts of the county. They are at elevations of 2,300 to 2,700 feet.

Representative profile of Hazel silt loam, sloping (7 to 15 percent slopes), in a wooded area 1 mile south of Sylvatus on Highway 100:

O1—3 inches to 1 inch, loose oak leaves and twigs.
O2—1 inch to 0, very dark gray (10YR 3/1), partly decayed leaves and twigs.
A1—0 to 2 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; 50 percent phyllite fragments up to ½ inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A3—2 to 11 inches, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; friable; 10 percent phyllite chips; plentiful fine, medium, and large roots; gradual, smooth boundary.
B—11 to 17 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; 50 to 60 percent phyllite fragments up to 3 inches in diameter; plentiful fine and medium roots; gradual, wavy boundary.
C—17 to 25 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; 75 percent phyllite fragments up to 3 inches in diameter.
R—25 inches +, slightly weathered phyllite.

The surface layer is dark-brown to yellowish-brown silt loam or channery silt loam and is 2 to 13 inches thick. The subsoil is dark brown to yellowish brown. The solum is 10 to 25 inches thick. The depth to hard rock ranges from 15 to 40 inches. Hard schist fragments in varying amounts occur on the surface and throughout the profile.

Hazel channery complex, steep (15 to 45 percent slopes) (HmE).—Some of the soils in this complex are similar to the soil described as representative of the series, but others have a somewhat thinner profile than the representative soil. Large numbers of phyllite fragments and schist fragments are scattered on the surface and throughout the profile. Included in the areas mapped are small areas of less steeply sloping soils.

These soils are better suited to trees than to other crops. (Capability unit VIIs–1; woodland suitability group 8)

Hazel channery complex, very steep (45+ percent slopes) (HmF).—Some of the soils in this complex are similar to the soil described as representative of the series, but others have a somewhat thinner profile than the representative soil. Large numbers of phyllite and schist fragments are scattered on the surface and throughout the profile. Included in the areas mapped is a small acreage where the texture is silt loam and the surface layer is less than 20 percent coarse fragments.

The soils in this complex are suited to trees but not to crops. (Capability unit VIIs–1; woodland suitability group 8)

Hazel complex, sloping (7 to 15 percent slopes) (HnC).—Some of the soils in this complex are similar to the soil described as representative of the series, but others have a somewhat thinner profile than the representative soil. In some places as much as 25 percent of the soil mass consists of coarse fragments of rock.

Most of the acreage is in woodland, but a small acreage has been cleared and is used for pasture and for cultivated crops. (Capability unit IVe–4; woodland suitability group 8)

Hazel complex, steep (15 to 45 percent slopes) (HnE).—Some of the profiles of the soils in this complex are similar to the profile described as representative of the series. Generally, these soils are somewhat thinner than the representative soil, have a thinner and less well developed subsoil, and are underlain by rock at a depth of 10 to 16 inches. Some areas of deeper Hazel soils are included, also. In some places as much as 25 percent of the soil mass consists of coarse fragments of rock. Included in the areas mapped are scattered but sizable areas of moderately steep Hazel soils.

Small areas have been cleared and used for pasture, but this complex is better suited to forest. (Capability unit VIIe–1; woodland suitability group 8)

Hiwassee Series

The Hiwassee series consists of deep, well-drained soils on old high stream terraces. These soils were derived from old alluvium washed chiefly from Cecil, Hayesville, Porters, Myersville, and associated soils of the Piedmont Plateau and the Blue Ridge Mountains. Hiwassee soils have a surface layer of dark reddish-brown loam about 9 inches thick and generally a subsoil of dark-red clay. They are generally underlain by unconforming material, either the surface of an old buried soil or layers of gravel and cobblestones. The native vegetation consists of mixed hardwoods.

These soils are medium acid or strongly acid, medium in fertility, and low or medium in organic-matter content. They are moderately permeable and have good available moisture capacity.

Hiwassee soils are closely associated with Wickham and Turbeville soils. They developed in sediments older than those in which Wickham soils developed, and they have more clearly defined profile development than Wickham soils, a darker brown surface layer, and a subsoil of red clay, and they generally are higher above the flood plains. Hiwassee soils have a darker colored, finer textured, generally thinner surface layer than Turbeville soils.

In Carroll County, Hiwassee soils are mapped only as part of undifferentiated groups with Turbeville soils.

Representative profile of Hiwassee loam, sloping (2 to 15 percent slopes), in a cultivated field along Lovills Creek, 100 yards east of Highway 687:

Ap—0 to 9 inches, reddish-brown (5YR 4/4) loam; moderate, fine, granular structure; friable; common fine pores; few rounded pebbles up to 1 inch in diameter; abundant fine roots; clear, smooth boundary.

B1—9 to 16 inches, dark-red (2.5YR 3/6) heavy clay loam; moderate, fine and medium, subangular blocky structure; firm; common fine pores; thin, distinct, continuous clay films on peds and in pores; few rounded pebbles up to 1 inch in diameter; few finely divided mica flakes; plentiful fine roots; gradual, smooth boundary.

B21t—16 to 26 inches, dark-red (2.5YR 3/6) clay; strong, medium, subangular blocky structure; firm; common fine pores; thin, prominent, continuous clay films on peds; few rounded pebbles up to ½ inch in diameter; few finely divided mica flakes; few fine roots; gradual, smooth boundary.

B22t—26 to 34 inches, dark-red (2.5YR 3/6) heavy clay loam; moderate, fine and medium, subangular blocky structure; firm; few fine pores; thin, prominent, continuous clay films on peds; a little grit, and more gravel than in the B21t horizon; few finely divided mica flakes; few fine roots; gradual, smooth boundary.

IIB23t—34 to 40 inches, dark-red (2.5YR 3/6) clay loam; moderate, medium, subangular blocky structure; firm; few fine pores; thin, distinct, continuous clay films on peds; compact in place and difficult to dig out with spade; 60 percent pebbles and cobblestones up to 6 inches in diameter; few finely divided mica flakes; few fine roots.

The surface layer is dark-brown to dark reddish-brown loam, cobbly fine sandy loam, and fine sandy loam. It is 6 to 10 inches thick. The subsoil is dark red or red clay or clay loam. It is 2 to 6 feet thick. Layers of cobblestones and gravel or the surface of a buried soil may occur at a depth of 3 to 10 feet. In places there are a few pebbles or cobblestones on the surface.

Hiwassee and Turbeville loams, gently sloping (2 to 7 percent slopes) (HtB).—The Hiwassee soil in this undifferentiated group is similar to the one described as representative of the Hiwassee series, but it is less steep than the representative soil (fig. 4). A Turbeville fine sandy loam is described under the heading "Turbeville Series."

The soils of this complex are suited to all crops grown in the area. (Capability unit IIe–2; woodland suitability group 6)

Hiwassee and Turbeville loams, sloping (2 to 15 percent slopes) (HtC).—The Hiwassee soil in this undifferentiated group is the one described as representative of the Hiwassee series. A Turbeville fine sandy loam is described under the heading "Turbeville Series." Included in the areas mapped are small areas of gently sloping Hiwassee and Turbeville loams and some moderately eroded areas.

Most of this soil complex is cultivated. (Capability unit IIIe–3; woodland suitability group 6)

Hiwassee and Turbeville loams, moderately steep (15 to 25 percent slopes) (HtD).—The Hiwassee soil in this undifferentiated group is similar to but steeper than the one described as representative of the Hiwassee series. A Turbeville fine sandy loam is described under the heading "Turbeville Series." Included in the areas mapped are small areas of soils that have a thinner surface layer and a few scattered areas of steeper soils.

The soils of this complex are likely to erode if they are cultivated. Most of the acreage is used for pasture and for growing alfalfa, but a small acreage is used for cultivated crops. (Capability unit IVe–1; woodland suitability group 6)

Hiwassee and Turbeville cobbly fine sandy loams, sloping (7 to 15 percent slopes) (HuC).—The Hiwassee soil in this undifferentiated group is similar to the one described as representative of the Hiwassee series, but 15 to 20 percent of its surface layer consists of cobblestones as much as 10 inches in diameter. A Turbeville fine sandy loam is described under the heading "Turbeville Series."

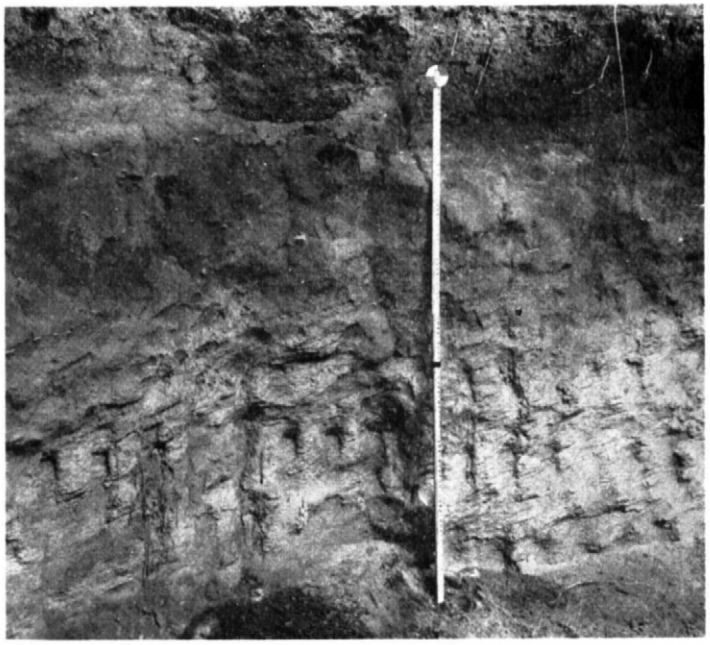

Figure 4.—Profile of Hiwassee loam.

The surface layer of these soils is 6 to 12 inches thick. In places erosion has removed part of the original surface layer, and the remaining surface soil is yellowish brown. The cobblestones interfere with cultivation and reduce the available moisture capacity.

The soils of this complex are mostly in forest, to which they are well suited. (Capability unit IVe–5; woodland suitability group 7)

Hiwassee and Turbeville cobbly fine sandy loams, moderately steep (15 to 25 percent slopes) (HuD).—The Hiwassee soil in this undifferentiated unit is similar to the one described as representative of the Hiwassee series, but the slope is steeper and the surface layer contains 15 to 20 percent cobblestones. A Turbeville fine sandy loam is described under the heading "Turbeville Series." Included in the areas mapped are small areas of moderately eroded soils that have a thinner, yellowish-brown surface layer, small areas of soils that have a yellowish-red subsoil, and spots of steeper soils.

The soils of this complex are used largely for forest and pasture. They are poorly suited to cultivated crops because of the cobblestones. (Capability unit IVe–5; woodland suitability group 7)

Hiwassee and Turbeville fine sandy loams, sloping (2 to 15 percent slopes) (HvC).—The Hiwassee soil in this undifferentiated group is similar to the one described as representative of the Hiwassee series. The Turbeville soil is similar to that described under the heading "Turbeville Series." Small areas of these soils have a surface layer as much as 15 inches thick. Included in the areas mapped are small areas of gently sloping soils, small areas of steeper soils, and areas of moderately eroded soils that have a yellowish-brown plow layer. Also included

are some areas of soils that have a strong-brown and yellowish-red subsoil. The mapped areas are mostly Turbeville soils.

The soils of this complex are suited to all crops grown locally. (Capability unit IIIe–4; woodland suitability group 7).

Louisa Series

The Louisa series consists of soils that are mostly shallow or moderately deep and excessively drained. These soils developed in material weathered mainly from mica schist but partly from talcose schist, mica gneiss, and quartz mica schist. They have a surface layer of dark-gray to dark yellowish-brown loam and a subsoil of strong-brown to yellowish-red loam. The native vegetation consists of mixed hardwoods and pine.

These soils are strongly acid, low in fertility, and low in organic-matter content. Permeability is moderately rapid.

Louisa soils are associated with Cecil, Braddock, and Fletcher soils. They are shallower than any of the associated soils. They are more micaceous than Cecil and Braddock soils, and they have a less well defined subsoil. Louisa soils are coarser textured than Fletcher soils.

Soils of this series occur in the Piedmont Plateau section of Carroll County.

Representative profile of Louisa loam, steep (25 to 45 percent slopes), in a wooded area 200 yards southeast of Lovills Creek on Highway 687:

O1—3 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, decayed organic matter and leaf mold.
A1—0 to 2 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; abundant fine and medium roots; abundant finely divided mica flakes; a few schist fragments up to ¼ inch in diameter; clear, smooth boundary.
A2—2 to 8 inches, brown to dark-brown (7.5YR 4/4) loam; weak, fine and medium, granular structure; friable; plentiful fine and medium roots, and few large roots; plentiful finely divided mica flakes, which give a feeling of greasiness; 10 percent schist fragments up to 1 inch in diameter; gradual, wavy boundary.
B—8 to 20 inches, yellowish-red (5YR 4/6) loam; weak, fine, subangular blocky structure; friable; plentiful fine and medium roots; plentiful finely divided mica, which gives a feeling of greasiness; 30 percent schist fragments up to 1½ inches in diameter; gradual, smooth boundary.
C—20 to 25 inches, partly weathered quartz mica schist and thin lenses of yellowish-red silty soil material along rock crevices; few fine and medium roots.
R—25 inches +, quartz mica schist.

The surface layer is 6 to 8 inches thick. The subsoil is strong brown in some places, but it is generally yellowish-red heavy loam to light clay loam. The solum is 10 to 20 inches thick. The depth to rock ranges from 15 inches to 6 feet.

Louisa complex, steep (25 to 45 percent slopes) (LcE).—In this complex, Louisa soils that show little or no evidence of subsoil development are intermixed with Louisa soils that have a subsoil of loam to light clay loam. The depth to weathered micaceous material varies. Included in the areas mapped are small areas of silt loam and sandy loam and a small acreage of very steep Louisa soils.

These soils are severely limited for most uses because of the steep slopes and the low available moisture capacity. (Capability unit VIIe–1; woodland suitability group 5)

Louisburg Series

The Louisburg series consists of soils that are moderately deep and excessively drained. These soils developed in material weathered from granite and granite gneiss. They have a surface layer of dark grayish-brown sandy loam and a subsoil of thin, brown to strong-brown sandy loam. The native vegetation consists of mixed oaks and pines.

These soils are strongly acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability and low available moisture capacity.

Louisburg soils are associated with Edneyville soils. They do not have the well-defined subsoil typical of Edneyville soils.

Sloping to steep soils of this series occur in the Piedmont Plateau and Blue Ridge Mountain sections of Carroll County.

Representative profile of Louisburg sandy loam, steep (25 to 45 percent slopes), in a wooded area a quarter of a mile east of the intersection of Highways 750 and 100:

O1—2 inches to 1 inch, mixture of oak leaves and pine needles.
O2—1 inch to 0, partly decayed leaves and twigs.
A1—0 to 2 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable; common quartz pebbles up to 1/8 inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 9 inches, brown (10YR 5/3) sandy loam; weak, fine and medium, granular structure; friable; grayish-brown (10YR 5/2) organic staining along old root channels and worm casts; 10 percent quartz fragments up to 1/16 inch in diameter; plentiful medium roots, and few large roots; gradual, wavy boundary.
B—9 to 23 inches, strong-brown (7.5YR 5/6) sandy loam soil material; structureless; friable; 25 percent quartz cobblestones up to 6 inches in diameter; few medium roots.
R—23 inches +, partly weathered granite and granite gneiss.

The surface layer is dark grayish-brown to yellowish-brown fine sandy loam to sandy loam 7 to 10 inches thick. The subsoil is strong-brown to pale-yellow sandy loam to heavy sandy loam. The depth to bedrock is 2 to 3 feet.

Louisburg complex, moderately steep (7 to 25 percent slopes) (LoD).—The soils in this complex are similar to but less steep than the one described as typical of the series. Included in the areas mapped are small areas of sloping Louisburg soils and small areas of shallow soil with a brown loam surface layer. Also included are small spots of a deep, moderately well drained soil that has a subsoil of clay, and also small spots of a deep, well-drained soil that has a subsoil of fine sandy loam.

There are a few rock outcrops, which are shown on the soil map by symbols.

These soils are not suited to row crops. Most of the acreage has been cleared and is used for hay crops and pasture. (Capability unit VIe–2; woodland suitability group 5)

Louisburg complex, steep (25 to 45 percent slopes) (LoE).—The soils in this complex are similar to the one described as representative of the series. Included in the areas mapped are small areas of a shallower soil with a brown loam surface layer.

These soils are generally shallow to rock and have only a weakly defined subsoil. There are rock outcrops, which are shown on the soil map by symbols.

Most of the acreage has been cleared and is used for hay and pasture. (Capability unit VIIe–1; woodland suitability group 5)

Madison Series

The Madison series consists of deep, well-drained soils on uplands. These soils developed in material weathered from quartz mica schist and quartz mica gneiss. They have a dark-brown to dark grayish-brown surface layer and a subsoil of red clay loam to clay. The native vegetation consists of white oak, black oak, scarlet oak, hickory, other hardwoods, and scattered Virginia pine.

These soils are strongly acid, low in fertility, and low in organic-matter content. They are moderately permeable.

Madison soils are associated with Cecil and Talladega soils. They are slightly coarser textured than Cecil soils, and they contain more mica and have a thinner solum. Madison soils have a redder, better defined, finer textured subsoil than Talladega soils.

Large areas of gently sloping to steep Madison soils occur in the southern part of Carroll County, on the Piedmont Plateau, at elevations of 1,000 to 1,400 feet.

Representative profile of Madison fine sandy loam, gently sloping (2 to 7 percent slopes), in a mixed oak forest a third of a mile northeast of Cana on Highway 841:

O1—1½ inches to ½ inch, loose leaves and twigs.
O2—½ inch to 0, black (10YR 2/1), partly decayed leaves and twigs.
A1—0 to 2 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; few angular quartz pebbles up to ½ inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—2 to 7 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; friable; few angular quartz pebbles up to 1 inch in diameter; plentiful fine and medium roots; gradual, smooth boundary.
B1—7 to 10 inches, yellowish-red (5YR 5/6) fine sandy clay loam; weak, fine and medium, subangular blocky structure; friable; few angular quartz pebbles up to ½ inch in diameter; few thin, faint, patchy clay films; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B21t—10 to 19 inches, red (2.5YR 5/6) clay loam; moderate, fine and medium, subangular blocky structure; firm; few angular quartz pebbles up to 1 inch in diameter; thin, distinct, continuous clay films; abundant finely divided mica flakes; few fine and medium roots; gradual, smooth boundary.
B22t—19 to 29 inches, red (2.5YR 4/6) clay loam to clay; moderate, medium, subangular blocky structure; firm; few angular quartz pebbles up to ½ inch in diameter; thin, distinct, continuous clay films; 20 to 40 percent finely divided mica flakes; few fine roots; gradual, smooth boundary.
B3—29 to 34 inches, red (2.5YR 4/6) silty clay loam; weak, fine, subangular blocky structure; friable; few pebbles of weathered quartz mica gneiss up to 1½ inches in diameter; common, distinct, patchy clay films; more than 40 percent finely divided mica flakes, which give a feeling of slickness; few fine roots; gradual, wavy boundary.
C1—34 to 52 inches, yellowish-red (5YR 4/6) silty soil material; some fragments of quartz mica gneiss up to 1 inch in diameter; structureless; 40 percent finely divided mica flakes, which give a feeling of slickness; few scattered, fine and medium roots; gradual, wavy boundary.
C2—52 to 75 inches, dark-red (2.5YR 3/6) and reddish-yellow (7.5YR 6/8) weathered quartz mica gneiss; rock-controlled structure; easily crushed to a fine granular mass; 40 percent finely divided mica flakes, which give a feeling of slickness; few fine roots at a depth of 65 inches; gradual, wavy boundary.
C3—75 to 95 inches, yellowish-red, reddish-brown, and brown, weathered quartz mica gneiss; easily crushed to the texture of sandy loam.

The surface layer is dark grayish-brown to brown fine sandy loam and cobbly fine sandy loam. It is 6 to 10 inches thick. The subsoil is red to yellowish-red fine sandy clay loam to clay. A few angular pebbles and cobblestones occur on the surface in many places.

Madison cobbly fine sandy loam, sloping (2 to 15 percent slopes) (MaC).—This soil is similar to the one described as representative of the series, but it is steeper in most places. Quartz cobblestones cover as much as 20 percent of the surface and make up as much as 20 percent of the soil mass.

The available moisture capacity is fair. The cobblestones make cultivation difficult.

Most of this soil has been cleared, but part of it has reverted to forest. The open areas are used for hay and pasture. (Capability unit IVe–5; woodland suitability group 7)

Madison cobbly fine sandy loam, sloping, eroded (2 to 15 percent slopes) (MaC2).—The profile of this soil is similar to the profile described as representative of the series, except that part of the surface layer has been removed by erosion and small amounts of subsoil material have been mixed with the original surface layer in tillage. Quartz cobblestones cover as much as 20 percent of the surface and make up as much as 20 percent of the soil mass.

The available moisture capacity is fair. Tillage is difficult because of the cobblestones.

Most of this soil has been cleared, but at least half has reverted to forest. The areas now open are used for pasture. (Capability unit IVe–5; woodland suitability group 7)

Madison cobbly fine sandy loam, moderately steep (15 to 25 percent slopes) (MaD).—The profile of this soil is similar to the profile described as representative of the series but has a less well developed subsoil. Cobblestones cover as much as 20 percent of the surface and make up as much as 20 percent of the soil mass.

The available moisture capacity is fair. Tillage is difficult because of the cobblestones.

Most of this soil has been cleared, but much of it has reverted to forest. The small areas that remain open are used for pasture. (Capability unit IVe–5; woodland suitability group 7)

Madison cobbly fine sandy loam, moderately steep, eroded (15 to 25 percent slopes) (MaD2).—This soil has a thinner surface layer and a more weakly developed subsoil than the soil described as representative of the series. Cobblestones cover as much as 20 percent of the surface and make up as much as 20 percent of the soil mass.

The available moisture capacity is fair. Tillage is difficult because of the cobblestones.

Most of this soil is in forest, but a small acreage is used for pasture. (Capability unit IVe–5; woodland suitability group 7)

Madison cobbly fine sandy loam, steep (25 to 45 percent slopes) (MaE).—The profile of this soil is similar to the

profile described as representative of the series. Cobblestones cover as much as 20 percent of the surface and make up as much as 20 percent of the soil mass. About a third of the acreage has a thinner surface layer than the rest because soil material has been lost through erosion. The subsoil is exposed in spots.

This soil is used mostly for forest because of the cobblestones and the steep slopes. (Capability unit VIe–3; woodland suitability group 7)

Madison fine sandy loam, gently sloping (2 to 7 percent slopes) (MdB).—The profile of this soil is like the profile described as representative of the series. Included in the areas mapped are small areas of sandy loam and very fine sandy loam. Also included are spots of severely eroded soils, in which the soil material at the surface is yellowish-red clay loam. In a few places there are weathered schist fragments or a few angular pebbles or cobblestones in the soil or on the surface.

Most of this soil has been cleared and is cultivated. (Capability unit IIe–3; woodland suitability group 7)

Madison fine sandy loam, gently sloping, eroded (2 to 7 percent slopes) (MdB2).—This soil has a thinner surface layer than the soil described as representative of the series. Included in the areas mapped are small areas of sandy loam and spots of severely eroded soils that have yellowish-red clay loam at the surface.

Most of this soil has been cleared and is used for row crops and forage crops. (Capability unit IIe–3; woodland suitability group 7)

Madison fine sandy loam, sloping (7 to 15 percent slopes) (MdC).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of sandy loam.

The available moisture capacity is good.

Most of the acreage has been cleared and is used for row crops, hay, or pasture. (Capability unit IIIe–4; woodland suitability group 7)

Madison fine sandy loam, sloping, eroded (7 to 15 percent slopes) (MdC2).—The surface layer of this soil is thinner than that of the soil described as representative of the series, because part of it has been removed by erosion. The plow layer is yellowish brown because small amounts of subsoil material have been mixed with the original surface layer during tillage. Included in the areas mapped are small areas of severely eroded soils.

Most of this soil has been cleared and is used for row crops, hay, and pasture. (Capability unit IIIe–4; woodland suitability group 7)

Madison fine sandy loam, moderately steep (15 to 25 percent slopes) (MdD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped is a small acreage of a soil that contains less mica and has a deeper, better developed subsoil.

Most of this soil has been cleared and is cultivated, but part of it is in second-growth hardwoods and pine. Because of the slopes, this soil erodes easily. (Capability unit IVe–2; woodland suitability group 7)

Madison fine sandy loam, moderately steep, eroded (15 to 25 percent slopes) (MdD2).—The profile of this soil is similar to but thinner than the one described as representative of the series. The surface layer is yellowish brown because small amounts of subsoil material have been mixed with the original surface layer during tillage. Included in the areas mapped are small areas of severely eroded soils that have yellowish-red clay loam at the surface. Also included are small areas of soils that contain less mica and have a thicker, better developed solum.

Most of this soil has been cleared and is cultivated, but part of it has reverted to hardwoods and pine. (Capability unit IVe–2; woodland suitability group 7)

Madison fine sandy loam, steep (25 to 45 percent slopes) (MdE).—The profile of this soil is similar to but thinner than the one described as representative of the series. Included in the areas mapped are small areas of soils that contain less mica and have a thicker, better developed subsoil.

Some of the less strongly sloping areas of this soil are used for pasture, but most of it has reverted to hardwoods and pine. (Capability unit VIe–1; woodland suitability group 7)

Madison fine sandy loam, steep, eroded (25 to 45 percent slopes) (MdE2).—The profile of this soil is similar to but thinner than the one described as representative of the series. Included in the areas mapped are small areas of soils that contain less mica and have a thicker, better developed subsoil.

Most of this soil is in forest, but a small acreage is used for pasture. (Capability unit VIe–1; woodland suitability group 7)

Manor Series

The Manor series consists of moderately deep or deep, somewhat excessively drained, highly micaceous soils on uplands. These soils developed in material weathered from mica gneiss and mica schist (fig 5). They have a surface layer of dark-brown loam and a subsoil of strong-brown loam. The native vegetation consists of white pine, Virginia pine, oak, and hickory, and an understory of mountain-laurel, rhododendron, and huckleberry.

These soils are very strongly acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability and low available moisture capacity.

Figure 5.—**Varied thickness of weathered material in profile of Manor loam.**

Manor soils are closely associated with Chester, Glenelg, Watauga, Porters, and Talladega soils. Their subsoil is not thick and well defined like that of Chester, Glenelg, and Watauga soils. Manor soils are not so brown as Porters soils, and they contain more mica. Their subsoil lacks the yellowish-red or reddish-brown color that is typical of Talladega soils.

Sloping to very steep soils of the Manor series occur as fairly large areas on ridges and plateaus in the Blue Ridge Mountain section of Carroll County.

Representative profile of Manor loam, steep (25 to 45 percent slopes), in a wooded area 0.4 mile west of the intersection of Highways 701 and 712, along Highway 712:

O1—3 inches to 1 inch, partly decomposed pine needles and leaves.
O2—1 inch to 0, very dark brown (10YR 2/2), decomposed organic matter.
A1—0 to 3 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; common finely divided mica, which gives a slight feeling of slickness; few quartz fragments up to ¼ inch in diameter; abundant fine and medium roots; clear, smooth boundary.
A2—3 to 8 inches, brown to dark-brown (7.5YR 4/4) loam; weak, fine, granular structure; friable; common finely divided mica, which gives a slight feeling of slickness; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B—8 to 17 inches, strong-brown (7.5YR 5/6) micaceous loam; weak, fine and medium, granular structure; friable; 20 to 40 percent finely divided mica, which gives a slight feeling of slickness; few fragments of quartz mica gneiss ½ inch in diameter; plentiful fine and medium roots; gradual, wavy boundary.
C1—17 to 31 inches, dark yellowish-brown (10YR 4/4) loamy soil material containing a few fragments of quartz mica gneiss up to 1 inch in diameter; few fine roots; contains finely divided mica, which gives a feeling of slickness; clear, wavy boundary.
C2—31 to 82 inches +, yellowish-brown (10YR 5/4) loamy soil material; 50 percent weathered quartz mica gneiss; few fine roots down to a depth of 50 inches; a slight feeling of slickness imparted by the mica.

A few quartz cobblestones and other stones are on the surface in many places. The surface layer is dark-brown to brown loam and very stony loam and is 8 to 12 inches thick. The subsoil is strong-brown to dark yellowish-brown loam or heavy loam. The depth to the weathered micaceous material in the substratum is 10 to 20 inches. The C1 horizon is yellowish-brown to brown loam that has weak, fine and very fine, granular structure, or is structureless loam mixed with loamy soil material. The C2 horizon is 6 inches to 6 feet thick.

Manor loam, sloping (7 to 15 percent slopes) (MnC).—This soil occurs on hogback ridges and on the top of peaks and knolls. The profile is similar to the one described as representative of the series. Included in the areas mapped are small areas of silt loam.

Most of this soil is in forest, but a small acreage is used for pasture and for cultivated crops. (Capability unit IVe–4; woodland suitability group 5)

Manor loam, moderately steep (15 to 25 percent slopes) (MnD).—This soil has a slightly thicker subsoil than the soil described as representative of the series. Included in the areas mapped is a small acreage of Manor silt loam.

This soil is highly erodible. A very small acreage is cultivated, but most of the acreage is used for pasture or forest. (Capability unit VIe–2; woodland suitability group 5)

Manor loam, steep (25 to 45 percent slopes) (MnE).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are areas of silt loam.

Most of this soil is used for forest. (Capability unit VIIe–1; woodland suitability group 5)

Manor loam, very steep (45+ percent slopes) (MnF).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of silt loam.

This soil is used for forest. (Capability unit VIIe–1; woodland suitability group 5)

Manor very stony loam, sloping (7 to 15 percent slopes) (MoC).—This soil occurs as small areas on top of knolls, peaks, and long, narrow, steep ridges. The profile is similar to the one described as representative of the series. Stones 12 inches or more in diameter, approximately 2½ to 5 feet apart, cover 3 to 15 percent of the surface. Cobblestones and other stones make up 10 to 15 percent of the profile.

Most of this soil is used for forest, but small areas are used for unimproved pasture. (Capability unit VIs–1; woodland suitability group 5)

Manor very stony loam, steep (15 to 45 percent slopes) (MoE).—This soil occurs as rather large areas on the Blue Ridge escarpment and in other mountainous areas. The profile is similar to the one described as representative of the series. Stones 12 inches or more in diameter, about 2½ to 5 feet apart, cover 3 to 15 percent of the surface of this soil. Cobblestones and other stones make up 10 to 15 percent of the profile.

Most of the acreage is used for forest. (Capability unit VIIs–1; woodland suitability group 5)

Manor very stony loam, very steep (45+ percent slopes) (MoF).—This soil is along the Blue Ridge escarpment and in other mountainous areas. The profile is similar to but thinner than the one described as representative of the series. Stones more than 12 inches in diameter, about 2½ to 5 feet apart, cover 3 to 15 percent of the surface. There are a few rock outcrops. Cobblestones and other stones make up 10 to 15 percent of the entire profile.

This soil is used for forest. (Capability unit VIIs–1; woodland suitability group 5)

Myersville Series

The Myersville series consists of soils that are moderately deep or deep and are well drained. These soils developed in material weathered from dark-colored basic rocks, such as hornblende gneiss and schist, mixed with a small amount of acidic material. They have a surface layer of dark-brown loam and a subsoil of yellowish-red light silty clay loam. These soils are underlain by partly weathered basic rocks. The native vegetation consists of oak, hickory, and other hardwoods.

These soils are medium acid or strongly acid, medium in fertility, and medium in organic-matter content. They are moderately permeable and have good available moisture capacity.

Myersville soils are associated with Rabun, Porters, Hayesville, Chester, and Glenelg soils. Their subsoil lacks the dark-red colors that are typical of the Rabun subsoil and is more yellow and yellowish red than the Porters

subsoil. Myersville soils have a finer textured solum than Hayesville soils, and they have a less red subsoil. They have a darker-colored surface layer and a redder subsoil than Chester and Glenelg soils.

The Myersville soils in Carroll County are at elevations of 2,000 to 3,000 feet.

Representative profile of Myersville loam, sloping (7 to 15 percent slopes), in an area of mixed hardwoods 100 yards east of the intersection of Highways 731 and 805:

O1—2 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, partly decayed leaves and twigs.
A1—0 to 2 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine, granular structure; friable; common fine pores; few finely divided mica flakes; few pebbles of hornblende gneiss up to ½ inch in diameter; abundant fine roots; clear, smooth boundary.
A2—2 to 7 inches, dark-brown (7.5YR 4/4) heavy loam; moderate, medium, granular structure; friable; common fine pores; few finely divided mica flakes; few quartz pebbles up to 3 inches in diameter; plentiful fine and few medium roots; gradual, smooth boundary.
B1—7 to 12 inches, reddish-brown (5YR 4/4) light clay loam; moderate, medium, granular structure to weak, fine, subangular blocky structure; friable; few fine pores; thin, faint, patchy clay films on peds and in pores; few pebbles of partly weathered hornblende gneiss up to 2 inches in diameter; common fine concretions of a dark-colored mineral; few finely divided mica flakes; few fine and medium roots; gradual, smooth boundary.
B21t—12 to 20 inches, yellowish-red (5YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; firm; thin, faint, continuous clay films on peds and in pores; common fine pores; common dark-colored mineral concretions up to ⅛ inch in diameter; pebbles of partly weathered hornblende gneiss make up 2 to 5 percent of mass; few finely divided mica flakes; few fine and medium roots; gradual, smooth boundary.
B22t—20 to 30 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm; common fine pores; thin, distinct, continuous clay films in pores and on peds; few pebbles of hornblende gneiss up to 2 inches in diameter; few finely divided mica flakes; few fine roots; gradual, smooth boundary.
B3—30 to 47 inches, yellowish-red (5YR 4/6) heavy silt loam to light silty clay loam; weak, fine, subangular blocky structure and moderate, medium, subangular blocky structure; friable; common fine pores; thin, faint, continuous clay films on peds and in pores; 30 percent or more partly weathered hornblende gneiss pebbles and cobblestones, up to 5 inches in diameter, that can be crushed with fingers to silty soil material; few fine roots; gradual, smooth boundary.
C—47 to 74 inches +, yellowish-red (5YR 4/8) silty soil material along seams and cracks in partly weathered hornblende gneiss that can be partly crushed with the fingers; few fine pores; few fine roots.

The surface layer is dark-brown to dark yellowish-brown loam or stony loam and is as much as 10 inches thick. The subsoil is yellowish-red to strong-brown light silty clay loam or clay loam. In many places it contains a few small black manganese concretions and small quartz fragments. The solum is generally 30 to 50 inches thick, but in the thin solum phases it is only 23 to 30 inches thick.

Myersville loam, gently sloping (2 to 7 percent slopes) (MrB).—The profile of this soil is similar to but slightly thicker than the one described as representative of the series. Included in the areas mapped are small areas of soils that have a slightly thinner surface layer because of losses of soil material through erosion.

This soil is well suited to all crops grown in the area. (Capability unit IIe–2; woodland suitability group 6)

Myersville loam, sloping (7 to 15 percent slopes) (MrC).—The profile of this soil is the one described as representative of the series. Included in the areas mapped are small areas of eroded soils.

This soil is used mainly for row crops and hay. (Capability unit IIIe–3; woodland suitability group 6)

Myersville loam, sloping, eroded (7 to 15 percent slopes) (MrC2).—The profile of this soil is similar to the one described as representative of the series, but the surface layer is thinner than that in the representative profile because soil material has been lost through erosion. Small amounts of subsoil material have been mixed into the plow layer in tillage.

This soil is suited to most of the crops grown locally. (Capability unit IIIe–3; woodland suitability group 6)

Myersville loam, steep (15 to 45 percent slopes) (MrE).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped is a small acreage of very steep Myersville soil.

About half of this soil has slopes of less than 25 percent, and this acreage is suitable for occasional cultivation. (Capability unit IVe–1; woodland suitability group 6)

Myersville loam, steep, eroded (15 to 45 percent slopes) (MrE2).—The profile of this soil is similar to the one described as representative of the series but is thinner because part of the surface layer has been removed by erosion.

More than half of this soil has slopes of less than 25 percent, and this acreage is suitable for occasional cultivation. (Capability unit IVe–1; woodland suitability group 6)

Myersville loam, thin solum, sloping (7 to 15 percent slopes) (MsC).—The profile of this soil is similar to but thinner than the one described as representative of the series. The subsoil is more weakly defined than that in the representative profile. Fragments of weathered hornblende gneiss occur on the surface and throughout the profile. Included in the areas mapped are small areas of soils that are similar to Myersville loam, thin solum, sloping, but have a thinner surface layer as a result of erosion.

This soil is used for cultivated crops, hay, and pasture. It is not well suited to cultivated crops, because of the rock fragments and inadequate available moisture capacity. (Capability unit IIIe–5; woodland suitability group 9)

Myersville loam, thin solum, steep (15 to 45 percent slopes) (MsE).—The profile of this soil is similar to but thinner and less well defined than the one described as representative of the series. Rock outcrops occur in some places. Included in the areas mapped are small areas of severely eroded soils that have a surface layer of silty clay loam. Also included are small areas of moderately eroded soils.

Most of this soil has slopes of less than 25 percent. It has been used for cultivated crops but is now used for hay and pasture. A small part of the steeper acreage has been cleared. Some of this is used for pasture, but much of it has reverted to forest. (Capability unit VIe–1; woodland suitability group 9)

Myersville stony loam, thin solum, sloping (7 to 15 percent slopes) (MyC).—The profile of this soil is similar to the one described as representative of the series but is thinner and less well defined. On the surface are stones more than 10 inches in diameter and 5 to 30 feet apart. The stones interfere with tillage.

Most of this soil is used for pasture or forest. (Capability unit IVe–5; woodland suitability group 9)

Myersville stony loam, thin solum, steep (15 to 45 percent slopes) (MyE).—The profile of this soil is similar to the one described as representative of the series but is thinner and less well defined. On the surface are stones more than 10 inches across and 5 to 30 feet apart that interfere with tillage. Included in the areas mapped are areas of moderately steep soils, some of which are moderately eroded. Also included are areas of moderately eroded soils and some very steep soils.

This soil is used mainly for pasture and forest. (Capability unit VIe–3; woodland suitability group 9)

Porters Series

The Porters series consists of well-drained, generally moderately deep soils on uplands. These soils developed in material weathered from igneous and metamorphic rocks, such as granite and gneiss. They have a surface layer of dark-brown loam and a subsoil of yellowish-brown heavy loam to clay loam. The native vegetation consists of mixed hardwoods and an understory of rhododendron and mountain-laurel.

These soils are strongly acid, medium in natural fertility, and medium in organic-matter content. They have fair to good available moisture capacity. Permeability is moderately rapid.

Porters soils are closely associated with Manor and Myersville soils. They are browner and less micaceous than Manor soils. They are darker colored than Myersville soils, and they have a less well defined subsoil.

Sloping to steep soils of this series occur at elevations of 2,000 to 3,500 feet along the Blue Ridge escarpment and the steeper intermountain divides in Carroll County.

Representative profile of Porters loam, sloping (7 to 15 percent slopes), in a stand of mixed hardwoods half a mile southeast of the Blue Ridge Parkway milepost No. 197, along a private road:

O1—2 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, dark reddish-brown (5YR 2/2), partly decomposed organic debris.
A11—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; very friable; few angular quartz fragments up to 1 inch in diameter; common finely divided mica flakes; abundant fine and medium roots; clear, smooth boundary.
A12—2 to 4 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure and moderate, medium, granular structure; friable; few angular fragments of quartz up to 1 inch in diameter; common fine mica flakes; common fine pores; abundant fine and medium roots; clear, smooth boundary.
A2—4 to 9 inches, very dark grayish-brown (10YR 3/2) light loam; moderate, fine and medium, granular structure; friable; few angular quartz fragments up to 3 inches in diameter; few angular quartz mica gneiss and quartz cobblestones up to 6 inches in diameter; few quartz fragments less than ⅛ inch in diameter; common fine mica; common fine and medium pores; plentiful fine and medium roots, and few large roots; abrupt, smooth boundary.
B2t—9 to 18 inches, dark yellowish-brown (10YR 4/4) heavy loam; weak, fine, subangular blocky structure to moderate, medium, subangular blocky; friable; few angular quartz pebbles and cobblestones; few fragments of quartz mica gneiss; few faint clay films in pores and as bridging between sand grains; plentiful medium roots, and few fine roots; gradual, wavy boundary.
B3—18 to 30 inches, dark-brown (10YR 4/3) weathered quartz mica gneiss easily crushed to loamy soil material; a few lenses and pockets of sandy soil material; few finely divided mica flakes; few fine, medium, and large roots; gradual, wavy boundary.
R—30 to 43 inches +, strong-brown (7.5YR 5/6), light-gray (10YR 7/1), and black (10YR 2/1), hartly weathered quartz mica gneiss; common ferromagnesium minerals; difficult to dig out with spade but, when dug out, easily crushed to fine sandy soil material.

The surface layer is very dark grayish brown to dark brown and as much as 10 inches thick. The subsoil is dark-brown to yellowish-brown heavy loam to clay loam. The depth to weathered rock is 20 to 30 inches, and the depth to bedrock is 22 to 40 inches.

Porters loam, sloping (7to 15 percent slopes) (PoC).—The profile of this soil is the one described as representative of the series.

This soil is well suited to the crops grown locally and is particularly good for apple orchards. (Capability unit IIIe–5; woodland suitability group 9)

Porters loam, moderately steep (15 to 25 percent slopes) (PoD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series.

Most of this soil is used for pasture and forest, but some acreage is used for cultivated crops or for apple orchards. (Capability unit IV–3; woodland suitability group 9)

Porters loam, steep (25 to 45 percent slopes) (PoE).—The profile of this soil is similar to but thinner than the one described as representative of the series.

This soil is used for pasture, apple orchards, and forest. (Capability unit VIe–1; woodland suitability group 9)

Porters loam, very steep (45+ percent slopes) (PoF).—The profile of this soil is similar to but thinner than the one described as representative of the series.

Most of this soil is in forest. (Capability unit VIIe–1; woodland suitability group 9)

Rabun Series

The Rabun series consists of soils that are deep and well drained. These soils developed in material weathered from hornblende gneiss, hornblende schist, other dark-colored metamorphic rocks, and dark-colored basic rocks. They have a surface layer of dark reddish-brown silt loam and a subsoil of dark reddish-brown to dark-red silty clay. The native vegetation consists of oak, hickory, and pine.

These soils are slightly acid, medium in fertility, and low or medium in organic-matter content. They are moderately permeable and have low available moisture capacity.

Rabun soils are associated with Myersville and Hayesville soils. They differ from Myersville soils in having a dark reddish-brown surface layer and a dark reddish-brown to dark-red subsoil. Rabun soils have a finer textured, browner surface layer than Hayesville soils, and they have a finer textured, redder subsoil.

The Rabun soils in Carroll County are sloping to steep and occur in the Blue Ridge Mountains at elevations of 2,400 to 2,900 feet.

Representative profile of Rabun silt loam, sloping (7 to 15 percent slopes), in a plowed field 200 yards east of the intersection of U.S. Highways 58 and 620:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/3) heavy silt loam; moderate, fine, subangular blocky structure to strong, medium, subangular blocky; friable; few pebbles of partly weathered hornblende gneiss up to 1½ inches in diameter; few particles of partly weathered hornblende gneiss less than ¼ inch in diameter; few finely divided mica flakes; abundant fine roots; clear, smooth boundary.

B1—8 to 13 inches, dark-red (2.5YR 3/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few, thin, faint, patchy clay films on ped surfaces; common, thin, faint clay films in pores; few finely divided mica flakes; common particles of partly weathered hornblende gneiss less than ¼ inch in diameter; few partly weathered fragments of hornblende gneiss up to 2 inches in diameter; plentiful fine roots; gradual, wavy boundary.

B21t—13 to 22 inches, dark-red (2.5YR 3/6) silty clay; moderate, medium, subangular blocky structure; friable; common, thin, faint, continuous clay films on ped surfaces; few pebbles of hornblende gneiss up to 1½ inches in diameter; few fine roots; gradual, wavy boundary.

B22t—22 to 35 inches, dark-red (2.5YR 3/6) silty clay; moderate, fine, subangular blocky structure mixed with strong, medium, subangular blocky structure; friable; common, thin, distinct, continuous clay films; clay content seems to be somewhat greater than in B21t horizon; few pebbles of weathered hornblende gneiss up to 1½ inches in diameter; few finely divided mica flakes; few fine roots; gradual, wavy boundary.

B3—35 to 42 inches, red (2.5YR 4/6) silty clay loam; moderate, fine, subangular blocky structure mixed with moderate, medium, subangular blocky; friable; common, thin, distinct, patchy clay films; few pebbles of partly weathered hornblende gneiss up to 1½ inches in diameter; few finely divided mica flakes; few fine roots; clear, wavy boundary.

C1—42 to 50 inches, red (2.5YR 4/6), partly weathered hornblende gneiss that can be partly crushed to silt loam soil material; 20 to 30 percent of horizon consists of yellowish-red (5YR 5/8) heavy silt loam soil and streaks of black (5YR 2/1) ferromagnesian material in rock crevices; slightly sticky; weak, fine, subangular blocky structure; few hair roots at a depth of 50 inches; clear, wavy boundary.

C2—50 to 60 inches, yellowish-red (5YR 5/8), partly weathered hornblende gneiss containing streaks of black (5YR 2/1) ferromagnesium; part of this material can be crushed to the texture of silt loam.

The surface layer is dark reddish brown to reddish brown and is 5 to 10 inches thick. The subsoil is dark reddish brown to dark red and is 19 to 34 inches thick. The depth to bedrock is 40 to 60 inches.

Rabun silt loam, sloping (7 to 15 percent slopes) (RaC).—The profile of this soil is the one described as representative of the series. Included in the areas mapped are small areas of heavy loam, a small acreage of gently sloping Rabun soil, some areas of gently sloping to sloping eroded Rabun soils that have a thinner surface layer, and some areas in which the silty clay loam subsoil is exposed.

This soil is well suited to all crops grown in the county. Stands of alfalfa may be damaged somewhat by alternate freezing and thawing during the winter. (Capability unit IIIe–3; woodland suitability group 6)

Rabun silt loam, moderately steep (15 to 25 percent slopes) (RaD).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series.

This soil can be used for row crops only infrequently. (Capability unit IVe–1; woodland suitability group 6)

Rabun silt loam, moderately steep, eroded (15 to 25 percent slopes) (RaD2).—The profile of this soil is similar to the one described as representative of the series, but the surface layer has been thinned by erosion and small amounts of subsoil material have been mixed with the original surface material in tillage. In some spots the upper part of the subsoil, which is dark-red silty clay loam, is exposed.

This soil is well suited to hay and pasture. (Capability unit IVe–1; woodland suitability group 6)

Rabun silt loam, steep (25 to 45 percent slopes) (RaE).—The profile of this soil is similar to but thinner than the one described as representative of the series. Included in the areas mapped are a small acreage of soils that have a thin surface layer and scattered spots in which the subsoil is exposed.

This soil is used for pasture or forest. (Capability unit VIe–1; woodland suitability group 6)

Ramsey Series

The Ramsey series consists of somewhat excessively drained, generally shallow soils that developed in material weathered from quartzite, shale, and slate. These soils have a surface layer of yellowish-brown to olive-brown very stony loam and a subsoil of yellowish-brown to dark-brown very stony loam to very stony heavy fine sandy loam. The native vegetation consists of chestnut oak, chestnut sprouts, scarlet oak, Virginia pine, a little white pine, a little hemlock, and an understory of mountain-laurel and rhododendron.

These soils are strongly acid, low in fertility, and low in organic-matter content. They have low available moisture capacity. Permeability is moderately rapid.

Ramsey soils are associated with Weikert and Hazel soils, both of which are less sandy than Ramsey soils.

Soils of this series occur in the Blue Ridge Mountains in the northern and northwestern parts of Carroll County at elevations of 2,600 to 3,500 feet. They are generally very stony and contain fragments of bedrock throughout. Rock outcrops are common.

Representative profile of Ramsey very stony loam, very steep (45+ percent slopes), in a wooded area a mile and a quarter south of Sheep Town, on Highway 635:

O1—1 to ½ inch, loose oak leaves and twigs.

O2—½ inch to 0, black, highly decomposed leaves and twigs.

A1—0 to 2 inches, light olive-brown (2.5Y 5/4) very stony loam; weak, fine, granular structure; friable; abundant fine and medium roots; gradual, smooth boundary; 50 percent stones more than 10 inches in diameter.

B—2 to 10 inches, light yellowish-brown (2.5Y 6/4) very stony heavy fine sandy loam; weak, fine, granular structure; friable; abundant fine and medium roots; gradual, smooth boundary; 80 percent stones more than 10 inches in diameter.

C—10 to 19 inches, light yellowish-brown (2.5Y 6/4), partly weathered quartzite fragments; films of very fine silty clay loam on quartzite fragments and along rock crevices; 95 percent stones more than 10 inches in diameter.

R—19 inches +, quartzite rock.

The surface layer is yellowish brown to olive brown. The subsoil is light yellowish-brown to brown very stony loam to very stony very fine sandy loam. The solum is 10 to 16 inches thick. The depth to bedrock ranges from 10 to 22 inches. The stones make up 50 to 90 percent of the profile and are 10 inches to several feet across.

Ramsey very stony loam, steep (15 to 45 percent slopes) (RmE).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped is a small acreage of a sloping Ramsey soil and a larger acreage that has moderately steep slopes.

Most of this soil is used for forest, but a small acreage is used for hay and pasture. (Capability unit VIIs–1; woodland suitability group 8)

Ramsey very stony loam, very steep (45+ percent slopes) (RmF).—The profile of this soil is the one described as representative of the series.

Most of this soil is used for forest. (Capability unit VIIs–1; woodland suitability group 8)

Rock Land

This land type is made up of areas where rock outcrops cover 50 to 90 percent of the surface and are not more than 10 feet apart. Use of these areas is severely limited by the steep slopes and outcrops. The outcrops make the use of machinery impractical.

Rock land, gneiss and schist (Rg).—This land type is on ridges and steep slopes in the Blue Ridge Mountains. Most of it has slopes of more than 25 percent, but a small acreage has slopes of 2 to 25 percent. Most areas are between 5 and 500 acres or more in size and are along the Blue Ridge escarpment, but some areas between 1 acre and 10 acres in size occur north of Hillsville along Big Reed Island Creek and Little Reed Island Creek. The vegetation consists of second-growth mixed hardwoods.

Rock land, gneiss and schist, is associated with Stony land, Porters materials, with Manor very stony loam, and, in a few places, with Porters loam and Manor loam. It is also associated with Myersville loam, Myersville stony loam, thin solum, and Rabun silt loam. The underlying geologic formations are similar to those underlying Stony land, Porters materials; Myersville stony loam, thin solum; and Manor very stony loam. (Capability unit VIIs–1; woodland suitability group 11)

Rock land, limestone (Rl).—This land type is on the tops and sides of steep ridges in the northwestern part of Carroll County. Most of it has slopes of more than 25 percent, but a few small areas have slopes of 2 to 25 percent. The vegetation consists of second-growth mixed hardwoods.

Rock land, limestone, is associated with Corydon rocky silt loam.

It is possible that this land type could be used for limestone quarries. (Capability unit VIIs–1; woodland suitability group 11)

Rock land, quartzite (Rr).—This land type is in the northern and northwestern parts of Carroll County, at elevations of 2,600 to 3,500 feet. It is underlain by quartzite and shale. Most of it has slopes of more than 25 percent, but a small acreage has slopes of 2 to 25 percent. The native vegetation (fig. 6) consists mostly of second-growth mixed hardwoods and small scattered stands of pine.

Figure 6.—Native vegetation on Rock land, quartzite, near Big Reed Island Creek. Exposed quartzite in road cut in right foreground.

Rock land, quartzite, is associated with Ramsey very stony loam and Weikert channery silt loam. (Capability unit VIIs–1; woodland suitability group 11)

Shelocta Series

The Shelocta series consists of deep, well-drained soils on benches and fan-shaped ridges at the foot of mountains and long slopes. These soils developed in local alluvium and in colluvium, most of which rolled or washed down mountain slopes from areas of Clymer, Weikert, and Ramsey soils and accumulated in narrow valleys. The colluvium was derived from sandstone and other noncalcareous material. These soils have a surface layer of grayish-brown fine sandy loam and a subsoil of yellowish-brown fine sandy clay loam to clay loam. The native vegetation consists of poplar, white oak, red oak, post oak, a little hemlock in places, and an understory of mountain-laurel, huckleberry, and rhododendron.

These soils are strongly acid, low in fertility, and low in organic-matter content. Permeability is moderate.

Shelocta soils are associated with Ramsey and Bolton soils, but they are thicker than Ramsey soils and are not so brown as Bolton soils, which developed in material weathered from sandy dolomitic limestone.

Soils of this series occur as rather small scattered areas at elevations of 2,000 to 3,000 feet in Carroll County. The largest areas are in the extreme northwestern part of the county.

Representative profile of Shelocta fine sandy loam, sloping (7 to 15 percent slopes), in a cultivated field at the foot of Poplar Camp Mountain, 1 mile west of the intersection of State Highway 636 and U.S. Highway 52, on Highway 636:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) fine sandy loam to very fine sandy loam; weak and moderate, fine, granular structure; very friable; few rounded and semirounded sandstone fragments up to 2 inches in diameter; few fine pores; plentiful fine roots; gradual, smooth boundary.

B1—7 to 15 inches, brownish-yellow (10YR 6/6) fine sandy clay loam to clay loam; weak, fine, subangular blocky structure; friable; few fine and medium pores; thin,

faint clay films in pores and in root channels; few krotovinas 1/16 inch in diameter; few polished sand grains; few sandstone pebbles; few fine roots; gradual, smooth boundary.

B21t—15 to 26 inches, yellowish-brown (10YR 5/6) clay loam; moderate, medium, subangular blocky structure; friable; thin, faint, patchy clay films on peds and in pores; few fine pores; slightly compact in place; few more angular and semirounded sandstone pebbles and gravel than in B1 horizon; some of the gravel can be crushed with the fingers; few fine roots to a depth of 26 inches; gradual, smooth boundary.

B22t—26 to 34 inches, yellowish-brown (10YR 5/6) clay loam; moderate, fine, subangular blocky structure; friable; few fine pores; thin, distinct, patchy clay films on peds and in pores; 10 percent semirounded and angular sandstone gravel up to 2 inches in diameter; slightly compact in place but easily crushed when dug out; gradual, smooth boundary.

B31—34 to 50 inches, yellowish-brown (10YR 5/4) silty clay loam mottled with strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6); weak, fine, subangular blocky structure to moderate, medium, subangular blocky; firm; few fine pores; thin, faint, patchy clay films on peds and in pores; 20 to 30 percent sandstone gravel up to 2 inches in diameter; gradual, smooth boundary.

IIB32—50 to 65 inches, intermixed yellowish-red (5YR 5/8), very pale brown (10YR 7/3), and brownish-yellow, (10YR 6/6) gritty sandy clay loam soil material; compact in place, but part friable and part firm and plastic when dug out; few, thin, faint clay flows on some ped surfaces; 30 to 40 percent sandstone gravel up to 1 inch in diameter; gradual, wavy boundary.

IIIC—65 inches +, compacted layer of sandstone gravel and cobblestones.

The surface layer is grayish-brown to yellowish-brown fine sandy loam and cobbly fine sandy loam 6 to 12 inches thick. The subsoil is pale-yellow to yellowish-brown fine sandy clay loam to clay loam. The depth to the compact layer ranges from 36 to more than 65 inches. The thickness of the solum and the degree of development vary, depending mainly upon the thickness and age of the colluvial and alluvial deposits.

Shelocta cobbly fine sandy loam, moderately steep (7 to 25 percent slopes) (ScD).—The profile of this soil is similar to the one described as representative of the series. Rounded and semirounded cobblestones make up 15 to 25 percent of the soil mass. Included in the areas mapped are areas of a Shelocta soil that has slopes of 7 to 15 percent and a small acreage that has slopes of 2 to 7 percent.

Most of this soil is used for forest. Cultivation is difficult because of the large number of cobblestones. The available moisture capacity is low. (Capability unit IVe–5; woodland suitability group 7)

Shelocta fine sandy loam, gently sloping (2 to 7 percent slopes) (ShB).—The profile of this soil is similar to but slightly thicker than the one described as representative of the series. Included in the areas mapped is a small area, half a mile south of Manning's store, of a soil that has a thick surface layer of dark-brown silt loam. Also included is soil that has a surface layer of dark-brown loam and a subsoil of reddish-brown silty clay loam.

This soil is well suited to most crops grown in the area. (Capability unit IIe–3; woodland suitability group 7)

Shelocta fine sandy loam, sloping (7 to 15 percent slopes) (ShC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped is a small acreage in which the surface layer is dark-brown loam and the subsoil is reddish-brown silty clay loam.

This soil is well suited to most crops grown in the area. (Capability unit IIIe–5; woodland suitability group 7)

Shelocta fine sandy loam, moderately steep (15 to 25 percent slopes) (ShD).—The profile of this soil is similar to the one described as representative of the series, but it is slightly thinner, particularly near the toe of mountain slopes. Included in the areas mapped are areas in which the surface layer is dark-brown loam and the subsoil is reddish-brown silty clay loam.

Most of this soil is used for pasture and forest. (Capability unit IVe–3; woodland suitability group 7)

Starr Series

The Starr series consists of deep, well-drained soils at the foot of slopes, along drainageways, and in depressions. These soils developed in recent colluvium washed or sloughed from upland soils, such as the Cecil, Braddock, Hiwassee, and Turbeville soils of the Piedmont Plateau, and the Hayesville, Rabun, and Myersville soils on plateaus in the Blue Ridge Mountains. Starr soils have a surface layer of reddish-brown loam and a subsoil of brown to dark-red loam, silty clay loam, or clay loam. The native vegetation consists of mixed hardwoods and pine.

These soils are strongly acid, medium in fertility, and low or medium in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Starr soils developed in material more recently deposited than that in which Braddock, Hiwassee, and Turbeville soils developed. They are browner than Cecil, Hayesville, Rabun, and Myersville soils, and they differ in mode of formation.

The Starr soils in Carroll County are gently sloping to sloping.

Representative profile of Starr loam, sloping (7 to 15 percent slopes), in a field 200 yards southeast of the intersection of Highways 666 and 676, along Highway 666:

A1—0 to 16 inches, reddish-brown (5YR 4/4) loam; weak, fine, granular structure; friable; plentiful fine and medium roots; gradual, smooth boundary.

B1—16 to 30 inches, reddish-brown (5YR 4/4) heavy loam to light clay loam; weak, medium, subangular blocky structure; friable; few medium roots; gradual, wavy boundary.

B2t—30 to 36 inches, dark reddish-brown (5YR 3/4) clay loam; few faint mottles of yellowish brown (10YR 5/8); slightly plastic; moderate, medium, granular structure to weak, fine, subangular blocky; thin, continuous clay films; gradual, smooth boundary.

IIC—36 inches +, quartz pebbles up to 3 inches in diameter mixed with loamy soil material.

The subsoil is brown to red loam to silty clay loam. The colluvial material is generally more than 3 feet thick, but it is as little as 18 inches thick in some places.

Starr loam, gently sloping (2 to 7 percent slopes) (SrB).—The profile of this soil is similar to but slightly thicker than the one described as representative of the series. Included in the areas mapped are areas of fine sandy loam.

Most of this soil is used for cultivated crops, but some of the acreage is used for hay and pasture. (Capability unit I–1; woodland suitability group 2)

Starr loam, sloping (7 to 15 percent slopes) (SrC).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small areas of fine sandy loam and a few areas of gravel or cobblestones.

Most of this soil has been cleared and is cultivated. (Capability unit IIIe–1; woodland suitability group 2)

State Series

The State series consists of deep, well-drained, nearly level to gently sloping soils on low terraces. These soils developed in sediments washed from upland soils, such as Hayesville, Myersville, and Cecil soils, that are underlain by igneous and metamorphic rocks. They have a surface layer of dark yellowish-brown fine sandy loam and a subsoil of dark yellowish-brown heavy silt loam to sandy clay loam. The native vegetation consists of hemlock, dogwood, white oak, red oak, black oak, and other hardwoods and a little white pine and shortleaf pine.

These soils are medium acid or strongly acid, low or medium in fertility, and low or medium in organic-matter content. They have moderately rapid permeability.

State soils are associated with Comus, Altavista, and Wickham soils. They are generally coarser textured than Comus soils and are less often flooded. State soils are better drained than Altavista soils, and their subsoil does not have the reddish-brown color that is typical of the subsoil in the Wickham soils.

State soils occur along the larger streams in Carroll County.

Representative profile of State fine sandy loam, nearly level (0 to 2 percent slopes), in a pasture field 300 yards downstream from bridge over Lovills Creek on Highway 686:

Ap—0 to 10 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; weak, fine, granular structure; very friable; few finely divided mica flakes; few stream-rounded quartz pebbles up to 1 inch in diameter; abundant fine and medium roots; clear, smooth boundary.

B1—10 to 19 inches, dark-brown (7.5YR 4/4) heavy sandy loam to light sandy clay loam; weak, fine and medium, subangular blocky structure; friable; few quartz pebbles up to ½ inch in diameter; few finely divided mica flakes; plentiful fine and medium roots; gradual, smooth boundary.

B2t—19 to 31 inches, dark yellowish-brown (10YR 4/4) light sandy clay loam; weak, fine and medium, subangular blocky structure; friable; few finely divided mica flakes; few quartz cobblestones up to 5 inches in diameter; few fine roots; clear, smooth boundary.

IIC1—31 to 49 inches, dark yellowish-brown (10YR 4/4) fine and medium loamy sand; few quartz pebbles up to 2 inches in diameter; 5 percent quartz fragments up to ¼ inch in diameter; few finely divided mica flakes; few fine roots; abrupt, smooth boundary.

IIIC2—49 to 60 inches, mixture of gravel and sand; grades to coarser material with depth.

The surface layer is brown to dark-brown and 9 to 12 inches thick. The subsoil is yellowish-brown to strong-brown heavy silt loam to sandy clay loam. It is weakly developed and has weak, fine, granular structure to weak, medium, subangular blocky. The solum is 25 to 60 inches thick. The substratum of yellowish-brown to dark-brown fine sandy loam to loamy fine sand is 5 to 20 inches thick. It is generally underlain by coarser material.

State fine sandy loam, nearly level (0 to 2 percent slopes) (SsA).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped along Stewarts Creek, Chestnut Creek, and Greasy Creek are small spots of silt loam. Also included is a small acreage of soils that are browner than this State soil.

Most of this soil has been cleared and is used for cultivated crops and forage crops. (Capability unit I–2; woodland suitability group 2)

State fine sandy loam, gently sloping (2 to 7 percent slopes) (SsB).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are some areas of silt loam and small areas of soils that are browner.

All of this soil has been cleared and is used for crops. (Capability unit IIe–1; woodland suitability group 2)

Stony Colluvial Land

Stony colluvial land (St) is made up of dark-brown loamy soil material mixed with cobblestones, boulders, and other stones. These materials came from areas of Porters and Manor soils on adjacent steep slopes. Stones and boulders 1 foot to more than 2 feet in diameter cover 15 to 90 percent of the surface and are not more than 2½ feet apart. The slope range is 2 to 25 percent.

Stony colluvial land occurs mostly in small areas at the base of the Blue Ridge escarpment, at elevations of 1,500 to 1,700 feet. Some is at the base of steep slopes in the Blue Ridge Mountains, at elevations of 2,100 to 2,300 feet. It is associated with Tusquitee very stony loam, but it is shallower and has larger stones and boulders. The slope range is gentle to moderately steep.

This land type is used for forest. (Capability unit VIs–1; woodland suitability group 11)

Stony Land, Porters Materials

This land type is on uplands. It is sloping to steep and is well drained. On and beneath the surface are stones more than 1 foot in diameter and 2½ to 5 feet apart. The soil material between the stones is loamy and very dark grayish brown to brown. It was derived from igneous and metamorphic rocks, such as granite and gneiss. The depth to rock is 10 to 18 inches.

Stony land, Porters materials, occurs at elevations of 2,000 to 3,500 feet along the Blue Ridge escarpment. Some is along the steeper intermountain stream divides in the Blue Ridge Mountains.

Stony land, Porters materials, sloping (7 to 15 percent slopes) (SuC).—In this unit the soil material is thicker than in the other units of this land type. Most of the acreage is used for forest, but small areas are used for pasture. (Capability unit VIs–1; woodland suitability group 9)

Stony land, Porters materials, steep (15 to 45 percent slopes) (SuE).—Most of this unit has slopes of more than 25 percent. Most of it is in forest, but small areas are in pasture and orchards. (Capability unit VIIs–1; woodland suitability group 9)

Stony land, Porters materials, very steep (45+ percent slopes) (SuF).—In this unit the soil material is shallower and the stones more numerous than in the other units of

this land type. Most of the acreage is in forest, but a few small areas are in pasture. (Capability unit VIIs–1; woodland suitability group 9)

Talladega Series

The Talladega series consists of soils that are deep and excessively drained. These soils developed in material weathered from mica schist, talcose schist, and phyllite. They have a surface layer of brown silt loam and a subsoil of yellowish-red silt loam. The native vegetation consists of mixed hardwoods and some white pine.

These soils are strongly acid, low in fertility, and low in organic-matter content. They have moderately rapid permeability and low available moisture capacity.

Talladega soils are closely associated with Manor, Watauga, and Hazel soils. They are similar to Manor soils in profile development, but they differ in having yellowish-red subsurface layers. Talladega soils differ from Watauga soils in having a yellowish-red subsoil. They are redder than Hazel soils and contain a large amount of mica flakes.

The Talladega soils in Carroll County are sloping to very steep and occur as small scattered areas in rough, strongly dissected intermountain areas in the Blue Ridge Mountains, at elevations of 1,800 to 3,000 feet.

Representative profile of Talladega silt loam, steep (25 to 45 percent slopes), in a wooded area 2 miles south of the intersection of Highways 764 and 765, along Highway 765:

O1—2 inches to 1 inch, loose leaves, needles, and twigs.
O2—1 inch to 0, partly decayed leaves, twigs, and needles.
A1—0 to 1 inch, brown to dark-brown (7.5YR 4/4) micaceous silt loam; weak, fine, granular structure; friable; more than 40 percent finely divided mica, which gives a feeling of slickness; few pebbles of mica schist and quartz up to ½ inch in diameter; common fine pores; abundant fine and medium roots; clear, smooth boundary.
A2—1 to 6 inches, reddish-brown (5YR 4/4) micaceous silt loam; weak, fine, granular structure; friable; common fine pores; more than 40 percent finely divided mica, which gives a feeling of slickness; few fragments of quartz and mica schist up to 1 inch in diameter; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B—6 to 12 inches, yellowish-red (5YR 4/8) micaceous silt loam; weak, fine, subangular blocky structure; friable; common fine pores; few, faint, patchy clay films on peds and in pores; more than 40 percent finely divided mica, which gives a feeling of slickness; few fragments of mica schist up to ½ inch in diameter; plentiful fine and medium roots; gradual, smooth boundary.
C1—12 to 39 inches, yellowish-red (5YR 4/8) and strong-brown (7.5YR 5/6) weathered mica schist; easily dug out with shovel and easily crushed with fingers; more than 40 percent finely divided mica, which gives a feeling of slickness; few fine and medium roots; rock-controlled structure; gradual, smooth boundary.
C2—39 to 52 inches, brown (7.5YR 5/4), pinkish-gray (7.5YR 7/2), and very dark gray (10YR 3/1) weathered mica schist; can be dug out with spade and is easily crushed with fingers to silty soil material; rock-controlled structure; more than 50 percent finely divided mica, which gives a feeling of slickness.

The surface layer is brown to dark brown and is 4 to 8 inches thick. The subsurface layers are reddish-brown to yellowish-red heavy silt loam to light silty clay loam. The depth to weathered rock is 10 to 20 inches, and the depth to hard rock is 3 to 6 feet. In some places there is no B horizon, and in these the A horizon directly overlies decomposed mica schist.

Talladega soils, sloping (7 to 15 percent slopes) (TaC).—The profiles of the soils in this complex are similar to the profile described as representative of the series. Included in the areas mapped are small areas of soils in which the underlying material is weathered to a depth of 50 inches or more. (Capability unit IVe–4; woodland suitability group 8)

Talladega soils, moderately steep (15 to 25 percent slopes) (TaD).—The profiles of the soils in this complex are similar to the profile described as representative of the series. Included in the areas mapped are areas of soils in which the underlying material is weathered to a depth of 50 inches or more.

These soils are used mostly for pasture or forest. (Capability unit VIe–2; woodland suitability group 8)

Talladega soils, steep (25 to 45+ percent slopes) (TaE).—The profiles of the soils in this complex are like the profile described as representative of the series. Included in the areas mapped are scattered areas of soils that have slopes of more than 45 percent, are shallow, and lack a subsoil.

These Talladega soils are used mostly for forest (fig. 7). (Capability unit VIIe–1; woodland suitability group 8)

Toxaway Series

The Toxaway series consists of black or very dark gray soils on first bottoms. These soils developed in fine sediments washed from upland soils, such as the Porters, Watauga, and Myersville soils, that are underlain by igneous and metamorphic rocks. The native vegetation consists of hardwoods, such as gum, poplar, and swamp maple, and of alders and other water-tolerant plants.

These soils are strongly acid, medium in fertility, and generally high in organic-matter content. Permeability is moderate in the surface layer and generally moderately slow in the underlying layers. Drainage, though variable, is generally very poor.

Figure 7.—**Steep Talladega soils on dissected plateaus in the Blue Ridge Mountains. Steep Manor soils also occur in this area.**

Toxaway soils are closely associated with Hatboro and Codorus soils. They differ from those soils in having a black surface layer and in being very poorly drained.

Soils of this series occur along some of the small streams in the Blue Ridge Mountain section of Carroll County, at elevations of 2,500 to 3,000 feet.

Representative profile of Toxaway silt loam, thick surface (0 to 2 percent slopes), in a pasture field along Little Reed Island Creek, 200 yards northwest of the intersection of Highways 798 and 702:

Apg—0 to 7 inches, black (10YR 2/1) silt loam; moderate, fine and medium, granular structure; friable; few, fine, faint mottles of dark reddish brown (5YR 3/3); 1 percent gravel and rounded and semirounded fragments less than ¼ inch in diameter; plentiful finely divided mica; abundant fine roots; clear, smooth boundary.

A11g—7 to 15 inches, black (5YR 2/1) silty clay loam; weak, coarse, angular blocky structure; friable; plentiful finely divided mica; 1 percent rounded and semirounded gravel; 3 to 5 percent quartzite fragments less than ¼ inch in diameter; plentiful fine roots; clear, smooth boundary.

A12g—15 to 23 inches, black (5YR 2/1) light clay loam; massive; friable; 20 percent gravel and 20 percent fragments less than ¼ inch in diameter; plentiful finely divided mica flakes, slightly more than in A11g horizon; few fine roots; gradual, smooth boundary.

A13g—23 to 28 inches, black (10YR 2/1) heavy silt loam; massive; friable; 2 to 5 percent fragments less than ¼ inch in diameter; 1 percent gravel; abundant partly decomposed grass and tree roots; few fine live roots to a depth of 28 inches; gradual, smooth boundary.

A14g—28 to 38 inches, layers of black (10YR 2/1) silt loam and sandy loam; massive; friable; 5 to 10 percent gravel; 10 percent fragments less than ¼ inch in diameter; fine and medium dead roots; clear, smooth boundary.

IICg—38 to 40 inches +, 5 percent rounded quartz cobblestones; 20 percent quartz, gneiss, and schist gravel; 50 percent fragments of quartz, gneiss, and schist grit less than ¼ inch in diameter; 25 percent fine, medium, and coarse sands.

The surface layer is black to very dark gray and is 20 to 40 inches thick. The subsurface layers range from very dark gray to brownish yellow and grayish brown in color and from silt loam to silty clay loam in texture. The depth to stream-deposited gravel and sand is 25 to 60 inches.

Toxaway silt loam, thick surface (0 to 2 percent slopes) (To).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are small spots of loam, silty clay loam, or fine sandy loam and a small acreage of an overwashed Toxaway soil that has a dark-brown surface layer 6 to 14 inches thick. Also included are a few areas of soils that have a compacted layer of sand and gravel at a depth of 14 inches or more and a few areas of Hatboro soils, Codorus soils, and Gravelly alluvial land.

Most of this soil is nearly level, but in a few areas adjacent to the uplands, the slope is as much as 5 percent. Floods are frequent, and the water table is at the surface for long periods.

Much of this soil has been cleared and is used for pasture. A few of the better drained areas are used for corn. (Capability unit IVw–1; woodland suitability group 4)

Turbeville Series

The Turbeville series consists of deep, well-drained soils on high stream terraces. These soils developed in old alluvium. They have a surface layer of brown to dark-brown fine sandy loam and a subsoil of red to dark-red clay to fine sandy loam. The native vegetation is mixed oak, hickory, shortleaf pine, Virginia pine, and, at higher elevations, white pine.

These soils are strongly acid, low or medium in fertility, and low in organic-matter content. They have good available moisture capacity. Permeability is moderately rapid in the upper part of the solum and moderate in the lower part.

Turbeville soils are associated with Hiwassee and Wickham soils. They contain more quartz than Hiwassee soils and have a thicker, lighter colored, coarser textured surface layer and a lighter colored, slightly coarser textured, more friable subsoil. Turbeville soils have a subsoil that is redder, better defined, and finer textured than that of Wickham soils.

Gently sloping to moderately steep Turbeville soils occur on high stream terraces in the Piedmont Plateau and Blue Ridge Mountain sections of Carroll County. They are mapped only in undifferentiated groups with Hiwassee soils.

Representative profile of Turbeville fine sandy loam, sloping (2 to 15 percent slopes), in an idle field 100 yards northeast of Pauls Creek on Highway 690:

A1—0 to 2 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; few rounded quartzite pebbles up to 1 inch in diameter; few finely divided mica flakes; abundant fine and medium roots; clear, smooth boundary.

A2—2 to 8 inches, brown (7.5YR 4/4) fine sandy loam; weak, fine, granular structure; friable; few rounded quartzite pebbles up to 1 inch in diameter; few finely divided mica flakes; common fine pores; abundant fine and medium roots, and few large roots; gradual, smooth boundary.

B1—8 to 12 inches, yellowish-red (5YR 4/6) fine sandy clay loam; weak, fine, subangular blocky structure; friable; few fine pores; few quartzite pebbles up to ½ inch in diameter; few finely divided mica flakes; plentiful fine and medium roots; gradual, smooth boundary.

B21t—12 to 21 inches, red (2.5YR 4/6) heavy clay loam; moderate, medium, subangular blocky structure; friable; thin, faint, patchy clay films on ped surfaces and in pores; few quartzite pebbles up to ½ inch in diameter; few finely divided mica flakes; few fine and medium roots; gradual, smooth boundary.

B22t—21 to 36 inches, red (2.5YR 4/6) to dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; firm; 10 percent semirounded and rounded quartzite gravel up to 3 inches in diameter; few fine mica flakes; thin, distinct, patchy clay films on ped surfaces; slightly compact in place; few krotovinas up to ½ inch in diameter; few fine and medium roots; gradual, smooth boundary.

IIB23t—36 to 52 inches, dark-red (10YR 3/6) clay loam; strong, medium, angular blocky and subangular blocky structure; firm; thin, faint, patchy clay films on ped surfaces and in pores; 55 percent quartzite pebbles and cobblestones up to 6 inches in diameter; common finely divided mica flakes; few fine pores; few fine roots; gradual, smooth boundary.

IIIB24t—52 to 80 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; fri-

able; common finely divided mica flakes, which give a feeling of slickness; thin, faint, patchy clay films; few fine roots.

The surface layer is brown to dark-brown loam, cobbly fine sandy loam, or fine sandy loam. It is 7 to 15 inches thick. The subsoil generally is red to dark-red clay, but the B2 horizon and the B3 horizons, if present, may be clay, clay loam, or fine sandy clay loam. The subsoil is generally 2 to 4 feet thick. At a depth of 3 to 10 feet is a layer of gravel or cobblestones or the surface layer of a buried soil. There may be a few pebbles or cobblestones on the surface.

Tusquitee Series

The Tusquitee series generally consists of deep, well-drained soils on colluvial fans or benches. These soils developed in local alluvium and colluvium washed from soils underlain by gneiss and schist, chiefly Porters, Manor, Chester, Glenelg, and Hayesville soils. The surface layer is dark yellowish-brown loam, and the subsoil is dark-brown light clay loam. The native vegetation consists of second-growth mixed oaks, yellow-poplar, and pine, and an understory of mountain-laurel and rhododendron.

These soils are medium acid, medium in fertility, and medium in organic-matter content. They have moderately rapid permeability and good available moisture capacity.

Tusquitee soils are closely associated with Hiwassee, Turbeville, and Starr soils. They are not so red as Hiwassee and Turbeville soils, and they lack the strong structure typical of those soils. Tusquitee soils are finer textured and less red than Starr soils.

Gently sloping to moderately steep soils of the Tusquitee series occur in Carroll County as areas of 1 to 5 acres, both on the Piedmont Plateau at elevations of 1,200 to 1,500 feet and in the Blue Ridge Mountains at elevations of 2,000 to 2,900 feet.

Representative profile of Tusquitee loam, gently sloping (2 to 7 percent slopes), in a cultivated field on Highway 802 a quarter of a mile east of Crooked Creek:

Ap—0 to 8 inches, dark yellowish-brown (10YR 3/4) loam; weak, fine, granular structure; friable; few fine pores; few finely divided mica flakes; few coarse sand grains; few quartz fragments up to ¼ inch in diameter; abundant fine roots; gradual, smooth boundary.

A3—8 to 15 inches, dark yellowish-brown (10YR 3/4) heavy loam; moderate, fine, granular structure; friable; few fine pores; few, thin, patchy clay films in worm holes; few finely divided mica flakes; few fine roots; gradual, smooth boundary.

B1—15 to 24 inches, dark-brown (10YR 4/3) light clay loam; weak, fine, subangular blocky structure; friable; common fine pores; few, thin, faint patchy clay films in pores and worm channels; few, finely divided mica flakes; few fine roots; gradual, smooth boundary.

B2t—24 to 40 inches, strong-brown (7.5YR 5/6) clay loam; weak, fine and medium, subangular blocky structure; friable; thin, faint, patchy clay film on peds and in pores; common fine pores; few krotovinas up to ½ inch in diameter; common finely divided mica flakes; few fine roots; gradual, smooth boundary.

B3—40 to 48 inches, yellowish-brown (10YR 5/8) light silty clay loam; few, fine, faint mottles of yellowish red (5YR 5/8); weak, fine, subangular blocky structure; friable; thin, faint, patchy clay films on ped surfaces and in pores; few fine pores; common coarse sand grains; a little angular and semirounded quartz grit; few fine roots; gradual, smooth boundary.

IIC—48 to 53 inches +, yellowish-brown (10YR 5/6) silty clay loam; 50 to 60 percent quartz grit and gravel up to 1½ inches in diameter; structureless; friable; few fine roots.

The surface layer is dark-brown to brown loam, cobbly loam, or very stony loam. It is 6 to 16 inches thick. The subsoil is brown to yellowish-brown sandy clay loam or clay loam and is 15 to 50 inches thick. There are a few quartz cobblestones on the surface.

Tusquitee cobbly loam, sloping (7 to 15 percent slopes) (TsC).—The profile of this soil is similar to the one described as representative of the series. Quartzite cobblestones 3 to 10 inches in diameter make up 15 to 25 percent of the soil mass. Included in the areas mapped are small areas of Tusquitee cobbly soils that are gently sloping and moderately steep.

This soil is droughty, and the cobblestones make cultivation difficult. Most of the acreage has been cleared and is used for pasture. (Capability unit IVe–5; woodland suitability group 6)

Tusquitee loam, gently sloping (2 to 7 percent slopes) (TuB).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped near Fries are small areas of soils that have a yellower subsoil.

This soil is well suited to most crops grown in the area. The larger areas are cultivated, but small areas are used for pasture or forest. (Capability unit IIe–1; woodland suitability group 6)

Tusquitee loam, sloping (7 to 15 percent slopes) (TuC).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped near Fries are small areas of soils that have a yellower subsoil.

Small areas of this soil are used for pasture and forest, but most of the larger areas are cultivated. (Capability unit IIIe–2; woodland suitability group 6)

Tusquitee loam, moderately steep (15 to 25 percent slopes) (TuD).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped near Fries are a few small areas of soils that have a yellower subsoil.

Most of this soil is used for pasture, but a small acreage is used for cultivated crops. (Capability unit IVe–3; woodland suitability group 6)

Tusquitee very stony loam, sloping (7 to 15 percent slopes) (TvC).—The profile of this soil is similar to the one described as representative of the series. On the surface and throughout the profile, 2½ to 5 feet apart, are stones more than 10 inches in diameter. There are a few rock outcrops in places. Included in the areas mapped is a small acreage that is gently sloping.

Most of this soil is used for forest. (Capability unit VIs–1; woodland suitability group 6)

Tusquitee very stony loam, moderately steep (15 to 25 percent slopes) (TvD).—The profile of this soil is similar to the one described as representative of the series. On the surface and throughout the profile, about 2½ to 5 feet

apart, are stones more than 10 inches in diameter. There are a few rock outcrops in places.

Most of this soil is used for forest. (Capability unit VIs–1; woodland suitability group 6)

Watauga Series

The Watauga series consists of deep, well-drained, micaceous soils on plateaus. These soils have a surface layer of brown silt loam and a subsoil of brown to yellowish-brown silty clay loam. They are moderately deep or deep to weathered mica schist and generally deep to hard bedrock. The native vegetation consists of oak, hickory, other hardwood trees, and white pine.

These soils are strongly acid, low in fertility, and low in organic-matter content. They are moderately permeable and have good available moisture content.

Watauga soils are closely associated with Manor, Hayesville, Chester, Glenelg, and Talladega soils. They have a thicker subsoil than Manor soils. They differ from Hayesville soils in having a surface layer of micaceous silt loam and a less red subsoil. They contain more mica, silt, and very fine sand than Chester and Glenelg soils. Watauga soils have a thicker and less red subsoil than Talladega soils.

Sloping to steep soils of the Watauga series occur on plateaus in the Blue Ridge Mountain section of Carroll County, at elevations of 2,500 to 3,000 feet.

Representative profile of Watauga silt loam, sloping (7 to 15 percent slopes), in a pasture field 2,000 feet northeast of the intersection of Highways 709 and 620:

Ap—0 to 7 inches, brown to dark-brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure to strong, coarse, granular; friable; abundant finely divided mica, which gives a slight feeling of slickness; common fine pores; abundant fine roots; clear, smooth boundary.

B21t—7 to 12 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; thin, faint, patchy clay films; common fine pores; abundant finely divided mica, which gives a slight feeling of slickness; few krotovinas ½ inch in diameter; few small worm channels; plentiful fine roots; gradual, smooth boundary.

B22t—12 to 21 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, fine, medium, and coarse, subangular blocky structure; friable; thin, distinct, patchy clay films on ped surfaces; few, faint, patchy clay films in pores; common fine pores; abundant finely divided mica, which gives a feeling of slickness; few krotovinas ½ inch in diameter; few fine roots; gradual, wavy boundary.

B3—21 to 29 inches, yellowish-brown (10YR 5/6) silt loam; weak, medium or coarse, subangular blocky structure to structureless; friable; few, faint, patchy clay films on ped surfaces; few fine pores; abundant very finely divided mica flakes, which give a feeling of slickness; few fragments of weathered mica schist up to ½ inch in diameter; few fine roots; gradual, wavy boundary.

C11—29 to 58 inches, pale-brown (10YR 6/3) silty soil material containing some weathered mica schist that is easily crushed to the texture of loose silt loam; abundant finely divided mica flakes, which give a feeling of slickness; rock-controlled structure; few seams of black (10YR 2/1) biotite, ⅛ inch thick; few fine roots; gradual, wavy boundary.

C12—58 to 96 inches, yellowish-brown (10YR 5/6), weathered mica schist, easily crushed to loose loamy soil material; some fine sand; abundant finely divided mica; rock-controlled structure; some black (10YR 2/1) streaks of biotite; gradual, wavy boundary.

C13—86 to 102 inches, yellowish-brown (10 YR 5/6), weathered mica schist containing small amounts of biotite; hard to dig out with spade, but, when dug out, easily crushed to loose loamy soil material; rock-controlled structure; abundant finely divided mica; gradual, wavy boundary.

C14—102 to 104 inches +, partly weathered mica schist.

The surface layer is brown to dark yellowish-brown silt loam and cobbly silt loam. It is 5 to 10 inches thick. The subsoil is brown to brownish-yellow light silty clay loam or clay loam 20 to 30 inches thick. It has weak to moderate, fine and medium, subangular blocky structure. The B3 horizon is silt loam in many places. The solum is 24 to 40 inches thick. The depth to hard bedrock is generally more than 5 feet.

Watauga cobbly silt loam, sloping (7 to 15 percent slopes) (WaC).—The profile of this soil is similar to the one described as representative of the series. Approximately 15 to 20 percent of the surface of this soil is covered with cobblestones up to 10 inches in diameter. Included in the areas mapped are small, scattered areas of soils that are moderately eroded.

Most of this soil is used for pasture and forest. The cobblestones interfere with cultivation and reduce the available moisture capacity. (Capability unit IVe–5; woodland suitability group 7)

Watauga cobbly silt loam, moderately steep (15 to 25 percent slopes) (WaD).—The profile of this soil is similar to but somewhat thinner than the one described as representative of the series. Cobblestones as much as 10 inches in diameter cover 15 to 20 percent of the surface of this soil.

About half the acreage is moderately eroded. The surface layer in the eroded areas is more yellowish brown than it is in other areas, and the subsoil is exposed in places.

This soil is used mainly for pasture and forest. The cobblestones interfere with tillage and reduce the available moisture capacity. (Capability unit IVe–5; woodland suitability group 7)

Watauga cobbly silt loam, steep (25 to 45 percent slopes) (WaE).—The profile of this soil is similar to but thinner than the one described as representative of the series. Cobblestones cover 15 to 25 percent of the surface of this soil. Included in the areas mapped are small, scattered areas of moderately eroded soils and some spots in which the subsoil is exposed.

Most of this soil is used for pasture and forest. The cobblestones and the steep slopes make pasture management difficult. (Capability unit VIe–3; woodland suitability group 7)

Watuaga silt loam, sloping (7 to 15 percent slopes) (WgC).—The profile of this soil is the one described as representative of the series. About a third of the acreage is moderately eroded. In the eroded areas the surface layer is thinner and less brown and more yellow than in other areas. Included in the areas mapped are small areas of loam and a small acreage of gently sloping soils.

Most of this soil has been cleared and is used for crops. (Capability unit IIIe–4; woodland suitability group 7)

Watauga silt loam, moderately steep (15 to 25 percent slopes) (WgD).—The profile of this soil is similar to the one described as representative of the series. Almost half the acreage is moderately eroded. The surface layer in

the eroded areas is more yellow and less brown than that in other areas. Included in the areas mapped are small areas of loam.

This soil is better suited to pasture than to row crops because of the moderately steep slopes. (Capability unit IVe–2; woodland suitability group 7)

Watauga silt loam, steep (25 to 45 percent slopes) (WgE).—The profile of this soil is similar to but thinner than the one described as representative of the series. About half the acreage is moderately eroded. The surface layer in the eroded areas is less brown and more yellow than that in other areas.

This soil is used for pasture and forest. (Capability unit VIe–1; woodland suitability group 7)

Weikert Series

The Weikert series consists of well-drained, generally shallow soils that developed in material weathered from sandstone and shale. These soils have a surface layer of brown silt loam and a subsoil of yellowish-brown silt loam. The native vegetation consists of chestnut oak, scarlet oak, Virginia pine, a little white pine and hemlock, and an understory of mountain-laurel and rhododendron.

These soils are strongly acid, low in fertility, and low in organic-matter content. Permeability is moderately rapid.

Weikert soils are associated with Clymer and Ramsey soils. They are shallower than Clymer soils, and they are finer textured than Ramsey soils.

Sloping to very steep soils of the Weikert series occur in the Blue Ridge Mountain section of Carroll County, at elevations of 2,600 to 3,500 feet.

Representative profile of Wiekert channery silt loam, steep (25 to 45 percent slopes), in a wooded area 3 miles east of Sheep Town on Highway 635:

O1—2 inches to 1 inch, loose leaves and twigs.
O2—1 inch to 0, dark-gray (N 4/0), partly decayed leaves and twigs.
A1—0 to 1 inch, dark grayish-brown (10YR 4/2) channery silt loam; weak, fine, granular structure; very friable; 15 to 20 percent sandstone fragments; abundant fine and medium roots; clear, wavy boundary.
A2—1 to 6 inches, brown (10YR 5/3) channery silt loam; weak, fine, granular structure; friable; 20 percent sandstone grit and sandstone gravel up to 1 inch in diameter; plentiful fine and medium roots, and few large roots; gradual, smooth boundary.
B2—6 to 15 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, fine, subangular blocky structure; friable; 50 percent angular and semirounded sandstone gravel up to 1½ inches in diameter; few fine and medium roots; gradual, wavy boundary.
B3—15 to 22 inches, pale-brown (10YR 6/3) silt loam in root crevices and as films on fragments of dark yellowish-brown (10YR 4/4) sandstone; 95 percent fragments; can be dug out with spade; few fine roots extend into cracks in rock; gradual, wavy boundary.
R—22 inches+, partly weathered sandstone, shale, and quartzite.

The surface layer is dark grayish-brown to dark-brown channery silt loam and very shaly silt loam. It is 5 to 8 inches thick. The subsoil is light yellowish brown to brown and is 6 to 16 inches thick. It has little or no clay accumulation. The solum is 10 to 22 inches thick, and hard rock is within 24 inches of the surface.

Weikert channery silt loam, sloping (7 to 15 percent slopes) (WhC).—The profile of this soil is similar to the one described as representative of the series.

Most of this soil is used for forest, but a few small areas are used for cultivated crops or pasture. The available moisture capacity is low. (Capability unit IVe–5; woodland suitability group 8)

Weikert channery silt loam, moderately steep (15 to 25 percent slopes) (WhD).—The profile of this soil is similar to the one described as representative of the series.

Most of this soil is used for forest, but a small acreage is used for hay and pasture. The available moisture capacity is low. (Capability unit VIe–3; woodland suitability group 8)

Weikert channery silt loam, steep (25 to 45 percent slopes) (WhE).—The profile of this soil is like the one described as representative of the series.

Most of this soil is used for forest, but a small acreage is used for pasture. (Capability unit VIIe–1; woodland suitability group 8)

Weikert very shaly silt loam, moderately steep (15 to 25 percent slopes) (WkD).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of moderately sloping soils.

This soil is not suited to cultivation, because of limited depth and the large quantity of shale. Most of the acreage is used for trees. (Capability unit VIs–1; woodland suitability group 15)

Weikert very shaly silt loam, steep (25 to 45 percent slopes) (WkE).—The profile of this soil is similar to but slightly thinner than the one described as representative of the series. Included in the areas mapped are small areas of soils that are not so steep.

Most of this soil is used for forest. (Capability unit VIIs–1; woodland suitability group 15)

Weikert very shaly silt loam, very steep (45+ percent slopes) (WkF).—The profile of this soil is similar to the one described as representative of the series.

This soil is used only for forest, because of the very steep slopes and numerous shale fragments. (Capability unit VIIs–1; woodland suitability group 15)

Wickham Series

The Wickham series consists of deep, well-drained soils on stream terraces, colluvial fans, and colluvial slopes. These soils developed in sediments washed from upland soils underlain by igneous and metamorphic rocks, such as Cecil, Hayesville, Watauga, and Porters soils. They have a surface layer of dark grayish-brown loam and a subsoil of reddish-brown silty clay loam or clay loam.

These soils are medium acid, medium in fertility, and medium in organic-matter content. Permeability is moderate.

Wickham soils are closely associated with Altavista and Hiwassee soils, which are on terraces. They developed in the same kind of material as Altavista and Hiwassee soils, but they are better drained than Altavista soils and have a browner subsoil than Hiwassee soils.

Gently sloping and moderately sloping soils of the Wickham series occur on the Piedmont Plateau and in the Blue Ridge Mountains, at elevations of 1,000 to 2,500 feet.

Representative profile of Wickham loam, gently sloping (2 to 7 percent slopes), in a wooded area on Highway 795, a tenth of a mile south of the intersection with Highway 840:

O2—1 inch to 0, loose leaves, twigs, and partly decayed organic debris.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; few very finely divided mica flakes; abundant fine roots; clear, smooth boundary.

A2—2 to 7 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; friable; a little rounded and angular quartz up to ⅛ inch in diameter; few finely divided mica flakes; abundant, large, medium, and fine roots; gradual, smooth boundary.

A3—7 to 10 inches, dark-brown (7.5YR 3/4) heavy loam; weak, fine and medium, granular structure; friable; few quartz fragments up to 3 inches in diameter; few finely divided mica flakes; plentiful large and medium roots, and few fine roots; clear, smooth boundary.

B1—10 to 14 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few rounded quartz fragments up to ⅛ inch in diameter; few, thin, faint clay films on ped surfaces; few fine and medium roots; gradual, smooth boundary.

B21t—14 to 28 inches, reddish-brown (5YR 4/4) light clay loam; moderate, fine and medium, subangular blocky structure; firm; few, thin, distinct clay films on ped surfaces; few fine quartz fragments up to ⅛ inch in diameter; few fine and medium roots; gradual, smooth boundary.

B22t—28 to 36 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; weak, fine and medium, subangular blocky structure; friable; few fine quartz fragments less than ⅛ inch in diameter; few, thin, prominent clay films on ped surfaces; few fine and medium roots; gradual, smooth boundary.

B3—36 to 46 inches, dark reddish-brown (2.5YR 3/4) heavy silt loam; weak, medium and coarse, subangular blocky structure; friable; few, thin, distinct clay films on ped surfaces; quartz fragments less than ⅛ inch in diameter are common; few medium roots; clear, smooth boundary.

IIC1—46 to 72 inches, yellowish-red (5YR 4/6) compacted layer of sand and fine quartz fragments less than ⅛ inch in diameter; structureless; few finely divided mica flakes that increase in number with depth; few large roots.

IIIC2—72 to 85 inches +, yellowish-brown (10YR 5/6) stratified loamy sand and sand containing gravel.

The surface layer is dark-brown to pale-brown loam and fine sandy loam 6 to 12 inches thick. The subsoil is strong-brown or dark reddish-brown clay loam or silty clay loam 24 to 40 inches thick. There are a few pebbles and cobblestones.

Wickham loam, gently sloping (2 to 7 percent slopes) (WmB).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are areas of silt loam and fine sandy loam. Also included are soils that have a dark-red subsoil.

This soil is on stream terraces and has gravel at the surface in places. Some small areas are subject to flooding.

Most of this soil has been cleared and is cultivated, but a few small areas are in forest. (Capability unit IIe–1; woodland suitability group 7)

Wickham loam, sloping (7 to 15 percent slopes) (WmC).—The profile of this soil is similar to the one described as representative of the series. Included in the areas mapped are small areas of silt loam and fine sandy loam. Also included are soils that have a red subsoil.

Most of this soil has been cleared and is cultivated. (Capability unit IIIe–2; woodland suitability group 7)

Wickham fine sandy loam, gently sloping (2 to 7 percent slopes) (WsB).—This soil occurs on colluvial fans and on gentle slopes in and at the base of the Blue Ridge Mountains. There may be gravel at the surface and stone lines in the subsoil. The subsoil is yellowish red in most places but red in some places. The texture of the subsoil is generally clay loam, but it is clay in some small areas.

Most of this soil has been cleared, and there are areas still wooded that could be cleared and used for truck crops, orchards, or general farm crops. (Capability unit IIe–3; woodland suitability group 7)

Wickham fine sandy loam, sloping (7 to 15 percent slopes) (WsC).—This soil has gravel on the surface and stone lines in the subsoil. Included are areas of soils that have a yellowish-red or red subsoil and some areas of clay.

This soil is used mainly for cultivated crops. (Capability unit IIIe–4; woodland suitability group 7)

Wickham fine sandy loam, sloping, eroded (7 to 15 percent slopes) (WsC2).—This soil occurs on old colluvial fans and on slopes near the base of the Blue Ridge Mountains. Part of the original surface layer has been removed by erosion, and the subsoil is exposed in places. The subsoil, although red in some places, is generally yellowish red. There may be gravel on the surface and stone lines in the subsoil.

Most of this soil is used for cultivated crops, but a few areas are used for pasture and orchards. (Capability unit IIIe–4; woodland suitability group 7)

Worsham Series

The Worsham series consists of deep, poorly drained soils on uplands and colluvial slopes. These soils developed in a mixture of colluvium, local alluvium, and residuum. They have a surface layer of dark grayish-brown loam and a subsoil of olive or gray, mottled silty clay loam. The underlying rocks may be granite, gneiss, or schist. The native vegetation consists of sweetgum, blackgum, and a few pines.

These soils are strongly acid, low in fertility, and low or medium in organic-matter content. Permeability is slow.

Worsham soils are associated with Louisburg, Edneyville, Tusquitee, and Starr soils. They differ from those soils in being poorly drained.

Soils of this series occur in depressions and at the head of small drainageways in Carroll County.

Representative profile of Worsham loam, gently sloping (2 to 7 percent slopes), in a pasture field on Highway 751, half a mile east of the intersection with Highway 693:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) loam; weak, fine and medium, granular structure; friable; plentiful fine and medium roots; few quartz fragments up to 2 inches in diameter; many iron concretions up to ⅛ inch in diameter; clear, wavy boundary.

B1g—8 to 15 inches, pale-olive (5Y 6/3) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium and coarse, sub-

angular blocky structure; friable; few, thin, faint clay films on ped surfaces; few fine roots; acid; gradual, wavy boundary.

B21tg—15 to 25 inches, light brownish-gray (2.5Y 6/2) heavy silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; firm; many, thin, prominent clay films; few fine roots; gradual, wavy boundary.

B22tg—25 to 33 inches, light olive-gray (5Y 6/2) silty clay loam; common, medium, distinct mottles; moderate, medium and coarse, subangular blocky structure to massive; firm; many, thin, prominent clay films on ped surfaces; many iron concretions from 1/16 to 1/8 inch in diameter; no roots; abrupt, smooth boundary.

C1g—33 to 44 inches, light olive-gray (5Y 6/2) gritty silty clay loam; many, medium and coarse, prominent mottles of yellowish red (5YR 4/8); structureless clayey material in crevices and pockets; firm; 60 percent fine and medium quartz fragments; abrupt, smooth boundary.

C2g—44 to 57 inches +, yellowish-red (5YR 4/8) intermixed with gray (5Y 6/1) silty soil material weathered from granite and gneiss.

The surface layer is 6 to 8 inches thick. The subsoil is pale-olive to light-olive sandy clay loam to silty clay loam. The depth to mottling is 8 to 10 inches, and the depth to hard rock is 5 to 10 feet.

Worsham loam, gently sloping (2 to 7 percent slopes) (WtB).—The profile of this soil is like the one described as representative of the series. Included in the areas mapped are areas of soils that are somewhat poorly drained and have a subsoil of grayish-brown silty clay loam to silty clay. Also included are small areas of sloping Worsham soils.

All of this soil has been cleared and is used for pasture. It is not suitable for cultivated crops, because it is slow to warm up in spring and has a seasonal water table near the surface. (Capability unit Vw–1; woodland suitability group 4)

Use and Management of the Soils

In this section the use and management of soils for crops, pasture, woodland, wildlife, engineering, and nonfarm purposes are discussed. The system of capability grouping used by the Soil Conservation Service is explained. Estimates of yields for major crops are given.

Most of the soils in Carroll County can benefit from management that includes drainage, the control of erosion, the addition of organic matter, and the use of a suitable cropping sequence or system. The drainage of somewhat poorly drained or poorly drained soils can be improved by using tile in cultivated areas where permeability is good and by using surface drains in pastures where the soils are less permeable. Grazing is excellent in most areas that are effectively drained. Erosion, including gullying, can be controlled by practices suggested by the Soil Conservation Service and the Virginia Agricultural Experiment Station. Growing greenmanure crops and cover crops regularly is beneficial to all the soils, because it provides regular additions of organic matter. A suitable cropping system helps to control erosion and to maintain the productivity of the soils.

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Capability Groups of Soils

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

In the capability system, all kinds of soils are grouped at three levels, the capability class, the subclass, and the unit.

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

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

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

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

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

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

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

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

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

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

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

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass

Management of soils by capability units

In the following pages each capability unit of Carroll County is described and some suggestions for use and management are given. Further information concerning the management of the soils can be obtained from the local soil conservationist and the county agricultural agent.

CAPABILITY UNIT I–1

This unit consists of one well-drained, deep, medium-textured soil on gentle colluvial slopes. This soil has an 8- to 15-inch surface layer of friable loam and a subsoil of loam to clay loam. It is acid, medium in natural fertility, and low or medium in organic-matter content. Permeability is moderately rapid, and the available moisture capacity is high. The response to management is good.

About 75 percent of the acreage is cultivated, 15 percent is used as pasture, and 10 percent is used as woodland.

The soil in this unit is suitable for the crops commonly grown. Corn, small grain, lespedeza, red clover, Ladino clover, orchardgrass, Kentucky 31 fescue, and legume-grass mixtures for pasture grow well under good management. Truck crops, such as cabbage, tomatoes, and peppers, also grow well. Alfalfa may be short lived because of seepage from adjacent higher areas. A suitable cropping sequence consists of a row crop followed by a winter cover crop.

Good tilth is easily maintained. There are no obstacles to the operation of equipment. In some places diversion terraces are needed. Plowing under cover crops or crop residue regularly helps to maintain the organic-matter content.

CAPABILITY UNIT I–2

This unit consists of one deep, nearly level soil on low stream terraces. This soil has a 9- to 12-inch surface layer of friable fine sandy loam and a subsoil of heavy silt loam to sandy clay loam.

This soil is medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. The subsoil has moderately rapid permeability. The available moisture capacity is high. Tilth is good.

About 80 percent of the acreage is cultivated, and 20 percent is used as pasture.

This soil is well suited to corn, red clover, Ladino clover, orchardgrass, lespedeza, fescue, vegetables, and legume-grass mixtures for pasture. It is not suited to deep-rooted crops, such as alfalfa, because it has a high water table.

A suitable cropping sequence consists of a row crop followed by a cover crop. This sequence helps to maintain the organic-matter content and to preserve tilth. Productivity is easily maintained.

CAPABILITY UNIT IIe–1

This unit consists of gently sloping, deep, well-drained soils on colluvial slopes and terraces. These soils have a 6- to 16-inch surface layer of friable or very friable fine sandy loam or loam and a subsoil of friable or firm heavy silt loam to sandy clay loam. The depth to bedrock is more than 5 feet. One soil has a seasonally high water table, which limits the depth of the root zone.

These soils are medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is high.

About 80 percent of the acreage is cultivated, and 20 percent is used as pasture.

Most of the soils in this unit are suited to corn, small grain, red clover, lespedeza, Ladino clover, orchardgrass, soybeans, Kentucky 31 fescue, alfalfa, and legume-grass mixtures for pasture. A suitable cropping system consists of a row crop followed by a small grain and an interseeded sod crop for hay.

Surface runoff is the main hazard in cultivated areas. Measures for controlling runoff include contour tillage, contour stripcropping, and diversion terrace systems that make use of grasses and legumes. The erosion hazard is moderate. Tilth is good. Crop residue and cover crops should be worked into the soils to maintain organic matter.

CAPABILITY UNIT IIe–2

This unit consists of deep, well-drained, medium-textured soils on gently sloping terraces and uplands. These soils have a 6- to 12-inch surface layer of friable loam and a subsoil of slightly firm or firm clay loam to clay. The depth to bedrock is 3 to 10 feet.

These soils are medium acid or strongly acid, medium in natural fertility, and low or medium in organic-matter content. Permeability is moderate, and the available moisture capacity is high.

About 50 percent of the acreage is cultivated, 40 percent is used as pasture, and 10 percent is used as woodland.

The soils in this unit are well suited to corn, alfalfa, small grain, lespedeza, red clover, white clover, Ladino clover, soybeans, orchardgrass, fescue, legume-grass mixtures for pasture, and fruit trees. A suitable cropping sequence is a row crop followed by a small grain and 2 years of a sod crop to be used for hay. Close-growing crops are needed for control of erosion.

Surface runoff is the main hazard in cultivated areas. Measures for controlling runoff are contour tillage, contour stripcropping, and diversion terrace systems that make use of grasses or legumes. The erosion hazard is moderate. Tilth is good. To maintain or improve tilth, it is necessary to incorporate organic matter into the soil and to avoid plowing when the soil is wet.

CAPABILITY UNIT IIe–3

This unit consists of gently sloping, deep, well-drained fine sandy loams and loams on uplands and colluvial

slopes. These soils have a 6- to 12-inch surface layer of friable loam to fine sandy loam and a subsoil of friable sandy clay loam to firm silty clay loam or clay. The depth to bedrock is more than 3 feet.

These soils are medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate, and the available moisture capacity is high. Some of these soils are moderately eroded.

About 70 percent of the acreage is cultivated, 15 percent is used as pasture, and 15 percent is used as woodland.

The soils in this unit are well suited to corn, alfalfa, small grain, red clover, lespedeza, Ladino clover, white clover, orchardgrass, fescue, grass-legume mixtures for pasture, and fruit trees. A suitable cropping sequence consists of a row crop, a crop of small grain, and 2 years of a legume-grass mixture.

Surface runoff is the main hazard in cultivated areas. Tilth is good except in spots where the plow layer is mostly in the subsoil. Barn litter and crop residue are needed to maintain the organic-matter content and thus improve or maintain tilth. In the more eroded areas, it may be necessary to increase the length of the rotation. Measures for erosion control include suitable cropping systems, contour tillage, stripcropping, diversion terraces, and sodded waterways.

CAPABILITY UNIT IIe-4

This unit consists of one gently sloping, moderately well drained, medium-textured soil on stream terraces. This soil has a 6- to 12-inch surface layer of friable silt loam and a subsoil of friable clay loam. The depth to bedrock is more than 5 feet.

This soil is strongly acid, low or medium in fertility, and low or medium in organic-matter content. Permeability is moderate, and the available moisture capacity is moderate. Surface runoff is slow or medium, and water may pond in flat areas.

About 80 percent of the acreage is cultivated, and 20 percent is used as pasture.

This soil is well suited to corn, Ladino clover, red clover, small grain, lespedeza, fescue, and truck crops. It is too wet to be well suited to alfalfa. A suitable cropping sequence consists of a row crop followed by a small grain and 2 years of a sod crop for hay.

Tilth is fair. Contour tillage helps to control runoff, and surface drains or tile drains are beneficial in flat areas and depressions. Heavy machinery should not be used on these soils in wet weather.

CAPABILITY UNIT IIw-1

This unit consists of one nearly level soil on flood plains that are flooded occasionally. This soil has a 7- to 18-inch surface layer of friable fine sandy loam. The depth to bedrock is more than 5 feet.

This soil is medium acid or strongly acid, medium in fertility, and medium in organic-matter content. It is well drained and has high available moisture capacity.

About 90 percent of the acreage is cultivated, and 10 percent is used as pasture.

This soil is well suited to corn, red clover, Ladino clover, white clover, lespedeza, orchardgrass, fescue, timothy, vegetables, and legume-grass mixtures for pasture, but it is not well suited to alfalfa, because of the occasional flooding. This is one of the best soils in the county for corn. A suitable cropping sequence is a row crop followed by a cover crop.

Tilth is excellent. Protection from flooding is the main need. The erosion hazard is slight. Heavy farm machinery cannot be used during periods of wet weather.

CAPABILITY UNIT IIs-1

This unit consists of a gravelly, nearly level land type made up of 6 to 15 inches of fine sandy loam to silt loam over material that is 10 to 20 percent gravel-size fragments of quartz, schist, and gneiss. The depth to bedrock or to an unconformable layer is 3 to 4 feet.

This land type is acid, medium in fertility, and medium in organic-matter content. It is well drained and has moderate available moisture capacity.

About 30 percent of the acreage is cultivated, 50 percent is used as pasture, and 20 percent is used as woodland.

The land type is fairly well suited to Ladino clover, orchardgrass, fescue, lespedeza for hay, and legume-grass mixtures for pasture, but it is not well suited to cultivated crops, because of numerous rock fragments in the plow layer. Some corn is grown, nevertheless.

Flooding is a hazard. Maintaining a good stand of legumes and grasses helps to prevent scouring of streambanks during high water. Runoff is slow.

CAPABILITY UNIT IIIe-1

This unit consists of one sloping, well-drained, deep, medium-textured soil on colluvial slopes. This soil has an 8- to 16-inch surface layer of friable loam and a subsoil of loam to clay loam. The colluvial material is 18 inches to 4 feet thick.

This soil is acid, medium in fertility, and low or medium in organic-matter content. The available moisture capacity is high.

About 75 percent of the acreage is cultivated, 15 percent is used as pasture, and 10 percent is used as woodland.

This soil is well suited to corn, small grain, lespedeza, red clover, Ladino clover, orchardgrass, Kentucky 31 fescue, legume-grass pasture, cabbage, tomatoes, and peppers. A suitable cropping sequence is a row crop followed by a small grain and 2 years of a legume-grass mixture for hay.

Good tilth is easily maintained. There are no obstacles to the operation of equipment. Measures for controlling erosion include a suitable cropping system, stripcropping, and a system of diversions and sodded waterways.

CAPABILITY UNIT IIIe-2

This unit consists of deep, well-drained, medium-textured soils on moderately sloping terraces and colluvial fans. These soils have a 6- to 16-inch surface layer of friable loam and a subsoil of friable silt loam. The depth to bedrock or to an unconformable layer ranges from 30 to 90 inches.

These soils are medium acid, medium in fertility, and medium in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is high.

About 85 percent of the acreage is cultivated, and 15 percent is used as pasture.

The soils in this unit are suited to corn, small grain, alfalfa, lespedeza, white clover, Ladino clover, red clover, orchardgrass, fescue, and legume-grass mixtures for pasture. A suitable cropping sequence is a row crop followed by a small grain and 2 years of a legume-grass mixture. Close-growing crops should be grown 2 years out of 3 because of the moderate runoff.

Erosion is the main hazard. Good measures for controlling erosion are contour tillage, contour stripcropping, and sod waterways. Tilth is good. To maintain or improve tilth, crop residue or other organic matter must be incorporated into the soil.

CAPABILITY UNIT IIIe-3

This unit consists of moderately sloping, deep, well-drained, medium-textured soils on uplands, stream terraces, and colluvial slopes. This soil has a 5- to 12-inch surface layer of friable loam and a subsoil of friable to firm silty clay loam to clay. The depth to bedrock is generally more than 3½ feet.

These soils are medium acid or strongly acid, medium in fertility, and low or medium in organic-matter content. Permeability is moderate, and the available moisture capacity is high.

About 50 percent of the acreage is cultivated, 25 percent is used as pasture, and 25 percent is used as woodland.

The soils in this unit are suited to corn, small grain, Ladino clover, red clover, alfalfa, orchardgrass, fescue, tree fruits, cabbages, tomatoes, peppers, beans, and legume-grass mixtures for pasture. A suitable cropping sequence is a row crop followed by a small grain and 2 years of a legume-grass mixture. It is necessary to grow a close-growing crop 2 years out of 3 because of the severe erosion hazard.

Surface runoff is the main hazard if these soils are cultivated. Measures for controlling runoff are contour tillage, contour stripcropping, and diversion terrace systems that make use of grasses and legumes. Additions of organic matter, in the form of barn litter, plant residue, or green-manure crops, are necessary. Good tilth is easily maintained except where the plow layer is made up mainly of subsoil material. These moderately eroded areas can be cultivated within only a narrow range of moisture content. Mulching or using crop residue improves tilth.

CAPABILITY UNIT IIIe-4

This unit consists of well-drained, moderately sloping, moderately deep or deep soils on terraces and uplands. These soils have a 5- to 15-inch surface layer of friable fine sandy loam, loam, or silt loam and a subsoil of friable or firm sandy clay loam to clay. The depth to bedrock is at least 2 feet.

These soils are medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate, and the available moisture capacity is moderate or high.

About 50 percent of the acreage is cultivated, 30 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are well suited to corn, small grain, grain sorghum, orchardgrass, alfalfa, lespedeza, red clover, white clover, Ladino clover, fescue, legume-grass mixtures, and tree fruits. Several are suited to flue-cured tobacco. A suitable cropping sequence is a row crop followed by a small grain and 2 years of legume-grass hay. Close-growing crops should be grown 2 years out of 3 because of the severe erosion hazard. All the soils in this unit are suited to improved pasture.

Surface runoff is the main hazard in cultivated areas. Measures that help to control runoff include contour tillage, contour stripcropping, and diversion systems that make use of grasses and legumes. Tilth is easily maintained, except in eroded spots where the plow layer is made up mostly of subsoil material. The moisture range within which the eroded spots can be cultivated is narrow. Plant residue should be worked into the soil, where feasible, to improve fertility and to help protect the soils against erosion.

CAPABILITY UNIT IIIe-5

This unit consists of sloping, moderately deep or deep, well-drained soils on uplands and colluvial slopes. These soils have a 5- to 12-inch surface layer of friable fine sandy loam, loam, or silt loam and a subsoil of fine sandy clay loam. The depth to bedrock ranges from 25 inches to as much as 6 feet.

These soils are medium acid or strongly acid, low or medium in fertility, and low or medium in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate or high.

About 50 percent of the acreage is cultivated, 30 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are fairly well suited to corn, small grain, alfalfa, orchardgrass, Ladino clover, red clover, fescue, legume-grass mixtures for pasture, and lespedeza. The shallower soils are not well suited to alfalfa, but they are well suited to fruit trees and truck crops. Tobacco would do well on most soils in this unit. A suitable cropping sequence is a row crop followed by a small grain and 2 years of hay. Because of the erosion hazard it is necessary to grow close-growing crops for 2 years out of 3 or 4.

Erosion and rapid runoff are the main hazards. Measures for controlling runoff are contour tillage, stripcropping, and diversion terrace systems that make use of grass and legumes. Tilth is good, except in eroded spots where the plow layer is made up mostly of subsoil material. The range of moisture content within which these spots can be cultivated is narrow. Increasing the length of rotation increases the infiltration rate. Applying barn litter or crop residue increases the content of organic matter, which may become depleted even under good management. Grazing should be controlled where these soils are used as pasture.

CAPABILITY UNIT IIIw-1

This unit consists of one nearly level, medium-textured, somewhat poorly drained soil on bottom lands that are flooded frequently. This soil has a 10- to 16-inch surface layer of friable silt loam. The depth to bedrock is generally more than 5 feet.

This soil is medium acid or strongly acid, medium or high in fertility, and medium or high in organic-matter content. Permeability is moderate, and the available moisture capacity is high.

About 40 percent of the acreage is cultivated, 40 percent is used as pasture, and 20 percent is used as woodland.

This soil is well suited to pasture. If tile drains are installed to remove excess moisture, it is also well suited to crops, such as corn and legume-grass mixtures for hay. It is not suited to deep-rooted crops, such as alfalfa, because it has a high water table.

The main management needs are control of the water table, control of runoff from higher areas, and control of flooding. Drainage outlets may be difficult to obtain. Heavy farm machinery cannot be used during wet periods.

CAPABILITY UNIT IIIs-1

This unit consists of one complex of cobbly, gently sloping, well-drained soils on uplands. These soils have a 4- to 8-inch surface layer of friable, cobbly loam and a subsoil of friable silty clay loam or clay loam. The depth to bedrock is generally more than 5 feet.

These soils are medium acid, low or medium in fertility, and low or medium in organic-matter content. Permeability is moderate, and the available moisture capacity is moderate or high.

About 60 percent of the acreage is cultivated, 30 percent is used as pasture, and 10 percent is used as woodland.

If the cobblestones are removed, these soils are well suited to pasture plants and fairly well suited to hay crops, such as red clover, alfalfa, lespedeza, and orchardgrass. Row crops should not be grown more than 1 year in 3 or 4 years.

Tilth is fair, but the cobblestones make cultivation difficult. Plowing should be on the contour.

CAPABILITY UNIT IIIs-2

This unit consists of one nearly level, excessively drained soil that is flooded frequently. This soil has a 5- to 10-inch surface layer of loose, noncoherent sand to loamy fine sand. The depth to stream-deposited gravel and cobblestones is 40 to 100 inches. This soil is strongly acid, low in fertility, and low in organic-matter content. Permeability is rapid, and the available moisture capacity is low.

About 20 percent of the acreage is cultivated, 50 percent is used as pasture, and 30 percent is used as woodland.

This soil is fairly well suited to native pasture, and it can be made into fair improved pasture consisting of fescue and Ladino clover. Its suitability for most uses is limited.

Tilth is good, and the moisture range within which this soil can be cultivated is wide. Erosion is not ordinarily a hazard, but in some places measures are needed to prevent streambank cutting.

CAPABILITY UNIT IVe-1

This unit consists of deep, well-drained, medium-textured soils on moderately steep and steep terraces and uplands. These soils have a 4- to 12-inch surface layer of friable loam or silt loam and a subsoil of friable or firm silty clay loam to clay. They are medium acid or strongly acid, medium in fertility, and low to high in organic-matter content. Permeability is moderate, and the available moisture capacity is high.

About 30 percent of the acreage is cultivated, 50 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are well suited to close-growing crops, such as alfalfa, orchardgrass, red clover, Ladino clover, lespedeza, and fescue. Under good management, a row crop, such as corn, can be grown 1 year in 4 or 5 years. A suitable cropping sequence is a row crop followed by 3 or 4 years of a sod crop. Areas having slopes of more than 25 percent are not suitable for cultivation but may be used for permanent pasture.

Surface runoff is the main hazard in cultivated areas. Measures that help to minimize the effects of runoff are contour tillage, stripcropping, and sodding of waterways. Spot mulching may be needed in the more eroded areas. Tilth is easily maintained, except in eroded spots where the plow layer is made up mostly of subsoil material. The range of moisture content within which these spots can be cultivated is narrow. At least once during each 4- or 5-year cropping sequence, plant residue should be worked into the soil to maintain or improve the organic-matter content.

CAPABILITY UNIT IVe-2

This unit consists of moderately steep and steep, moderately deep and deep, well-drained soils on uplands. These soils have a 4- to 10-inch surface layer of friable fine sandy loam to silt loam and a subsoil of friable or firm sandy clay loam to clay. The depth to bedrock is generally more than 5 feet.

These soils are medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate, and the available moisture capacity is moderate or high.

About 30 percent of the acreage is cultivated, 50 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are suited to alfalfa, orchardgrass, fescue, red clover, Ladino clover, lespedeza, timothy, legume-grass mixtures, corn, and small grain. A suitable cropping sequence is a row crop followed by 3 or 4 years of sod crops. A row crop should be grown not more than 1 year in 4 or 5 years. Areas having slopes of more than 25 percent should not be cultivated. Pasture does well on all the soils.

Surface runoff is the main hazard in cultivated areas. Measures for helping to reduce runoff are contour tillage, stripcropping, sodding of waterways, and a cropping sequence that includes close-growing crops. The hazard of erosion is severe. Good tilth is easily maintained, except in spots where the plow layer is made up mostly of subsoil material. The range of moisture content within which these spots can be cultivated is narrow. Utilizing crop residue and the growing of sod crops are ways of furnishing organic matter, which is rapidly depleted in cultivated areas.

CAPABILITY UNIT IVe-3

This unit consists of moderately steep, well-drained soils on uplands and colluvial slopes. These soils have

a 6- to 16-inch surface layer of fine sandy loam to silt loam and a subsoil of fine sandy clay loam to silty clay loam. The depth to bedrock or to an unconformable layer ranges from 2 feet to more than 5 feet.

These soils are medium acid or strongly acid, low or medium in fertility, and low or medium in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate or high.

About 40 percent of the acreage is cultivated, 40 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are fairly well suited to corn, small grain, orchardgrass, Ladino clover, red clover, lespedeza, and legume-grass mixtures for pasture. All but the shallowest are suited to alfalfa. A suitable cropping sequence is a row crop followed by a small grain and 2 or more years of sod crops. It is necessary to plant close-growing crops for at least 3 years out of 4.

Moderately steep slopes and a severe erosion hazard limit the use of these soils. Tilth is good except in eroded spots. The range of moisture content under which these spots can be cultivated is narrow. The use of crop residue and sod crops increases the organic-matter content. Surface runoff is medium to rapid in cultivated areas. Measures for controlling runoff are contour tillage, stripcropping, sodding of waterways, and a rotation consisting mostly of close-growing crops. Rotation of grazing and clipping for control of weeds are necessary pasture management practices.

CAPABILITY UNIT IVe-4

This unit consists of medium-textured, moderately deep and deep, well-drained to excessively drained soils on moderately sloping uplands. These soils have a 2- to 13-inch surface layer of friable loam or silt loam. The depth to bedrock ranges from 2 feet to more than 5 feet.

These soils are medium acid or strongly acid, low in fertility, and low in organic-matter content. Permeability is moderately rapid, and the available moisture capacity is low or moderate.

About 20 percent of the acreage is cultivated, 30 percent is used as pasture, and 50 percent is used as woodland.

The soils in this unit are well suited to pasture and forest. Fairly well suited pasture plants are orchardgrass, fescue, lespedeza, and white clover. Yields of corn and small grain are fair under good management. Row crops should be grown not more than 1 year in 4 or 5 years. It is best to maintain a good legume-grass cover. Fair yields of hay or pasture can be obtained.

Erosion is a moderate to severe hazard in cultivated areas. Surface runoff is medium. If row crops are grown, intensive conservation measures are needed, including contour tillage, contour stripcropping, and sodding of waterways. Clipping and rotation of grazing improve pastures.

CAPABILITY UNIT IVe-5

This unit consists of well-drained, deep and moderately deep, medium-textured soils on uplands, terraces, and colluvial fans and slopes. These soils have a 4- to 8-inch surface layer of cobbly fine sandy loam, cobbly loam, stony loam, or channery silt loam and a subsoil of sandy clay loam to clay. Cobblestones or other stones 3 to 10 inches in diameter cover 10 to 20 percent of the surface. The depth to bedrock ranges from 18 inches to more than 5 feet.

These soils are medium acid or very strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate or low, depending on the number of cobblestones.

About 40 percent of the acreage is cultivated, 40 percent is used as pasture, and 20 percent is used as woodland.

The soils in this unit are well suited to hay or pasture crops, such as orchardgrass, fescue, Ladino clover, red clover, and white clover. They are better suited to close-growing crops than to row crops. If row crops are grown, control of runoff and erosion is necessary.

Erosion is the main hazard. Measures for controlling erosion are contour tillage, stripcropping, sodding of waterways, and long rotations. Clipping and control of grazing help to improve pastures. Cobblestones have to be removed from the surface before mowing equipment is used.

CAPABILITY UNIT IVw-1

This unit consists of wet, nearly level soils on first bottoms that are flooded frequently and receive seepage from higher areas. These soils have a surface layer of silt loam or loam and are generally more than 5 feet in depth to bedrock. They are medium acid or strongly acid and medium or high in organic-matter content. Surface runoff is slow, and internal drainage is slow or very slow because of a seasonally high water table.

About 10 percent of the acreage is cultivated, 50 percent is used as pasture, and 40 percent is used as woodland.

The soils in this unit are not well suited to crops that require frequent tillage, but if artificially drained (fig. 8), are fair for corn and pasture crops. Fescue and Ladino clover are fairly well suited as pasture plants.

Figure 8.—**Open-ditch drain in Hatboro silt loam, which is in unit IVw-1.**

Tilth is poor or fair, and the use of heavy tillage machinery is restricted by the wetness.

CAPABILITY UNIT Vw-1

This unit consists of one wet, gently sloping, medium-textured soil on first bottoms that are flooded and receive seepage from the hillsides. This soil has a 7- to 12-inch surface layer of friable loam and a subsoil of silty clay loam or silty clay. It is strongly acid, low or medium in fertility, and low or medium in organic-matter content. The water table fluctuates. It is at or near the surface in winter and early in spring. Surface runoff is slow, and internal drainage is slow or very slow.

About 10 percent of this soil is cultivated, and 90 percent is used as pasture.

This soil, suitable only for pasture, furnishes good pasture in summer, early in fall, and late in spring. Water-tolerant plants, such as Ladino clover and fescue, should be grown.

Diversion ditches and surface drains are needed.

CAPABILITY UNIT VIe-1

This unit consists of well-drained, moderately deep and deep, medium-textured soils on steep uplands. These soils have a 4- to 7-inch surface layer of fine sandy loam to silt loam and a subsoil of friable silty clay loam to firm clay. They are medium acid or strongly acid, medium in fertility, and low or medium in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate or high.

About 70 percent of the acreage is used as pasture, and 30 percent is used as woodland.

These soils are not suitable for cultivation, because they are steep, but they are suitable for improved legume-grass pasture. Well-suited pasture grasses and legumes are orchardgrass, fescue, Ladino clover, red clover, and lespedeza. Managed grazing is the best way to remove undesirable plants, because mowing the steep slopes is difficult.

CAPABILITY UNIT VIe-2

This unit consists of medium-textured, moderately deep and deep, excessively drained soils on moderately steep uplands. These soils have a 2- to 10-inch surface layer of friable sandy loam, loam, or silt loam. The depth to bedrock ranges from 20 inches to more than 10 feet.

These soils are medium acid to very strongly acid, low in fertility, and low in organic-matter content. Permeability is moderately rapid, and the available moisture capacity is low or moderate.

About 20 percent of the acreage is cultivated, 50 percent is used as pasture, and 30 percent is used as woodland.

The soils in this unit are fairly well suited to orchardgrass, fescue, Ladino clover, red clover, and lespedeza, or to mixtures of these crops. They are also suited to white pine.

Grazing has to be controlled so that a good ground cover remains for protection against erosion.

CAPABILITY UNIT VIe-3

This unit consists of well-drained cobbly, stony, or channery soils on moderately steep or steep uplands. These soils have a 4- to 6-inch surface layer of stony, cobbly, or channery fine sandy loam, loam, or silt loam. Cobblestones 3 to 10 inches in diameter cover 10 to 20 percent of the surface. The depth to hard rock ranges from 18 inches to more than 4 feet.

These soils are medium acid or strongly acid, medium or low in fertility, and medium or low in organic-matter content. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate or low, depending on the number of cobblestones.

About 18 percent of the acreage is cultivated, 45 percent is used as pasture, and 37 percent is used as woodland.

The soils in this unit are suited to pasture, fruit trees, and forest. Well-suited pasture plants are fescue, orchardgrass, Ladino clover, and lespedeza.

Grazing should be controlled. Surface runoff is rapid unless a thick cover of vegetation is maintained. The cobblestones have to be removed before the weeds can be clipped. Using machinery is difficult on the steeper slopes. Some of the soils are so shallow that trees are easily uprooted.

CAPABILITY UNIT VIs-1

This unit consists of sloping and moderately steep, well-drained soils that are shallow to bedrock and to stone lines. Most of these soils have a 5- to 8-inch surface layer of very stony loam or silt loam. Stones more than 10 inches in diameter cover about 5 percent of the surface.

These soils are medium acid or strongly acid, low or medium in fertility, and low or medium in organic-matter content. Permeability is moderately rapid, and the available moisture capacity is mostly low. Surface runoff is medium or rapid.

About 10 percent of the acreage is cultivated, 40 percent is used as pasture, and 50 percent is used as woodland.

These soils are well suited to forest, and are fair for pasture. They are not suited to cultivation, because of the stones and ledges. Native bluegrass and white clover make a good sod if limed and fertilized.

CAPABILITY UNIT VIIe-1

This unit consists of steep and very steep, shallow, moderately deep, and deep soils on uplands. These soils have a 4- to 10-inch surface layer of friable sandy loam, loam, or silt loam. The depth to hard rock ranges from 6 inches to more than 6 feet.

These soils are strongly acid, medium in fertility, and medium or low in organic-matter content.

About 40 percent of the acreage is used as pasture, and 60 percent is used as woodland.

These soils are not suitable for cultivation and are only fair for pasture. They are better suited to trees. If used for pasture, they should be grazed only in summer, and not continuously. A good ground cover is necessary for control of erosion. Applying fertilizer and lime is difficult but is beneficial.

CAPABILITY UNIT VIIs-1

This unit consists of land types and steep or very steep soils that contain many coarse fragments. There are so many coarse fragments on the surface that the use of machinery is not feasible. The depth to hard rock ranges from 6 to 23 inches.

These soils and land types are low or medium in fertility, low or medium in organic-matter content, and mostly strongly acid. They are permeable and are low or moderate in available moisture capacity. Surface runoff is rapid.

About 14 percent of the acreage is used as pasture, and 86 percent is used as woodland.

These soils and land types are not suited to cultivation and are only fairly well suited to pasture. They are better suited as woodland.

Estimated Yields

Table 2 gives estimates of the average yields of the principal crops that can be obtained on the soils of Carroll County. The level of management is considered to include the use of lime and fertilizer in the amounts currently recommended by the Virginia Agricultural Experiment Station, and also to include erosion control, drainage where needed, proper seedbed preparation, a suitable cropping system, use of crop residue, control of plant diseases, weeds, and insects, and, for pasture, regulation of grazing. The figures in this table are based on the observations of the soil survey party and on yields reported by some farmers and other agricultural workers in this county and nearby Virginia counties.

TABLE 2.—*Estimated average yields per acre of the principal crops under improved management*

[Dashes indicate that the crop is not commonly grown or that the soil is not suited to the crop]

Soil	Grain			Hay				Tobacco		Pasture		Fruit	
	Corn	Wheat	Oats	Lespedeza	Alfalfa	Red clover	Orchardgrass	Burley	Flue-cured	Orchardgrass, fescue, and clover	Bluegrass and clover	Apples	Peaches
	Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Bu.*	*Bu.*
Altavista silt loam, gently sloping	80	25	45	1.50		2.00	2.25			185	130		
Atkins loam										160			
Bolton loam, steep										135	95		
Braddock cobbly fine sandy loam, sloping	67									140	100		
Buncombe loamy fine sand				.75									
Cecil fine sandy loam, gently sloping	100	34	58	2.00	3.75	2.25	2.20		2,200	185	140	600	200
Cecil fine sandy loam, gently sloping, eroded	95	32	55	1.80	3.50	2.10	2.05		2,000	185	140	590	195
Cecil fine sandy loam, sloping	95	32	55	1.80	3.50	2.10	2.05		2,000	155	110	590	190
Cecil fine sandy loam, sloping, eroded	90	30	52	1.70	3.20	2.00	1.95		1,800	145	100	580	185
Chester-Glenelg cobbly loams, gently sloping	75	25	45		3.00	1.75	1.60			190	140		
Chester-Glenelg cobbly loams, sloping	70	23	42		2.85	1.65	1.50			180	105		
Chester-Glenelg cobbly loams, sloping, eroded	60	21	38		2.60	1.50	1.35			180	105		
Chester-Glenelg cobbly loams, steep										160	90		
Chester-Glenelg cobbly loams, steep, eroded										155	85		
Chester-Glenelg loams, gently sloping	100	35	60		3.75	2.25	2.30			210	155		
Chester-Glenelg loams, gently sloping, eroded	95	33	57		3.60	2.10	2.20			210	155		
Chester-Glenelg loams, sloping	95	33	57		3.60	2.10	2.20			200	145		
Chester-Glenelg loams, sloping, eroded	90	30	55		3.35	2.00	2.05			200	145		
Chester-Glenelg loams, steep	85	28	51		3.35	1.90	1.95			175	100		
Chester-Glenelg loams, steep, eroded	75	27	45		3.00	1.70	1.75			160	90		
Clymer fine sandy loam, sloping	65			1.30	3.00		1.70			195	150		
Clymer fine sandy loam, moderately steep	58			1.15	2.70		1.53			170	105		
Codorus silt loam	60						2.00			220	160		
Codorus-Hatboro silt loams										170			
Comus fine sandy loam	100			1.90			2.20			210	150		

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of the principal crops under improved management*—Continued

Soil	Grain			Hay				Tobacco		Pasture		Fruit	
	Corn	Wheat	Oats	Lespedeza	Alfalfa	Red clover	Orchardgrass	Burley	Flue-cured	Orchardgrass, fescue, and clover	Bluegrass and clover	Apples	Peaches
	Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Bu.*	*Bu.*
Corydon rocky soils, steep											90		
Edneyville fine sandy loam, sloping	70			1.40	3.00		1.75			150	100		
Elioak silt loam, sloping	85			1.50	3.60		2.25			190	140		
Elioak silt loam, sloping, eroded	75			1.35	3.30		2.00			180	120		
Elioak silt loam, moderately steep	70			1.30	3.30		2.00			180	120		
Elioak silt loam, moderately steep, eroded	60			1.25	3.00		1.75			160	95		
Fletcher loam, sloping	90			1.70	3.35	2.00	2.00		1,800	155	110		
Fletcher loam, moderately steep	80			1.64	3.10	1.90	1.90		1,600	145	100		
Gilpin silt loam, sloping	75	26	46		3.00	1.70	1.76			190	125		
Gilpin silt loam, sloping, eroded	71	25	44		2.90	1.60	1.66			170	115		
Gilpin silt loam, moderately steep	70	24	43		2.85	1.55	1.60			180	120		
Gravelly alluvial land													
Gullied land													
Hatboro silt loam										160			
Hatboro-Toxaway silt loams										160			
Hayesville cobbly loam, sloping	70	23	42		2.85	1.65	1.50			95	75		
Hayesville cobbly loam, moderately steep, eroded	52	19	32		2.50	1.30	1.20			70	45		
Hayesville loam, gently sloping	100	35	60		3.75	2.25	2.30			180	160		
Hayesville loam, gently sloping, eroded	95	33	57		3.60	2.10	2.20			170	150		
Hayesville loam, sloping	95	33	57		3.60	2.10	2.20			155	130		
Hayesville loam, sloping, eroded	90	30	55		3.35	2.00	2.05			150	125		
Hayesville loam, moderately steep	85	28	51		3.25	1.90	1.95			145	120		
Hayesville loam, moderately steep, eroded	75	26	45		3.00	1.70	1.75			140	110		
Hazel channery complex, steep											30		
Hazel channery complex, very steep											25		
Hazel complex, sloping		15	24			.90	1.00			90	60		
Hazel complex, steep										60	40		
Hiwassee and Turbeville loams, gently sloping	100	35	57	2.00	4.00	2.25	2.35			210	190	550	
Hiwassee and Turbeville loams, sloping	95	33	54	1.90	3.75	2.20	2.10			195	180		
Hiwassee and Turbeville loams, moderately steep	89	30	52	1.75	3.50	2.00	2.00			180	170		
Hiwassee and Turbeville cobbly fine sandy loams, sloping	85	32	53	1.90	3.40	2.00	1.90		1,900	190	175		
Hiwassee and Turbeville cobbly fine sandy loams, moderately steep										170	155		
Hiwassee and Turbeville fine sandy loams, sloping	90	34	55	2.00	3.60	2.40	2.00		2,000	185	170		
Louisa complex, steep											40	460	
Louisburg complex, moderately steep	50			1.20			1.30				40		
Louisburg complex, steep											40	460	
Madison cobbly fine sandy loam, sloping	72	24	42	1.50	2.85	1.60	1.35		1,600	190	100	550	
Madison cobbly fine sandy loam, sloping, eroded	69	23	40	1.40	2.60	1.50	1.30		1,525	135	95	540	
Madison cobbly fine sandy loam, moderately steep	67	22	39	1.35	2.50	1.47	1.28		1,500	130	80	540	
Madison cobbly fine sandy loam, moderately steep, eroded	64	21	37	1.30	2.35	1.40	1.22		1,400	125	75	530	

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of the principal crops under improved management*—Continued

Soil	Grain			Hay				Tobacco		Pasture		Fruit	
	Corn	Wheat	Oats	Lespedeza	Alfalfa	Red clover	Orchardgrass	Burley	Flue-cured	Orchardgrass, fescue, and clover	Bluegrass and clover	Apples	Peaches
	Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Bu.*	*Bu.*
Madison cobbly fine sandy loam, steep											60	515	
Madison fine sandy loam, gently sloping	95	32	55	1. 90	3. 50	2. 10	2. 10		2, 100	185	120	575	195
Madison fine sandy loam, gently sloping, eroded	90	30	52	1. 70	3. 40	2. 00	1. 95		1, 900	180	110	560	190
Madison fine sandy loam, sloping	90	30	52	1. 70	3. 40	2. 00	1. 95		1, 900	155	100	560	185
Madison fine sandy loam, sloping, eroded	85	28	50	1. 60	3. 15	1. 90	1. 85		1, 700	150	95	550	180
Madison fine sandy loam, moderately steep	85	28	50	1. 60	3. 15	1. 90	1. 85			145	100	550	170
Madison fine sandy loam, moderately steep, eroded	80	26	48	1. 50	3. 00	1. 80	1. 75			140	90	535	160
Madison fine sandy loam, steep											45	530	
Madison fine sandy loam, steep, eroded											40	510	
Manor loam, sloping		17	27			1. 00	1. 10			100	70		
Manor loam, moderately steep		14	25			. 85	1. 00			70	40		
Manor loam, steep											30		
Manor loam, very steep											30		
Manor very stony loam, sloping											40		
Manor very stony loam, steep											30		
Manor very stony loam, very steep											30		
Myersville loam, gently sloping	100	35	62		4. 00	2. 35	2. 50			185	135		
Myersville loam, sloping	95	33	60		3. 75	2. 25	2. 40			175	125		
Myersville loam, sloping, eroded	90	30	57		3. 50	2. 10	2. 25			170	120		
Myersville loam, steep	80	29	55		3. 40	2. 00	2. 10			120	95		
Myersville loam, steep, eroded	80	26	50		3. 20	1. 80	1. 90			110	90		
Myersville loam, thin solum, sloping	72	26	45		3. 00	1. 70	1. 80			165	120		
Myersville loam, thin solum, steep										100	90		
Myersville stony loam, thin solum, sloping										155	110		
Myersville stony loam, thin solum, steep										100	90		
Porters loam, sloping	72	26	45		3. 00	1. 70	1. 80			195	125	650	
Porters loam, moderately steep	67	22	41		2. 70	1. 50	1. 53			170	115	625	
Porters loam, steep										100	100	615	
Porters loam, very steep											90	580	
Rabun silt loam, sloping	95	35	60		3. 75	2. 25	2. 40			175	110		
Rabun silt loam, moderately steep	90	33	57		3. 55	2. 15	2. 30			150	95		
Rabun silt loam, moderately steep, eroded	81	30	52		3. 40	1. 95	2. 07			130	95		
Rabun silt loam, steep										120	90		
Ramsey very stony loam, steep													
Ramsey very stony loam, very steep													
Rock land, gneiss and schist													
Rock land, limestone													
Rock land, quartzite													
Shelocta cobbly fine sandy loam, moderately steep										130	95		
Shelocta fine sandy loam, gently sloping	70			1. 50	3. 25		1. 90			210	125		
Shelocta fine sandy loam, sloping	65			1. 30	3. 00		1. 70			195	110		

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of the principal crops under improved management*—Continued

Soil	Grain			Hay				Tobacco		Pasture		Fruit	
	Corn	Wheat	Oats	Lespedeza	Alfalfa	Red clover	Orchardgrass	Burley	Flue-cured	Orchardgrass, fescue, and clover	Bluegrass and clover	Apples	Peaches
	Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Bu.*	*Bu.*
Shelocta fine sandy loam, moderately steep	58			1. 15	2. 75		1. 53			170	100		
Starr loam, gently sloping	110	30	50		4. 00	2. 30	2. 50	2, 600		220	190		
Starr loam, sloping	105	29	48		3. 85	2. 20	2. 40	2, 550		200	180		
State fine sandy loam, nearly level	110				4. 00	2. 30	2. 50			210	170		
State fine sandy loam, gently sloping	105				3. 85	2. 20	2. 40			210	160		
Stony colluvial land													
Stony land, Porters materials, sloping											90	600	
Stony land, Porters materials, steep											85	570	
Stony land, Porters materials, very steep											70	560	
Talladega soils, sloping		14	25			. 85	1. 00			105	85		
Talladega soils, moderately steep										90	80		
Talladega soils, steep										70	70		
Toxaway silt loam, thick surface										180			
Tusquitee cobbly loam, sloping	70	23	42		2. 60	1. 65	1. 50			100	120		
Tusquitee loam, gently sloping	100	33	55		4. 00	2. 30	2. 50	2, 600		200	190		
Tusquitee loam, sloping	95	31	52		3. 80	2. 20	2. 40	2, 600		190	180		
Tusquitee loam, moderately steep	85	28	47		3. 50	2. 00	2. 20	2, 400		175	170		
Tusquitee very stony loam, sloping											120		
Tusquitee very stony loam, moderately steep											100		
Watauga cobbly silt loam, sloping	60	20	39		2. 60	1. 52	1. 50			140	95		
Watauga cobbly silt loam, moderately steep	55	18	35		2. 40	1. 50	1. 45			125	85		
Watauga cobbly silt loam, steep										95	70		
Watauga silt loam, sloping	75	26	46		3. 00	1. 70	1. 76			160	110		
Watauga silt loam, moderately steep	69	24	43		2. 80	1. 65	1. 60			130	95		
Watauga silt loam, steep										110	80		
Weikert channery silt loam, sloping				1. 00			1. 25			120	80		
Weikert channery silt loam, moderately steep				1. 00			1. 25			100	70		
Weikert channery silt loam, steep										90	60		
Weikert very shaly silt loam, moderately steep											50		
Weikert very shaly silt loam, steep											40		
Weikert very shaly silt loam, very steep											40		
Wickham loam, gently sloping	100	30	60		4. 00	2. 50	2. 25			220	195		
Wickham loam, sloping	95	25	55	1. 75	3. 85	2. 50	2. 00			210	195		
Wickham fine sandy loam, gently sloping	90	30	55	2. 00	3. 50	2. 25	2. 00		2, 000	220	190	600	200
Wickham fine sandy loam, sloping	85	25	53	1. 90	3. 20	2. 00	1. 90		1, 900	210	180	590	190
Wickham fine sandy loam, sloping, eroded	75	25	45	1. 50	3. 00	1. 00	1. 90		1, 700	200	170	575	180
Worsham loam, gently sloping	55									160			

[1] The number of days in 1 year that 1 acre will support 1 animal unit (1 cow, 1 horse, 1 steer, 5 hogs, 7 sheep, or 7 goats) without injury to the pasture.

Woodland Uses of the Soils [1]

In the Blue Ridge Mountain section of Carroll County, the original forest consisted of stands of chestnut, oak, yellow-poplar, hickory, black walnut, black locust, red maple, and dogwood. In some small areas the dominant species were hemlock, white pine, shortleaf pine, pitch pine, and Virginia pine. Chestnut trees originally made up as much as 75 percent of the forest in places, but they were destroyed by the chestnut blight in the early twenties and have been replaced by chestnut oak, red oak, scarlet oak, black oak, yellow-poplar, and hickory.

In the Piedmont section of the county, the original forest consisted of oak, yellow-poplar, maple, hickory, blackgum, black locust, dogwood, black walnut, shortleaf pine, and Virginia pine. There were a few pure stands of pine.

On the bottom lands of the county, the original forest consisted of ash, oak, yellow-poplar, maple, black walnut, sycamore, river birch, elm, and sweetgum.

Most of the original forest had been cut over before 1920. Effective fire control and other management practices are now in use, and the annual growth exceeds the annual timber cut.

Woodland suitability groups

The soils in Carroll County have been placed in 15 woodland suitability groups. All the soils in one group have about the same potential for production of wood crops, and all are limited to about the same degree by the hazards of seedling mortality, plant competition, equipment limitation, erosion, and windthrow. Potential productivity and the degrees of limitation are discussed in the descriptions of the individual groups.

Potential productivity is expressed in terms of site index. Site index is the height, in feet, that trees of a specified kind can be expected to reach in 50 years on a specified soil. It depends largely on the capacity of the soil to furnish moisture and growing space for roots. The ranges in site index given in the descriptions of woodland suitability groups are estimates and should be used only as general guides in judging the suitability of the soils for use as woodland.

Seedling mortality refers to the expected loss of seedlings as a result of unfavorable characteristics of the soil. A mortality rating of *slight* indicates that a loss of not more than 25 percent of the seedlings planted is expected, or that trees ordinarily regenerate naturally in places where there are adequate sources of seed. A rating of *moderate* indicates that a loss of 25 to 50 percent of the seedlings planted is expected, or that trees do not ordinarily regenerate naturally in numbers needed for adequate restocking. In some places replanting to fill open spaces will be necessary. A rating of *severe* indicates that a loss of more than 50 percent of the stock planted is expected, or that trees do not ordinarily regenerate naturally.

Plant competition refers to the competition from undesirable trees and shrubs that invade the site and hinder the establishment and growth of desirable trees after the woodland has been disturbed by cutting or fire. Competition is *slight* if undesirable species are no special problem. It is *moderate* if the invaders do not prevent but only delay the natural regeneration of desirable plants and if simple methods will prevent undesirable trees from invading. Competition is *severe* if trees cannot regenerate naturally. If seedlings are planted, undesirable plants must be controlled by carefully preparing the site and using intensive woodland management.

Equipment limitation refers to the limitation on the use of ordinary equipment caused by unfavorable soil characteristics or topography. Some of the unfavorable characteristics that limit the use of equipment are poor drainage, stones, rocks, and steep slopes. The limitation is *slight* if there is no special problem in use of equipment. It is *moderate* if not all types of equipment can be used at all times, if the periods when equipment cannot be used are not longer than 3 months, and if the use of equipment damages the roots of trees to some extent. It is *severe* if many types of equipment cannot be used, if the periods when wetness or a high water table restricts the use of equipment are longer than 3 months, or if the use of equipment seriously damages the roots of trees and the structure and stability of the soil.

Erosion hazard refers to the potential hazard of erosion where accepted woodland management practices are followed. Such practices would include regulated rotational harvest cuttings and careful construction and maintenance of logging roads and trails. The erosion hazard is *slight* if no special erosion-control practices are needed. It is *moderate* if a longer cutting rotation and better road construction are needed for control of erosion. The hazard is *severe* if the use of heavy equipment must be restricted and harvest-cutting restrictions must be imposed.

Windthrow hazard is related to soil characteristics that affect the development of tree roots, and the firmness with which the roots anchor the tree in the soil. Knowing the degree of this hazard is important when choosing trees for planting and when planning harvest cuttings. The windthrow hazard is *slight* if the roots hold the tree firmly against a normal wind and individual trees are likely to remain standing even if protective trees on all sides are removed. The hazard is *moderate* if the trees are not subject to windthrow except when the soil is excessively wet or the wind velocity is very high. It is *severe* if root development is not deep enough to give adequate stability and individual trees are likely to be blown over if they are released on all sides.

WOODLAND SUITABILITY GROUP 1

The one soil in this woodland group is a deep loamy sand that is flooded frequently. This soil is excessively drained and has low available moisture capacity. The slope range is 0 to 2 percent, except in narrow bands and on escarpments, where the slope is as much as 15 percent.

The estimated site indexes for the principal species are as follows: Loblolly pine, 85 to 90; yellow-poplar, 85 to 100; shortleaf pine, 60 to 70; oaks, 65 to 75. The species to favor in natural woodlots are loblolly pine, yellow-poplar, black walnut, and shortleaf pine. The

[1] L. W. KEMPF, woodland conservationist, Soil Conservation Service, helped to prepare this section.

species preferred for planting are loblolly pine, yellow-poplar, and black walnut.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is slight. Equipment limitations are slight. The hazard of erosion is slight. Windthrow is only a slight hazard, for development of roots is not restricted.

WOODLAND SUITABILITY GROUP 2

This group consists of deep, medium-textured to fine-textured soils along streams and medium-textured soils at the base of steep slopes and in depressions. The soils along streams are occasionally flooded during extremely high water. The available moisture capacity is high. The slope range is 0 to 15 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 85 to 100; loblolly pine, 85 to 95; white pine, 80 to 90; oaks, 75 to 85; shortleaf pine, 60 to 70; Virginia pine, 60 to 70. The species to favor in natural woodlots are loblolly pine, yellow-poplar, oaks, shortleaf pine, and Virginia pine. The species preferred for planting are loblolly pine, yellow-poplar, and shortleaf pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is slight. Equipment limitations are slight; equipment can be used the year round. The hazard of erosion is slight because the topography is nearly level. Windthrow is only a slight hazard, since the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 3

This group consists of deep, moderately well drained to poorly drained soils that are flooded frequently. The surface layer is silt loam, and the subsoil is silt loam to silty clay loam. The available moisture capacity is high. The slope range is 0 to 2 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 85 to 100; loblolly pine, 85 to 95; oaks, 75 to 85; shortleaf pine, 70 to 75; Virginia pine, 70 to 75. The species to favor in natural woodlots are loblolly pine, yellow-poplar, red oak, white oak, shortleaf pine, and Virginia pine. The species preferred for planting are loblolly pine, yellow-poplar, shortleaf pine, or Virginia pine.

Seedling mortality is slight, since the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is severe. Equipment limitations are moderate or severe, because of wetness. The erosion hazard is only slight because the topography is nearly level. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 4

This group consists of poorly and very poorly drained soils, some on bottom lands that are flooded frequently, and some along or at the head of small drainageways. The surface layer is loam or silt loam, and the mottled, slowly permeable subsoil is silt loam, clay loam, silty clay loam, or silty clay. The available moisture capacity is high. The slope range is 0 to 7 percent.

The estimated site indexes for the principal species are as follows: White pine, 80 to 90; loblolly pine, 75 to 85; oaks, 55 or less. The species to favor in natural woodlots are loblolly pine, white pine, and oaks. The species preferred for planting are loblolly pine and white pine.

Seedling mortality is moderate. Plant competition is severe. Equipment limitations are severe because of wetness. The hazard of erosion is slight, because the topography is nearly level or gently sloping. Windthrow is a slight or moderate hazard, for a high water table restricts the development of roots.

WOODLAND SUITABILITY GROUP 5

This group consists of excessively drained, shallow, stony soils on uplands. The surface is loam to sandy loam. The available moisture capacity is low. The slope range is 7 to more than 45 percent.

The estimated site indexes for the principal species are as follows: White pine, 80 to 90; loblolly pine, 75 to 85; shortleaf pine, 60 to 70; Virginia pine, 60 to 70; oaks, 55 to 65. The species to favor in natural woodlots are white pine (fig. 9), loblolly pine, shortleaf pine, Virginia pine, red oak, and white oak. The species preferred for planting are white pine, loblolly pine, Virginia pine, and shortleaf pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is slight. Equipment limitations are moderate or severe, depending on the slope. The hazard of erosion is moderate because of the moderate to steep slopes. Windthrow is a slight or moderate hazard because the soils are shallow and stony.

WOODLAND SUITABILITY GROUP 6

This group consists of well-drained, dark-red soils on uplands and brown to dark-red soils on stream terraces and colluvial slopes. The surface layer is loam or silt loam, and the subsoil is sandy clay loam to clay. The available moisture capacity is high. The slope range is 2 to more than 45 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 95 to 105; white pine, 90

Figure 9.—White pine on Manor loam. The stand is 7 years old.

to 100; loblolly pine, 75 to 85; red oak and white oak, 75 to 85; shortleaf pine, 70 to 80; Virginia pine, 70 to 80. The species to favor in natural woodlots are white pine, Virginia pine, shortleaf pine, red oak, white oak, and yellow-poplar. The species preferred for planting are yellow-poplar, white pine, shortleaf pine, loblolly pine, and Virginia pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is slight. Equipment limitations are moderate or severe, depending upon the slope. The hazard of erosion is slight or moderate. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 7

This group consists of deep, well-drained soils of the Piedmont Plateau and Blue Ridge Mountains. The surface layer is fine sandy loam, silt loam, or loam, and the subsoil is fine sandy clay loam to clay. The available moisture capacity is moderate or high. The slope range is 2 to 45 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 85 to 100; white pine, 80 to 90; loblolly pine, 75 to 85; oaks, 65 to 75; Virginia pine, 70 to 75; shortleaf pine, 60 to 70. The species to favor in natural woodlots are yellow-poplar, loblolly pine, white pine, oaks, shortleaf pine, and Virginia pine. The species preferred for planting are loblolly pine, yellow-poplar, shortleaf pine, Virginia pine, and, for some of the soils, white pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is slight. Equipment limitations are slight or moderate, depending upon the slope. The hazard of erosion is slight or moderate, depending upon the slope. Windthrow is a slight hazard.

WOODLAND SUITABILITY GROUP 8

This group consists of very shallow and shallow, medium-textured, droughty soils on uplands. The fertility is low, and the available moisture capacity is low or moderate. The slope range is 7 to more than 15 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 70 to 85; white pine, 70 to 80; Virginia pine, 60 to 70; oaks, 55 to 65; shortleaf pine, 50 to 60. The species to favor in natural woodlots are white pine, yellow-poplar, Virginia pine, shortleaf pine, and oaks. The species preferred for planting are white pine, yellow-poplar, Virginia pine, and shortleaf pine.

Seedling mortality is moderate, as the soils are droughty. Plant competition is moderate. Equipment limitations are moderate or severe because of the slopes. The hazard of erosion is slight. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 9

This group consists of shallow to moderately deep soils on uplands. The surface layer is dark grayish-brown to yellowish-brown loam or silt loam, and the subsoil is brown to yellowish-red heavy loam to clay loam. The available moisture capacity is low or moderate. The slope range is 7 to more than 45 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 85 to 100; white pine, 80 to 90; oaks, 65 to 75; Virginia pine, 60 to 70; shortleaf pine, 50 to 60. The species to favor in natural woodlots are white pine, yellow-poplar, oaks, and shortleaf pine. The species preferred for planting are white pine and Virginia pine.

Seedling mortality is moderate, as internal drainage of these soils is rapid and the moisture supply is somewhat limited. Plant competition is moderate. Equipment limitations are moderate or severe because of the slopes. The hazard of erosion is slight. Windthrow is a slight hazard.

WOODLAND SUITABILITY GROUP 10

This group consists of moderately well drained soils on terraces. The surface layer of these soils is brown silt loam, and the subsoil is yellowish-brown clay loam. The available moisture capacity is moderate. The slope range is 2 to 7 percent.

The estimated site indexes for the principal species are as follows: Loblolly pine, 75 to 85; yellow-poplar, 70 to 85; white pine, 70 to 80; oaks, 65 to 75; Virginia pine, 60 to 70; shortleaf pine, 60 to 70. The species to favor in natural woodlots are white pine, Virginia pine, shortleaf pine, oaks, and yellow-poplar. The species preferred for planting is loblolly pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is moderate or slight. Equipment limitations are moderate because of wetness. The hazard of erosion is slight. Windthrow is a slight hazard.

WOODLAND SUITABILITY GROUP 11

This group consists of land types that are severely gullied or very rocky. The available moisture capacity is low. The slope is 2 to more than 25 percent.

The estimated site indexes for the principal species are as follows: White pine, 40 to 70; loblolly pine, 40 to 60; Virginia pine, 40 to 60; shortleaf pine, 40 to 60; oaks, 55 or less. In natural woodlots, the trees present should be encouraged, regardless of species. Most of the trees will never reach commercial size. The species preferred for planting, which is done only for control of erosion, are Virginia pine, loblolly pine, or white pine.

Seedling mortality is moderate or severe. Plant competition is slight. Equipment limitations are severe because of gullies, slopes, rockiness, and soil conditions. The hazard of erosion is moderate or severe, depending on the slope or the degree of gullying. Windthrow is a severe hazard because the development of roots is restricted.

WOODLAND SUITABILITY GROUP 12

The one soil in this group is moderately deep, well drained, and rocky. It is on uplands. The surface layer is brown to reddish-brown silt loam to silty clay loam, and the subsoil is reddish-brown silty clay loam to clay. The available moisture capacity is moderate. The slope range is 15 to 45 percent.

The estimated site indexes for the principal species are as follows: White pine, 70 to 80; yellow-poplar, 70 or less; Virginia pine, 50 to 60; shortleaf pine, 50 to 60; oaks, 55 to 65. The species to favor in natural woodlots are white pine and Virginia pine. The species preferred for planting is white pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for survival and growth of seedlings. Plant competition is moderate. Equipment limitation is moderate because of the slopes. The hazard of erosion is moderate. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 13

The one soil in this group is deep and well drained. It is on uplands. The surface layer is brown to dark-brown loam, and the subsoil is reddish-brown fine sandy clay loam to clay loam. The available moisture capacity is high. The slope range is 15 to 45 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 85 to 100; oaks, 65 to 75; Virginia pine, 60 to 70; shortleaf pine, 60 to 70. The species to favor in natural woodlots are yellow-poplar, red oak, white oak, Virginia pine, and shortleaf pine. The species preferred for planting are white pine and Virginia pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for the survival and growth of seedlings. Plant competition is moderate. Equipment limitations are moderate, depending on the slope. The hazard of erosion is moderate because of the slope and the physical properties of the soil. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 14

This group consists of moderately deep to deep, well-drained soils. The surface layer is dark grayish-brown to grayish-brown fine sandy loam, and the subsoil is olive-brown to yellowish-brown fine sandy clay loam or clay loam. The available moisture capacity is high. The slope range is 7 to 25 percent.

The estimated site indexes for the principal species are as follows: Yellow-poplar, 70 to 85; white pine, 70 to 80; red oak and white oak, 65 to 75; Virginia pine, 60 to 70; shortleaf pine, 50 to 60. The species to favor in natural woodlots are white pine, yellow-poplar, red oak, white oak, and Virginia pine. The species preferred for planting are white pine and Virginia pine.

Seedling mortality is slight, as the supply of moisture normally is adequate for the survival and growth of seedlings. Plant competition is moderate. Equipment limitations are slight or moderate, depending on the slope. The hazard of erosion is slight. Windthrow is only a slight hazard, for the development of roots is not restricted.

WOODLAND SUITABILITY GROUP 15

This group consists of shallow soils on uplands. The surface layer is gray to dark-brown very shaly silt loam. The subsoil is thin. The available moisture capacity is low. The slope range is 15 to 45 percent.

The estimated site indexes for the principal species are as follows: Virginia pine, 60 to 70; white pine, 70 or less; shortleaf pine, 50 to 60; oaks, 50 or less. The species to favor in natural woodlots are Virginia pine and white pine. The species preferred for planting is Virginia pine.

Seedling mortality is moderate, because of droughtiness. Plant competition is moderate. Equipment limitations are slight or moderate, depending on the slope. The hazard of erosion is moderate because of the slope. Windthrow is a moderate hazard, for the development of roots is restricted.

Soil Interpretations for Wildlife Habitat

The wildlife population of any area depends upon the availability of food, cover, and water in a suitable combination (*1*).[2] Habitats are created, improved, or maintained by establishing desirable vegetation and developing water supplies in suitable places.

In table 3 each of the soils in Carroll County is rated as to its suitability for the elements of wildlife habitat and also for three classes of wildlife. These ratings refer only to the suitability of the soil and do not take into account the climate, the present use of the soil, or the distribution of wildlife and human populations. The suitability of individual sites has to be determined by on-site inspection.

The meanings of the numerical ratings used in table 3 are as follows: 1, *well suited*; 2, *suited*; 3, *poorly suited;* and 4, *unsuited. Well suited* means that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected. *Suited* means that habitats can be created, improved or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention may be required for satisfactory results. *Poorly suited* indicates that habitats can be created, improved, or maintained in most places; that the soil has rather severe limitations; that habitat management is difficult and expensive and requires intensive effort; and that results are not always satisfactory. *Unsuited* indicates that it is impractical or impossible to create, improve, or maintain habitats and that unsatisfactory results are probable.

The column heading "Grain and seed crops" refers to grain-producing or seed-producing annual plants, such as corn, sorghum, wheat, oats, millet, buckwheat, soybean, and sunflower.

"Grasses and legumes" refers to domestic perennial grasses and herbaceous legumes that have been established by planting and that furnish food and cover for wildlife. The grasses include fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, and panicgrass. The legumes include alfalfa and clover and other trefoils.

"Wild herbaceous upland plants" refers to native or introduced perennial grasses and forbs, or weeds, that provide food and cover for upland wildlife. These plants include bluestem, indiangrass, wild ryegrass, oatgrass, pokeweed, strawberry, lespedeza, beggarweed, wildbean, nightshade, goldenrod, and dandelion.

[2] Italic numbers in parentheses refer to Literature Cited, p. 108.

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

[1=well suited, 2=suited, 3=poorly suited, 4=unsuited. See text for further explanation of ratings]

Soil	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Altavista silt loam, gently sloping	2	2	2	1	2	4	2	3	2	1	3
Atkins loam	3	2	2	1	2	2	3	4	2	1	3
Bolton loam, steep	4	3	1	1	3	4	4	4	3	1	4
Braddock cobbly fine sandy loam, sloping	2	2	2	1	2	4	3	4	2	1	4
Buncombe loamy fine sand	3	3	3	3	1	4	4	4	3	3	4
Cecil fine sandy loam, gently sloping	1	1	1	1	1	4	3	4	1	1	4
Cecil fine sandy loam, gently sloping, eroded	1	1	1	1	1	4	3	4	1	1	4
Cecil fine sandy loam, sloping	1	1	1	1	1	4	3	4	1	1	4
Cecil fine sandy loam, sloping, eroded	1	1	1	1	1	4	3	4	1	1	4
Chester-Glenelg cobbly loams, gently sloping	2	1	1	1	3	4	4	4	1	1	4
Chester-Glenelg cobbly loams, sloping	2	1	1	1	3	4	4	4	1	1	4
Chester-Glenelg cobbly loams, sloping, eroded	3	2	1	1	3	4	4	4	2	1	4
Chester-Glenelg cobbly loams, steep	4	3	1	1	3	4	4	4	3	1	4
Chester-Glenelg cobbly loams, steep, eroded	4	4	1	1	3	4	4	4	3	2	4
Chester-Glenelg loams, gently sloping	2	1	1	1	3	4	4	4	1	1	4
Chester-Glenelg loams, gently sloping, eroded	2	2	1	1	3	4	4	4	1	1	4
Chester-Glenelg loams, sloping	2	1	1	1	3	4	4	4	1	1	4
Chester-Glenelg loams, sloping, eroded	3	2	1	1	3	4	4	4	2	1	4
Chester-Glenelg loams, steep	4	3	1	1	3	4	4	4	3	1	4
Chester-Glenelg loams, steep, eroded	4	4	1	1	3	4	4	4	3	2	4
Clymer fine sandy loam, sloping	2	2	2	2	2	4	4	4	2	2	4
Clymer fine sandy loam, moderately steep	3	2	2	2	2	4	4	4	2	2	4
Codorus silt loam	2	1	1	1	3	3	3	3	1	1	3
Codorus-Hatboro silt loams	4	3	3	1	1	1	4	4	3	1	3
Comus fine sandy loam	2	1	1	1	3	4	4	4	1	1	4
Corydon rocky soils, steep	4	3	1	1	3	4	4	4	3	1	4
Edneyville fine sandy loam, sloping	2	1	1	1	3	4	4	4	1	1	4
Elioak silt loam, sloping	1	1	1	1	1	4	3	4	1	1	4
Elioak silt loam, sloping, eroded	1	1	1	1	1	4	3	4	1	1	4
Elioak silt loam, moderately steep	2	2	2	1	2	4	4	4	2	1	4
Elioak silt loam, moderately steep, eroded	4	3	3	2	2	4	4	4	3	2	4
Fletcher loam, sloping	2	1	1	1	3	4	4	4	1	1	4
Fletcher loam, moderately steep	4	3	1	1	3	4	4	4	3	1	4
Gilpin silt loam, sloping	2	1	1	1	3	4	4	4	1	1	4
Gilpin silt loam, sloping, eroded	3	2	1	1	3	4	4	4	2	1	4
Gilpin silt loam, moderately steep	3	2	1	1	3	4	4	4	2	1	4
Gravelly alluvial land	2	2	2	2	2	2	1	4	2	2	2
Gullied land	4	3	3	3	3	4	4	4	4	3	4
Hatboro silt loam	4	3	3	1	1	1	4	4	3	1	2
Hatboro-Toxaway silt loams	4	3	3	1	1	1	4	4	3	1	3
Hayesville cobbly loam, sloping	3	2	1	1	3	4	4	4	2	1	4

TABLE 3.—*Suitability for elements of wildlife habitats and kinds of wildlife*—Continued

Soil	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Hayesville cobbly loam, moderately steep, eroded	4	3	1	1	3	4	4	4	3	1	4
Hayesville loam, gently sloping	1	1	1	1	3	4	4	4	1	1	4
Hayesville loam, gently sloping, eroded	2	2	1	1	3	4	4	4	1	1	4
Hayesville loam, sloping	2	1	1	1	3	4	4	4	1	1	4
Hayesville loam, sloping, eroded	3	2	1	1	3	4	4	4	2	1	4
Hayesville loam, moderately steep	4	3	1	1	3	4	4	4	3	1	4
Hayesville loam, moderately steep, eroded	4	4	1	1	3	4	4	4	3	2	4
Hazel channery complex, steep	3	3	3	2	3	4	4	4	3	2	4
Hazel channery complex, very steep	4	3	3	3	2	4	4	4	4	3	4
Hazel complex, sloping	3	3	3	3	2	4	3	4	3	3	4
Hazel complex, steep	4	3	3	2	3	4	4	4	3	2	4
Hiwassee and Turbeville loams, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Hiwassee and Turbeville loams, sloping	1	1	1	1	3	4	3	4	1	1	4
Hiwassee and Turbeville loams, moderately steep	2	2	2	1	3	4	4	4	2	1	4
Hiwassee and Turbeville cobbly fine sandy loams, sloping	1	1	1	1	2	4	2	4	1	1	3
Hiwassee and Turbeville cobbly fine sandy loams, moderately steep	2	3	2	2	3	4	3	4	2	2	4
Hiwassee and Turbeville fine sandy loams, sloping	1	1	1	1	3	4	3	4	1	1	4
Louisa complex, steep	4	3	3	2	3	4	4	4	3	2	4
Louisburg complex, moderately steep	3	3	3	2	2	4	3	4	3	2	4
Louisburg complex, steep	4	3	3	2	3	4	4	4	3	2	4
Madison cobbly fine sandy loam, sloping	2	3	3	2	3	4	3	4	3	2	4
Madison cobbly fine sandy loam, sloping, eroded	2	3	3	2	3	4	3	4	3	2	4
Madison cobbly fine sandy loam, moderately steep	3	3	3	2	3	4	4	4	3	2	4
Madison cobbly fine sandy loam, moderately steep, eroded	3	3	3	2	3	4	4	4	3	2	4
Madison cobbly fine sandy loam, steep	4	3	3	2	3	4	4	4	3	2	4
Madison fine sandy loam, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Madison fine sandy loam, gently sloping, eroded	1	1	1	1	3	4	3	4	1	1	4
Madison fine sandy loam, sloping	1	1	1	1	3	4	3	4	1	1	4
Madison fine sandy loam, eroded	1	1	1	1	3	4	3	4	1	1	4
Madison fine sandy loam, moderately steep	2	2	2	1	2	4	4	4	2	1	4
Madison fine sandy loam, moderately steep, eroded	2	2	2	1	2	4	4	4	2	1	4
Madison fine sandy loam, steep	4	3	3	2	3	4	4	4	3	2	4
Madison fine sandy loam, steep, eroded	4	3	3	2	3	4	4	4	3	2	4
Manor loam, sloping	2	2	2	2	2	4	4	4	2	2	4
Manor loam, moderately steep	3	2	2	2	2	4	4	4	2	2	4
Manor loam, steep	4	3	2	2	2	4	4	4	3	2	4
Manor loam, very steep	4	4	2	2	2	4	4	4	3	2	4

TABLE 3.—*Suitability for elements of wildlife habitats and kinds of wildlife*—Continued

Soil	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Manor very stony loam, sloping	3	3	3	3	1	4	4	4	3	2	4
Manor very stony loam, steep	4	3	3	3	1	4	4	4	4	2	4
Manor very stony loam, very steep	4	4	3	3	1	4	4	4	4	3	4
Myersville loam, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Myersville loam, sloping	1	1	1	1	3	4	3	4	1	1	4
Myersville loam, sloping, eroded	1	1	1	1	3	4	3	4	1	1	4
Myersville loam, steep	2	2	1	1	2	4	4	4	1	1	4
Myersville loam, steep, eroded	3	3	2	1	2	4	4	4	3	1	4
Myersville loam, thin solum, sloping	2	2	2	2	3	4	3	4	2	2	4
Myersville loam, thin solum, steep	2	2	2	2	3	4	3	4	2	2	4
Myersville stony loam, thin solum, sloping	1	1	1	1	3	4	3	4	1	1	4
Myersville stony loam, thin solum, steep	4	3	2	3	1	4	4	4	3	2	4
Porters loam, sloping	2	2	1	2	3	4	3	4	1	2	4
Porters loam, moderately steep	2	2	1	2	3	4	3	4	1	2	4
Porters loam, steep	3	3	2	2	2	4	4	4	3	2	4
Porters loam, very steep	4	3	2	2	2	4	4	4	3	2	4
Rabun silt loam, sloping	1	1	1	1	3	4	3	4	1	1	4
Rabun silt loam, moderately steep	2	2	1	1	2	4	4	4	1	1	4
Rabun silt loam, moderately steep, eroded	2	2	1	1	2	4	4	4	1	1	4
Rabun silt loam, steep	4	3	2	2	2	4	4	4	3	2	4
Ramsey very stony loam, steep	4	3	3	3	1	4	4	4	4	2	4
Ramsey very stony loam, very steep	4	3	3	3	1	4	4	4	4	2	4
Rock land, gneiss and schist	4	3	3	3	1	4	4	4	4	2	4
Rock land, limestone	4	3	3	3	1	4	4	4	4	2	4
Rock land, quartzite	4	3	3	3	1	4	4	4	4	2	4
Shelocta cobbly fine sandy loam, moderately steep	2	2	1	1	3	4	4	4	1	1	4
Shelocta fine sandy loam, gently sloping	1	1	1	1	3	4	2	4	1	1	3
Shelocta fine sandy loam, sloping	1	1	1	1	3	4	2	4	1	1	3
Shelocta fine sandy loam, moderately steep	1	1	1	1	3	4	2	4	1	1	3
Starr loam, gently sloping	1	1	1	1	3	4	4	4	1	1	4
Starr loam, sloping	1	1	1	1	3	4	4	4	1	1	4
State fine sandy loam, nearly level	1	1	1	1	3	4	4	4	1	1	4
State fine sandy loam, gently sloping	1	1	1	1	3	4	4	4	1	1	4
Stony colluvial land	4	3	3	3	1	4	4	4	4	2	4
Stony land, Porters materials, sloping	1	1	1	1	3	4	3	4	1	1	4
Stony land, Porters materials, steep	4	3	3	3	1	4	4	4	4	2	4
Stony land, Porters materials, very steep	4	4	3	3	1	4	4	4	4	3	4
Talladega soils, sloping	3	3	3	3	1	4	3	4	3	2	4
Talladega soils, moderately steep	4	3	2	2	2	4	4	4	3	2	4
Talladega soils, steep	4	3	2	2	2	4	4	4	3	2	4
Toxaway silt loam, thick surface	2	1	1	1	3	3	3	3	1	1	3
Tusquitee cobbly loam, sloping	2	2	1	1	2	4	4	4	1	1	4
Tusquitee loam, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Tusquitee loam, sloping	1	1	1	1	3	4	3	4	1	1	4

TABLE 3.—*Suitability for elements of wildlife habitats and kinds of wildlife*—Continued

Soil	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Tusquitee loam, moderately steep	2	2	1	1	2	4	4	4	1	1	4
Tusquitee very stony loam, sloping	1	1	1	1	1	4	2	4	1	1	3
Tusquitee very stony loam, moderately steep	2	2	1	1	2	4	4	4	1	1	4
Watauga cobbly silt loam, sloping	3	2	1	1	3	4	4	4	2	1	4
Watauga cobbly silt loam, moderately steep	4	3	1	1	3	4	4	4	3	1	4
Watauga cobbly silt loam, steep	4	4	1	1	3	4	4	4	3	2	4
Watauga silt loam, sloping	2	1	1	1	3	4	4	4	1	1	4
Watauga silt loam, moderately steep	3	2	1	1	3	4	4	4	2	1	4
Watauga silt loam, steep	4	3	1	1	3	4	4	4	3	1	4
Weikert channery silt loam, sloping	3	3	2	2	2	4	4	4	3	2	4
Weikert channery silt loam, moderately steep	3	3	2	2	2	4	4	4	3	2	4
Weikert channery silt loam, steep	4	3	2	2	2	4	4	4	3	2	4
Weikert very shaly silt loam, moderately steep	4	3	3	3	1	4	4	4	4	2	4
Weikert very shaly silt loam, steep	4	4	3	3	1	4	4	4	4	3	4
Weikert very shaly silt loam, very steep	4	4	3	3	1	4	4	4	4	3	4
Wickham loam, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Wickham loam, sloping	1	1	1	1	3	4	3	4	1	1	4
Wickham fine sandy loam, gently sloping	1	1	1	1	3	4	3	4	1	1	4
Wickham fine sandy loam, sloping	1	1	1	1	3	4	3	4	1	1	4
Wickham fine sandy loam, sloping, eroded	1	1	1	1	3	4	3	4	1	1	4
Worsham loam, gently sloping	3	2	2	1	2	3	4	4	2	1	4

"Hardwood woody plants" refers to nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife. These plants commonly have become established through natural processes but may have been planted. They include oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, honeysuckle, blueberry, greenbrier and other briers, autumn-olive, and multiflora rose.

"Coniferous woody plants" are cone-bearing trees and shrubs that are used mainly as cover but may furnish food in the form of browse, seeds, or fruitlike cones. These plants commonly become established through natural processes but may be planted. They include spruce, pine, white-cedar, hemlock, balsam fir, redcedar, juniper, and yew.

"Wetland food and cover plants" are annual and perennial wild herbaceous plants that grow on moist to wet sites; they do not include submerged or floating aquatics. These plants furnish food or cover mostly for wetland wildlife. They include smartweed, wild millet, spikerush and other rushes, sedges, burreed, wildrice, rice cutgrass, and cattails.

"Shallow water developments" are impoundments or excavations for controlling water and generally are not more than 6 feet deep. Control structures include low dikes and levees, shallow dugouts, level ditches, and devices for controlling the water level in marshy drainageways or channels.

"Excavated ponds" are dugout areas or combinations of dugout areas and low-dike impoundments. To be suitable for fish, they require an ample supply of water. They include ponds that are built on nearly level land, that have a surface area of at least one-fourth of an acre, that average 6 feet in depth over at least one-fourth of their acreage, and that have a dependable source of water of suitable quality.

"Openland wildlife" are quail, pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, woodchuck, and other birds and mammals that normally live

on cropland, pasture, meadow, and lawn and in other openland areas where grasses, herbs, and shrubby plants grow.

"Woodland wildlife" are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray squirrel, red squirrel, gray fox, white-tailed deer, raccoon, wild turkey, and other birds and mammals that normally live in wooded areas where hardwood trees and shrubs and coniferous trees and shrubs grow.

"Wetland wildlife" are duck, goose, rail, heron, shore birds, mink, muskrat, beaver, and other birds and mammals that normally live in wet areas, such as ponds, marshes, and swamps.

Engineering Uses of the Soils

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water-storage facilities, erosion-control structures, drainage systems, and sewage disposal systems.

Information in this report can be used by engineers to—

1. Make soil and land-use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate possible sources of stone, gravel, and other construction materials.
5. Correlate the performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Altavista (AlB)	1½ to 2½	5+	0 to 9		85 to 100	80 to 100	65 to 100	Silt loam	ML
			9 to 37		85 to 100	80 to 100	55 to 85	Clay loam	CL
			37 to 43	20	70 to 80	70 to 75	25 to 35	Sandy loam and cobblestones.	SC, SM
Atkins (At)	0	2½ to 5	0 to 8		85 to 100	80 to 100	50 to 80	Loam	ML
			8 to 20		85 to 100	80 to 100	20 to 55	Fine sandy clay loam.	SC, CL
			20 to 26		95 to 100	85 to 100	75 to 90	Silty clay loam.	ML, CL
			26 to 31		85 to 100	80 to 100	35 to 60	Fine sandy clay.	SC, CL
Bolton (BoE)	4+	5+	0 to 9		85 to 100	80 to 100	65 to 80	Loam	ML
			9 to 21		85 to 100	80 to 100	55 to 85	Fine sandy clay loam.	ML, CL
			21 to 48		85 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			48 to 58		85 to 100	80 to 100	70 to 90	Silty clay loam.	ML, CL
Braddock (BrC)	4+	5+	0 to 11	20	70 to 80	70 to 80	25 to 40	Cobbly fine sandy loam.	SM
			11 to 19	5	75 to 90	75 to 90	25 to 55	Sandy clay loam.	SC, CL
			19 to 27	5	75 to 90	75 to 90	55 to 80	Clay loam	CL
			27 to 36	75	15 to 25	15 to 25	15 to 25	Very cobbly clay loam.	ML, CL

See footnote at end of table.

It is not intended that this report will eliminate the need for on-site sampling and testing of sites in preparation for design and construction of specific engineering works and uses. The report should be used only in planning more detailed field surveys to determine the condition of the soil, in place, at the site of the proposed construction.

Engineering classification systems

The two systems for classification of soils that are in general use among engineers are the American Association of State Highway Officials (AASHO) system (*5*) and the Unified system (*10*).

In the AASHO system, soil materials are classified in seven groups, ranging from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clayey soils that have low bearing capacity when wet. The relative engineering value of the soils within each group can be indicated by a group index number, which ranges from 0 for the best materials to 20 for the poorest. The group index number, if it has been determined, is shown in parentheses after the soil-group symbol, thus: A–4(1).

In the Unified system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), and highly organic (one class).

Estimated engineering properties

Table 4 provides estimates of soil properties significant in engineering, including permeability, shrink-swell potential, and corrosion potential.

The column headed "Permeability" refers to the quality that enables a soil to transmit water and air. In table 4, the rates are expressed in inches per hour, which can be expressed verbally as follows:

Inches per hour	
Less than 0.2	Slow.
0.20 to 0.63	Moderately slow.
0.63 to 2.0	Moderate.
2.0 to 6.3	Moderately rapid.
More than 6.3	Rapid.

Maximum dry density is the highest density obtained when a soil is compacted at the optimum moisture content. If soil material is compacted at successively higher content of moisture, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Moisture-density data are important in earthwork, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

engineering properties

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A–4	2.0 to 6.3	0.12	5.1 to 5.5			Low		
A–6	0.63 to 2.0	.13	5.1 to 5.5	15 to 20	95 to 105	Moderate	High	Moderate.
A–2	0.63 to 2.0	.11	5.1 to 5.5	14 to 18	100 to 110	Moderate	Moderate	Moderate.
A–4	0.63 to 2.0	.18	5.1 to 5.5			Low		
A–2, A–6	0.63 to 2.0	.15	5.1 to 5.5	20 to 25	95 to 105	Moderate	High	Moderate.
A–6, A–7	0.20 to 0.63	.15	4.5 to 5.0	10 to 15	110 to 115	Moderate	High	High.
A–6, A–7	0.20 to 0.63	.12	4.5 to 5.0			Moderate	High	High.
A–4	0.63 to 2.0	.18	5.1 to 5.5			Low		
A–6	0.63 to 2.0	.18	5.1 to 5.5	12 to 15	120 to 125	Moderate	Moderate	Moderate.
A–6, A–7	0.63 to 2.0	.18	4.5 to 5.0	12 to 15	118 to 122	Moderate	Moderate	High.
A–6, A–7	0.63 to 2.0	.18	4.5 to 5.0	15 to 20	110 to 115	Moderate	Moderate	High.
A–2, A–4	2.0 to 6.3	.11	5.1 to 5.5	22 to 28	95 to 105	Low		
A–2, A–6	0.63 to 2.0	.14	5.1 to 5.5	20 to 25	95 to 100	Low	Moderate	Moderate.
A–6, A–7	0.63 to 2.0	.14	5.1 to 5.5	20 to 25	95 to 100	Moderate	Moderate	Moderate.
A–7	0.63 to 2.0	.13	4.5 to 5.0	20 to 25	90 to 100	Moderate	Moderate	High.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Buncombe (Bu)	3+	5+	0 to 5		90 to 100	90 to 100	10 to 20	Loamy fine sand.	SP–SM, SM.
			5 to 54		90 to 100	90 to 100	0 to 10	Loamy fine sand.	SP, SP–SM.
Cecil (CeB, CeB2, CeC, CeC2).	4+	5+	0 to 8	3	80 to 100	80 to 100	35 to 55	Fine sandy loam.	SM, ML.
			8 to 32		90 to 100	90 to 100	60 to 80	Clay	MH, CH.
			32 to 48		85 to 100	80 to 100	45 to 60	Fine sandy clay loam.	ML, SC.
			48 to 58		85 to 100	80 to 100	50 to 60	Weathered quartz mica schist.	ML
Chester:									
Cobbly loams (CgB, CgC, CgC2, CgE, CgE2).	4+	5+	0 to 7	15 to 25	60 to 75	60 to 75	45 to 75	Cobbly loam.	ML
(For Glenelg part of these units, see Glenelg series.)			7 to 25		85 to 100	85 to 100	40 to 80	Silty clay loam.	ML, SC.
			25 to 30		85 to 100	80 to 100	50 to 80	Loam	ML
			30 to 60		85 to 100	85 to 100	35 to 65	Weathered quartz mica schist.	SM, ML.
Loams (ChB, ChB2, ChC, ChC2, ChE, ChE2).	4+	5+	0 to 7		85 to 100	80 to 100	50 to 80	Loam	ML
			7 to 26		85 to 100	85 to 100	40 to 80	Silty clay loam.	ML, SC.
(For Glenelg part of these units, see Glenelg series.)			26 to 31		85 to 100	80 to 100	50 to 80	Loam	ML
			35 to 58		85 to 100	85 to 100	35 to 65	Weathered mica schist.	SM, ML.
Clymer (ClC, ClD)	4+	3½ to 5	0 to 8		85 to 100	65 to 90	25 to 55	Fine sandy loam.	SM, ML.
			8 to 24		85 to 95	80 to 90	35 to 55	Fine sandy clay loam.	SC, CL.
			24 to 35		50 to 75	50 to 75	25 to 40	Light fine sandy clay loam.	SC
			35 to 52					Weathered sandstone conglomerate material.	
Codorus (Co, Cs)	0 to 1	5+	0 to 14		85 to 100	80 to 100	65 to 90	Silt loam	ML or CL.
			14 to 30		85 to 100	80 to 100	65 to 100	Silt loam	ML or CL.
(For Hatboro part of the Cs unit, see Hatboro series.)			30 to 36		85 to 100	80 to 100	25 to 40	Stratified sandy material.	SM
Comus (Cu)	3+	5+	0 to 10		85 to 100	80 to 100	30 to 60	Fine sandy loam.	SM, ML.
			10 to 33	3	85 to 95	80 to 95	40 to 60	Fine sandy loam.	SM, ML.
			33 to 50	25	65 to 75	60 to 70	10 to 20	Stratified sand and gravel.	SM

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-2	>6.3	0.07	5.1 to 5.5	10 to 15	100 to 110	Low		
A-3	>6.3	.07	5.1 to 5.5	10 to 15	105 to 115	Low	Very low	Low.
A-4	>6.3	.13	5.1 to 5.5			Low		
A-7	0.63 to 2.0	.14	5.1 to 5.5	22 to 28	95 to 105	High	High	Moderate.
A-6, A-7	0.63 to 2.0	.14	5.1 to 5.5	20 to 25	95 to 100	Moderate	Moderate	Moderate.
A-5	0.63 to 2.0	.13	4.5 to 5.0	20 to 25	95 to 105	Moderate	Moderate	High.
A-4	0.63 to 2.0	.11	5.6 to 6.0	13 to 19	100 to 110	Low		
A-6, A-7	0.63 to 2.0	.15	5.6 to 6.0	13 to 19	105 to 117	Moderate	Moderate	Moderate.
A-4	0.63 to 2.0	.15	5.1 to 5.5	13 to 19	105 to 117	Low	Low	Moderate.
A-4, A-5	0.63 to 2.0	.12	5.1 to 5.5	13 to 19	101 to 111	Low	Low	Moderate.
A-4	0.63 to 2.0	.18	5.6 to 6.0	13 to 19	100 to 110	Low		
A-6, A-7	0.63 to 2.0	.16	5.6 to 6.0	13 to 19	105 to 117	Moderate	Moderate	Moderate.
A-4	0.63 to 2.0	.16	5.1 to 5.5	13 to 19	105 to 117	Low	Low	Moderate.
A-4, A-5	0.63 to 2.0	.12	5.1 to 5.5	13 to 19	101 to 111	Low	Low	Moderate.
A-2, A-4	2.0 to 6.3	.13	5.6 to 6.0	10 to 15	105 to 110	Low		
A-4, A-6	2.0 to 6.3	.14	5.1 to 5.5	10 to 15	105 to 115	Low	Moderate	Moderate.
A-2, A-6	2.0 to 6.3	.14	5.1 to 5.5	10 to 15	105 to 115	Low	Moderate	Moderate.
	2.0 to 6.3	.12	5.1 to 5.5			Low	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.17	5.1 to 5.5	22 to 28	90 to 100	Low		
A-4, A-6	0.63 to 2.0	.19	5.1 to 5.5	22 to 28	90 to 100	Low	Moderate	Moderate.
A-2, A-4	0.63 to 2.0	.15	4.5 to 5.0			Low	Moderate	High.
A-2, A-4	0.63 to 2.0	.15	5.6 to 6.0	14 to 20	105 to 115	Low		
A-4	0.63 to 2.0	.15	5.6 to 6.0	14 to 20	105 to 115	Low	Low	Moderate.
A-2	0.63 to 2.0	.10	5.1 to 5.5	12 to 16	105 to 115	Low	Low	Moderate.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Corydon (CyE)	4+	1 to 2	0 to 6	----------	85 to 100	80 to 100	80 to 90	Silty clay loam.	CL, MH
			6 to 13	----------	85 to 100	80 to 100	80 to 100	Silty clay	CH, MH
			13 to 20	----------	85 to 100	80 to 100	80 to 100	Silty clay loam.	CH, MH
Edneyville (EdC)	4+	3 to 6	0 to 8	----------	85 to 100	80 to 100	25 to 55	Fine sandy loam.	SM, ML
			8 to 12	----------	85 to 100	80 to 100	25 to 60	Fine sandy loam.	SM, ML
			12 to 30	----------	85 to 100	80 to 100	35 to 55	Sandy clay loam.	SC, CL
			30 to 39	----------	85 to 100	80 to 100	25 to 55	Weathered granitic material.	SC, CL
Elioak (EkC, EkC2, EkD, EkD2).	4+	5+	0 to 10	----------	85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			10 to 24	----------	85 to 100	80 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			24 to 32	----------	85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			32 to 41	----------	85 to 100	80 to 100	----------	Weathered mica schist.	----------
Fletcher (FcC, FcD)	4+	2½ to 5	0 to 7	----------	85 to 100	80 to 100	50 to 80	Loam	ML
			7 to 26	----------	85 to 100	80 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			26 to 31	----------	85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			31 to 42	----------	85 to 100	80 to 100	60 to 80	Weathered schist.	ML
Gilpin (GnC, GnC2, GnD).	4+	2½ to 5	0 to 8	----------	85 to 100	80 to 90	60 to 85	Silt loam	ML, CL
			8 to 24	----------	45 to 90	35 to 95	35 to 70	Silty clay loam.	CL, GC
			24 to 31	----------	40 to 70	35 to 65	15 to 60	Silt loam	ML, CL, GM.
			31 to 52	----------	----------	----------	----------	Weathered phyllite and schist.	----------
Glenelg:									
Cobbly loams	4+	5+	0 to 7	15 to 25	60 to 75	60 to 75	45 to 75	Cobbly loam.	ML
			7 to 30	----------	85 to 100	85 to 100	40 to 80	Silty clay loam.	CL, SC
			30 to 40	----------	90 to 100	90 to 100	55 to 75	Silt loam	CL, ML
			40 to 50	----------	85 to 100	85 to 100	50 to 60	Weathered mica schist.	ML
Loams	4+	5+	0 to 7	----------	85 to 100	85 to 100	50 to 60	Loam	ML
			7 to 32	----------	85 to 100	85 to 100	40 to 80	Silty clay loam.	SC
			32 to 40	----------	90 to 100	90 to 100	90 to 100	Silt loam	CL, ML
			40 to 49	----------	85 to 100	80 to 100	50 to 60	Micaceous loamy material.	ML

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-6, A-7	0. 63 to 2. 0	. 12	6. 6 to 7. 3	20 to 25	90 to 100	Moderate		
A-7	0. 20 to 0. 63	. 12	6. 1 to 6. 5	25 to 30	90 to 95	Moderate	High	Low.
A-6, A-7	0. 20 to 0. 63	. 12	6. 1 to 6. 5	25 to 30	90 to 95	Moderate	Moderate	Low.
A-2, A-4	2. 0 to 6. 3	. 16	5. 1 to 5. 5	10 to 15	105 to 115	Low		
A-2, A-4	2. 0 to 6. 3	. 16	5. 1 to 5. 5	10 to 15	105 to 115	Low	Low	Moderate.
A-6	2. 0 to 6. 3	. 17	5. 1 to 5. 5	15 to 20	110 to 115	Moderate	Moderate	Moderate.
A-2, A-6			4. 5 to 5. 0	10 to 15	115 to 120		Moderate	High.
A-4, A-6	2. 0 to 6. 3	. 15	5. 1 to 5. 5	15 to 20	100 to 110	Low		
A-6, A-7	0. 63 to 2. 0	. 16	5. 1 to 5. 5	20 to 25	95 to 105	Moderate	Moderate	Moderate.
A-4, A-6	0. 63 to 2. 0	. 15	4. 5 to 5. 0	20 to 25	95 to 105	Low	Low	High.
			4. 5 to 5. 0	18 to 24	100 to 110	Low	Low	High.
A-4	2. 0 to 6. 3	. 17	5. 1 to 5. 5	15 to 20	100 to 110	Low		
A-6, A-7	0. 63 to 2. 0	. 17	5. 1 to 5. 5	20 to 25	95 to 105	Moderate	Moderate	Moderate.
A-4, A-6	0. 63 to 2. 0	. 15	4. 5 to 5. 0	20 to 25	95 to 105	Low	Low	High.
A-4, A-5, A-6	0. 63 to 2. 0	. 13	4. 5 to 5. 0	15 to 20	100 to 110	Low	Low	High.
A-4, A-6	0. 63 to 2. 0	. 18	5. 1 to 5. 5			Low		
A-6, A-7	0. 63 to 2. 0	. 15	5. 1 to 5. 5	10 to 15	113 to 118	Moderate	Moderate	Moderate.
A-2, A-4, A-6	0. 63 to 2. 0	. 17	4. 5 to 5. 0	11 to 14	107 to 120	Moderate	Moderate	High.
			4. 5 to 5. 0				Moderate	High.
A-4	0. 63 to 2. 0	. 11	5. 1 to 5. 5	13 to 19	100 to 110	Low		
A-6, A-7	0. 63 to 2. 0	. 15	5. 1 to 5. 5	13 to 19	105 to 117	Moderate	Moderate	Moderate.
A-4, A-6	0. 63 to 2. 0	. 15	4. 5 to 5. 0			Low	Low	High.
A-4	0. 63 to 2. 0	. 12	4. 5 to 5. 0			Low	Low	High.
A-4	0. 63 to 2. 0	. 18	5. 1 to 5. 5	13 to 19	100 to 110	Low		
A-6, A-7	0. 63 to 2. 0	. 16	5. 1 to 5. 5	13 to 19	105 to 117	Moderate	Moderate	Moderate.
A-4, A-6	0. 63 to 2. 0	. 16	4. 5 to 5. 0			Low	Low	High.
A-4	0. 63 to 2. 0	. 12	4. 5 to 5. 0			Low	Low	High.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Gravelly alluvial land (Gr).	3+	3 to 4	0 to 10	10 to 20	70 to 80	65 to 80	40 to 50	Gravelly fine sandy loam.	SM, ML
			10 to 30	10 to 20	65 to 80	65 to 80	30 to 45	Gravelly fine sandy loam.	SM, ML
			30 to 50	10 to 30	50 to 70	50 to 70	10 to 20	Gravelly loamy sand.	GM, SM
Gullied land (Gu) (No estimates of engineering properties.)									
Hatboro (Ha, Hb) (For Toxaway part of the Hb unit, see Toxaway series.)	0 to 1	5+	0 to 5	----------	90 to 100	90 to 100	65 to 100	Silt loam	ML, CL
			5 to 48	----------	90 to 100	90 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			48 to 70	----------	85 to 100	80 to 100	35 to 60	Fine sandy loam.	SM, ML
Hayesville:									
Cobbly loam (HcC, HcD2).	4+	5+	0 to 6	20	65 to 80	80 to 100	50 to 80	Cobbly loam.	ML, CL
			6 to 22	----------	90 to 100	85 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			22 to 36	----------	90 to 100	85 to 100	65 to 100	Silt loam	ML, CL
			36 to 75	----------	90 to 100	85 to 100	----------	Weathered quartz mica schist.	----------
Loam (HeB, HeB2, HeC, HeC2, HeD, HeD2).	4+	5+	0 to 6	----------	85 to 100	80 to 100	50 to 80	Loam	ML
			6 to 28	----------	90 to 100	85 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			28 to 41	----------	90 to 100	85 to 100	65 to 100	Silt loam	ML, CL
			41 to 86	----------	90 to 100	85 to 100	----------	Weathered quartz mica schist.	----------
Hazel:									
Channery complex (HmE, HmF).	4+	1½ to 2	0 to 10	20	----------	----------	----------	Channery silt loam.	----------
			10 to 23	20	----------	----------	----------	Channery silt loam.	----------
			23	----------	----------	----------	----------	Phyllite rock.	----------
Complex (HnC, HnE)	4+	1½ to 2	0 to 11	----------	80 to 90	70 to 90	60 to 90	Silt loam	ML, CL
			11 to 25	----------	45 to 65	40 to 60	40 to 60	Silt loam	GM, ML
			25	----------	----------	----------	----------	Phyllite rock.	----------
Hiwassee:									
Loams and fine sandy loams (HtB, HtC, HtD, HvC). (For Turbeville part of these units, see Turbeville series.)	4+	5+	0 to 9	----------	85 to 100	80 to 100	50 to 80	Loam	ML
			9 to 16	----------	80 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			16 to 26	----------	85 to 100	80 to 100	70 to 100	Clay	CH, MH
			26 to 34	----------	85 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			34 to 40	60	35 to 40	35 to 40	25 to 40	Clay loam	ML

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-4	0.63 to 2.0	.10	5.1 to 5.5	15 to 20	110 to 120	Low		
A-2, A-4	0.63 to 2.0	.10	5.1 to 5.5	15 to 20	110 to 120	Low	Low	Moderate.
A-2, A-4	0.63 to 2.0	.08	4.5 to 5.0	10 to 18	110 to 120	Low	Low	High.
A-4, A-6	0.63 to 2.0	.15	5.1 to 5.5	20 to 25	95 to 105	Low		
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	20 to 25	95 to 105	Moderate	High	Moderate.
A-4	0.63 to 2.0	.13	4.5 to 5.0			Low	High	High.
A-4, A-6	2.0 to 6.3	.15	5.1 to 5.5	22 to 28	95 to 105	Low		
A-6, A-7	0.63 to 2.0	.17	5.1 to 5.5	20 to 25	95 to 100	Moderate	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.17	5.1 to 5.5	20 to 25	95 to 100	Low	Low	Moderate.
	0.63 to 2.0	.15	4.5 to 5.0	20 to 25	90 to 100	Low	Low	High.
A-4	2.0 to 6.3	.16	5.1 to 5.5	22 to 28	95 to 105	Low		
A-6, A-7	0.63 to 2.0	.17	5.1 to 5.5	20 to 25	95 to 100	Moderate	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.17	5.1 to 5.5	20 to 25	95 to 100	Moderate	Low	Moderate.
	0.63 to 2.0	.15	4.5 to 5.0	20 to 25	90 to 100	Low	Low	High.
	2.0 to 6.3	.15	5.1 to 5.5	12 to 16	95 to 105	Low		
	2.0 to 6.3	.15	5.1 to 5.5	12 to 14	95 to 105	Low	Low	Moderate.
A-4, A-6	2.0 to 6.3	.15	5.1 to 5.5	12 to 16	95 to 105	Low		
A-4	2.0 to 6.3	.15	5.1 to 5.5	12 to 14	95 to 105	Low	Low	Moderate.
A-4	2.0 to 6.3	.14	5.6 to 6.0			Low		
A-6, A-7	0.63 to 2.0	.15	5.6 to 6.0	20 to 25	100 to 105	Moderate	Moderate	Moderate.
A-7	0.63 to 2.0	.15	5.1 to 5.5	25 to 35	90 to 100	High	High	Moderate.
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	15 to 20	100 to 110	Moderate	Moderate	Moderate.
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	15 to 20	100 to 110	Moderate	Moderate	Moderate.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Hiwassee—Continued									
Cobbly fine sandy loam (HuC, HuD).	4+	5+	0 to 9	20	70 to 80	60 to 70	50 to 70	Cobbly loam.	ML, CL
(For Turbeville part of these units, see Turbeville series.)			9 to 15	5	85 to 95	80 to 90	55 to 85	Clay loam	CL, CH
			15 to 32	5	85 to 95	80 to 90	70 to 85	Clay	CH, MH
			32 to 48	5	85 to 95	80 to 90	55 to 85	Clay loam	CL, CH
Louisa (LcE)	4+	1½ to 5	0 to 8		85 to 90	80 to 90	50 to 80	Loam	ML
			8 to 20		55 to 70	45 to 60	40 to 55	Loam	ML, SM
			20 to 25					Weathered quartz mica schist.	
Louisburg (LoD, LoE)	4+	2 to 3	0 to 9		85 to 100	80 to 100	25 to 45	Sandy loam	SM, SC
			9 to 23	25	60 to 75	50 to 65	20 to 35	Weathered granite.	SM, SC
Madison:									
Cobbly fine sandy loam (MaC, MaC2, MaD, MaD2, MaE).	4+	3 to 5	0 to 6	20	70 to 80	70 to 80	25 to 60	Cobbly fine sandy loam.	SM, ML
			7 to 18		85 to 100	80 to 100	35 to 55	Fine sandy clay loam.	SC, CL
			18 to 28		90 to 100	90 to 100	70 to 100	Clay	CH, MH
			28 to 33		85 to 100	80 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			33 to 70		90 to 100	90 to 100		Weathered mica gneiss.	
Fine sandy loam (MdB, MdB2, MdC, MdC2, MdD, MdD2, MdE, MdE2).	4+	3 to 5	0 to 7		80 to 100	80 to 100	25 to 60	Fine sandy loam.	SM, ML
			7 to 19		85 to 100	80 to 100	20 to 55	Silt loam	SC, CL
			19 to 29		85 to 100	80 to 100	70 to 100	Clay	CH, MH
			29 to 34		85 to 100	80 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			34 to 95		85 to 100	80 to 100	70 to 90	Weathered mica gneiss.	CL, MH, CH.
Manor:									
Loam (MnC, MnD, MnE, MnF).	4+	2 to 5+	0 to 8		85 to 100	80 to 100	50 to 80	Loam	ML
			8 to 17		85 to 100	80 to 100	50 to 80	Loam	ML
			17 to 82		55 to 85	45 to 85	35 to 45	Weathered gneiss.	SM
Very stony loam (MoC, MoE, MoF).	4+	2 to 5+	0 to 8	15	70 to 85	70 to 85	50 to 80	Very stony loam.	ML, CL
			8 to 17		85 to 100	80 to 100	50 to 80	Micaceous loam.	ML, CL
			17 to 82		55 to 85	45 to 85	35 to 45	Weathered gneiss.	SM
Myersville:									
Loam (MrB, MrC, MrC2, MrE, MrE2).	4+	3 to 5	0 to 7		85 to 100	80 to 100	50 to 80	Loam	ML
			7 to 47		75 to 100	75 to 100	75 to 100	Silty clay loam.	CL, CH
			47 to 74					Weathered hornblende gneiss.	

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-4, A-6	2.0 to 6.3	.14	5.6 to 6.0			Low		
A-6, A-7	0.63 to 2.0	.15	5.6 to 6.0	20 to 25	100 to 105	Moderate	Moderate	Moderate.
A-7	0.63 to 2.0	.15	5.1 to 5.5	25 to 35	90 to 100	High	High	Moderate.
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	15 to 20	100 to 110	Moderate	Moderate	Moderate.
A-4	2.0 to 6.3	.10	5.1 to 5.5	22 to 28	95 to 105	Low		
A-4	2.0 to 6.3	.08	5.1 to 5.5	22 to 28	95 to 105	Low	Low	Moderate.
A-2, A-4	>6.3	.08	5.1 to 5.5	8 to 12	120 to 125	Low		
A-2, A-4	2.0 to 6.3	.10	5.1 to 5.5	10 to 14	115 to 120	Low	Low	Moderate.
A-2, A-4	>6.3	.11	5.6 to 6.0		100 to 105	Low		
A-6	0.63 to 2.0	.13	5.1 to 5.5	20 to 25	100 to 105	Low	Moderate	Moderate.
A-7	0.63 to 2.0	.13	5.1 to 5.5	25 to 35	100 to 110	High	High	Moderate.
A-6, A-7	0.63 to 2.0	.11	4.5 to 5.0	20 to 25	95 to 100	Moderate	Moderate	High.
A-2, A-4	>6.3	.12	5.6 to 6.0	20 to 25	100 to 105	Low		
A-2, A-6	0.63 to 2.0	.13	5.1 to 5.5	20 to 25	100 to 105	Low	Moderate	Moderate.
A-7	0.63 to 2.0	.13	5.1 to 5.5	25 to 35	100 to 110	High	High	High.
A-6, A-7	0.63 to 2.0	.13	4.5 to 5.0	20 to 25	95 to 100	Moderate	Moderate	High.
A-4	2.0 to 6.3	.10	4.5 to 5.0			Low		
A-4	2.0 to 6.3	.10	4.5 to 5.0	15 to 18	108 to 115	Low	Low	High.
A-4, A-6	2.0 to 6.3	.08	4.5 to 5.0	16 to 18	105 to 118	Low	Low	High.
A-4	2.0 to 6.3	.10	4.5 to 5.0			Low		
A-4	2.0 to 6.3	.10	4.5 to 5.0	15 to 18	100 to 115	Low	Low	High.
A-4, A-6	2.0 to 6.3	.08	4.5 to 5.0	16 to 18	105 to 118	Low	Low	High.
A-4	0.63 to 2.0	.14	5.6 to 6.0			Low		
A-6, A-7	0.63 to 2.0	.15	5.6 to 6.0	13 to 19	105 to 117	Moderate	Moderate	Moderate.
				13 to 23	101 to 111	Low	Moderate	High.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Myersville—Continued									
Loam, thin solum, and stony loam, thin solum (MsC, MsE, MyC, MyE).	4+	2 to 3	0 to 7	5	85 to 95	80 to 95	50 to 80	Loam	ML
			7 to 24	----------	75 to 100	75 to 100	75 to 100	Silty clay loam.	CL, MH, CH.
			24 to 30	----------	----------	----------	----------	Weathered hornblende gneiss.	----------
Porters (PoC, PoD, PoE, PoF).	4+	2 to 3½	0 to 9	----------	85 to 100	75 to 100	45 to 80	Loam	ML, SM
			9 to 18	----------	75 to 100	70 to 100	40 to 80	Loam	ML, SM
			18 to 43	----------	75 to 100	70 to 100	25 to 60	Weathered quartz mica gneiss.	SM, ML
Rabun (RaC, RaD, RaD2, RaE).	4+	3 to 5	0 to 8	----------	85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			8 to 13	----------	85 to 100	80 to 100	75 to 100	Silty clay loam.	CL, MH, CH.
			13 to 35	----------	90 to 100	85 to 100	75 to 100	Silty clay	CL, MH, CH.
			35 to 42	----------	90 to 100	90 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			42 to 60	----------	90 to 100	90 to 100	55 to 85	Weathered hornblende gneiss.	ML, MH
Ramsey (RmE, RmF)	4+	1 to 2½	0 to 2	50	45 to 50	40 to 50	15 to 25	Very stony loam.	GM
			2 to 10	80	10 to 20	10 to 20	0 to 10	Fine sandy loam.	GM
			10 to 19	95	----------	----------	----------	Partly weathered quartzite.	----------
Rock land (Rg, Rl, Rr)—(No estimates of engineering properties.)									
Shelocta:									
Cobbly fine sandy loam (ScD)	4+	3 to 5	0 to 7	20	65 to 80	60 to 75	25 to 50	Cobbly fine sandy loam.	SM, ML
			7 to 34	----------	80 to 90	80 to 90	55 to 85	Clay loam	CL
			34 to 50	----------	60 to 75	60 to 70	50 to 60	Silty clay loam.	CL, MH, CH
			50 to 60	----------	60 to 75	60 to 70	35 to 55	Sandy clay loam.	GC, CL
Fine sandy loam (ShB, ShC, ShD)	4+	3 to 5	0 to 7	----------	85 to 100	80 to 100	25 to 50	Fine sandy loam.	SM
			7 to 34	----------	80 to 90	80 to 90	55 to 85	Clay loam	CL
			34 to 50	----------	75 to 80	75 to 80	75 to 80	Silty clay loam.	CL, MH
			50 to 65	----------	75 to 80	75 to 80	35 to 55	Silty clay loam.	SC, CL
Starr (SrB, SrC)	3+	5+	0 to 16	----------	90 to 100	90 to 100	50 to 80	Loam	ML
			16 to 36	----------	85 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			36	20	----------	----------	----------	Gravel and sandy materials.	----------

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A–4	0. 63 to 2. 0	. 14	5. 6 to 6. 0			Low		
A–6, A–7	0. 63 to 2. 0	. 15	5. 6 to 6. 0	13 to 19	105 to 117	Moderate	Moderate	Moderate.
				13 to 23	101 to 111	Low	Moderate	High.
A–4	2. 0 to 6. 3	. 20	5. 6 to 6. 0			Low		
A–4	2. 0 to 6. 3	. 20	5. 1 to 5. 5	17 to 20	105 to 110	Low	Low	Moderate.
A–2, A–4	2. 0 to 6. 3	. 18	4. 5 to 5. 0	15 to 20	108 to 114	Low	Low	High.
A–4, A–6	2. 0 to 6. 3	. 20	6. 1 to 6. 5			Low		
A–6, A–7	0. 63 to 2. 0	. 16	6. 1 to 6. 5	15 to 20	105 to 117	Moderate	Moderate	Low.
A–7	0. 63 to 2. 0	. 16	5. 6 to 6. 0	20 to 30	90 to 105	High	High	High.
A–6, A–7	0. 63 to 2. 0	. 16	5. 6 to 6. 0	15 to 20	105 to 117	Moderate	Moderate	High.
A–5, A–7	0. 63 to 2. 0	. 15		25 to 35	80 to 90	Low	Moderate	High.
A–2, A–4	2. 0 to 6. 3	. 12	5. 1 to 5. 5			Low		
A–2, A–4	2. 0 to 6. 3	. 08	4. 5 to 5. 0	10 to 15	100 to 100	Low	High	High.
						Low		
A–2, A–4	2. 0 to 6. 3	. 12	5. 6 to 6. 0	10 to 20	105 to 115	Low		
A–6	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Moderate	Moderate	Moderate.
A–6, A–7	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Moderate	Moderate	Moderate.
A–6	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Low	Moderate	Moderate.
A–2, A–4	2. 0 to 6. 3	. 15	5. 6 to 6. 0	10 to 20	105 to 115	Low		
A–6	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Moderate	Moderate	Moderate.
A–6, A–7	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Moderate	Moderate	Moderate.
A–6, A–7	0. 63 to 2. 0	. 16	5. 1 to 5. 5	10 to 20	110 to 120	Low	Moderate	Moderate.
A–4,	>6. 3	. 14	6. 1 to 6. 5			Low		
A–6, A–7	2. 0 to 6. 3	. 16	5. 6 to 6. 0	18 to 22	100 to 105	Moderate	Moderate	Moderate.
	2. 0 to 6. 3	. 16	5. 1 to 5. 5	18 to 22	100 to 105	Low	Moderate	Moderate.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
State (SsA, SsB)	2½ to 5	5+	0 to 10		90 to 100	90 to 100	30 to 55	Fine sandy loam.	SM, ML
			10 to 31		90 to 100	90 to 100	35 to 55	Sandy clay loam.	SC, CL
			31 to 49		85 to 100	80 to 100	10 to 35	Loamy sand.	SP–SM, SM.
			49 to 60					Gravel, cobblestones, and sand.	
Stony colluvial land (St). (No estimates of engineering properties.)	4+	5+							
Stony land, Porters materials (SuC, SuE, SuF). (No estimates of engineering properties.)	4+	1½							
Talladega (TaC, TaD, TaE).	4+	3 to 6	0 to 6		85 to 100	80 to 100	50 to 80	Silt loam	ML, CL
			6 to 12		85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			12 to 52		90 to 100	90 to 100	65 to 100	Weathered mica schist.	ML, CL
Toxaway (To)	0 to 1	5+	0 to 7		90 to 100	90 to 100	75 to 100	Silt loam	ML, CL
			7 to 15		90 to 100	90 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			15 to 23		85 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			23 to 38		85 to 95	80 to 95	65 to 95	Silt loam	ML, CL
			38 to 40	54				Stratified gravel and cobblestones.	GP
Turbeville:									
Loams and fine sandy loams.	4+	5+	0 to 8		80 to 100	80 to 100	25 to 60	Fine sandy loam.	SM, ML
			8 to 12		85 to 100	80 to 100	25 to 55	Fine sandy clay loam.	SC, CL
			12 to 21		85 to 100	80 to 100	55 to 85	Clay loam	CL, CH
			21 to 36		85 to 100	80 to 100	70 to 100	Clay	CH, MH
			36 to 52	55	40 to 45	40 to 45	35 to 40	Very cobbly clay loam.	CL
Cobbly fine sandy loams.	4+	5+	0 to 10	20	70 to 80	65 to 75	20 to 55	Cobbly fine sandy loam.	SM, ML
			10 to 15	5	85 to 95	75 to 85	30 to 55	Sandy clay loam.	SC, CL
			15 to 30	5	85 to 95	75 to 85	70 to 80	Clay	CH, MH
			30 to 52	5	85 to 95	75 to 85	40 to 55	Sandy clay loam.	SC, CL

See footnote at end of table.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-2, A-4	>6.3	.14	5.6 to 6.0			Low		
A-6	2.0 to 6.3	.16	5.1 to 5.5	18 to 22	100 to 105	Low	Moderate	Moderate.
A-2	2.0 to 6.3	.16	5.1 to 5.5	18 to 22	100 to 105	Low	Low	Moderate.
	2.0 to 6.3	.08	5.1 to 5.5	18 to 22	100 to 105	Low	Low	Moderate.
A-4, A-6	2.0 to 6.3	.12	5.1 to 5.5			Low		
A-4, A-6	2.0 to 6.3	.12	5.1 to 5.5	11 to 15	112 to 120	Low	Moderate	Moderate.
A-4, A-6	2.0 to 6.3	.12	4.5 to 5.0			Low	Moderate	High.
A-4, A-6	0.63 to 2.0	.15	5.1 to 5.5			Low		
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	18 to 24	100 to 110	Moderate	High	Moderate.
A-6, A-7	0.20 to 0.63	.15	5.1 to 5.5	18 to 22	100 to 105	Moderate	High	Moderate.
A-4, A-6	0.20 to 0.63	.15	5.1 to 5.5			Low	High	Moderate.
A-2	0.63 to 2.0	.12				Low	High	Moderate.
A-2, A-4	2.0 to 6.3	.12	5.6 to 6.0			Low		
A-2, A-6	0.63 to 2.0	.15	5.6 to 6.0	20 to 25	100 to 105	Moderate	Moderate	Moderate.
A-6, A-7	0.63 to 2.0	.15	5.1 to 5.5	25 to 35	90 to 100	Moderate	Moderate	Moderate.
A-7	0.63 to 2.0	.15	5.1 to 5.5	15 to 20	100 to 110	High	High	Moderate.
A-6	0.63 to 2.0	.15	4.5 to 5.0	15 to 20	100 to 110	Moderate	Moderate	High.
A-2, A-4	2.0 to 6.3	.12	5.6 to 6.0	20 to 25	100 to 105	Low		
A-2, A-6	0.63 to 2.0	.15	5.6 to 6.0	25 to 35	90 to 100	Moderate	Moderate	Moderate.
A-7	0.63 to 2.0	.15	5.1 to 5.5	15 to 20	100 to 110	High	High	Moderate.
A-2, A-6	0.63 to 2.0	.15	4.5 to 5.0	15 to 20	100 to 110	Moderate	Moderate	High.

TABLE 4.—*Estimated*

Soil series or type, and map symbol (alphabetical listing)	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification	
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Tusquitee:									
Cobbly loam and very stony loam (TsC, TvC, TvD).	4+	5+	0 to 8	20	70 to 80	70 to 80	50 to 65	Cobbly loam.	ML, CL
			15 to 42	15	75 to 85	75 to 85	55 to 70	Clay loam	CL, CH
			42 to 48	15	75 to 85	75 to 85	55 to 70	Silty clay loam.	CL, MH, CH.
			48 to 60	30	60 to 70	55 to 70		Mixed colluvial material.	
Loam (TuB, TuC, TuD).	4+	5+	0 to 8		90 to 100	85 to 100	50 to 80	Loam	ML, OL
			15 to 40		90 to 100	85 to 100	55 to 85	Clay loam	CL, CH
			40 to 48		90 to 100	85 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			48 to 53		65 to 75	50 to 75	40 to 60	Mixed colluvial material.	GM, ML
Watauga:									
Cobbly silt loam (WaC, WaD, WaE).	4+	5+	0 to 7	20	65 to 80	65 to 80	50 to 80	Cobbly silt loam.	ML, CL
			7 to 20		90 to 100	85 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			20 to 28		90 to 100	85 to 100	65 to 100	Silt loam	ML, CL
			28 to 100		90 to 100	85 to 100	65 to 100	Weathered mica schist.	ML, CL
Silt loam (WgC, WgD, WgE).	4+	5+	0 to 7		90 to 100	85 to 100	65 to 100	Silt loam	ML, CL
			7 to 21		90 to 100	85 to 100	80 to 100	Silty clay loam.	CL, MH, CH.
			21 to 29		90 to 100	85 to 100	65 to 100	Silt loam	ML, CL
			29 to 102		90 to 100	85 to 100	25 to 35	Weathered mica schist.	SM
Weikert:									
Channery silt loam (WhC, WhD, WhE).	4+	2	0 to 6	20	40 to 80	40 to 80	20 to 55	Channery silt loam.	GM, ML
			6 to 15		30 to 60	25 to 50	10 to 35	Shaly silt loam.	GM, GP-GM.
			15 to 22					Weathered sandstone.	
Very shaly silt loam (WkD, WkE, WkF).	4+	2	0 to 3		50 to 85	50 to 85	20 to 55	Shaly silt loam.	GM, ML
			3 to 15		30 to 60	25 to 50	10 to 35	Shaly clay loam.	GM, GP-GM
			15 to 36					Weathered shale.	
Wickham (WmB, WmC, WsB, WsC, WsC2).	4+	5+	0 to 10		85 to 100	80 to 100	50 to 80	Loam, fine sandy loam.	ML, CL
			10 to 28		85 to 100	80 to 100	55 to 85	Clay loam	ML, CL
			28 to 36		85 to 100	80 to 100	80 to 100	Silty clay loam.	ML, CL
			36 to 46		85 to 100	80 to 100	65 to 100	Silt loam	ML, CL
			46 to 85		50 to 95	50 to 90	25 to 75	Fine sandy loam and loamy sand.	GM, ML
Worsham (WtB)	0 to ½	5+	0 to 8		90 to 100	90 to 100	60 to 75	Loam	ML
			8 to 33		90 to 100	90 to 100	65 to 90	Silty clay loam.	CL, CH
			33 to 57		85 to 100	80 to 100	60 to 75	Silty clay loam.	CL, MH

[1] The corrosion potential of the surface layer is not significant, because pipe and tile are generally laid at greater depth.

engineering properties—Continued

Classification—continued	Permeability	Estimated available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential [1]	
AASHO							Steel	Concrete
	Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Pounds per cubic foot*			
A-4, A-6	>6.3	.22	5.6 to 6.0	18 to 22	100 to 105	Low		
A-6, A-7	2.0 to 6.3	.20	5.6 to 6.0	18 to 22	100 to 105	Moderate	Moderate	Moderate.
A-6, A-7	2.0 to 6.3	.20	5.1 to 5.5	18 to 22	100 to 105	Moderate	Moderate	Moderate.
	2.0 to 6.3	.15	5.1 to 5.5			Low	Moderate	Moderate.
A-4	>6.3	.22	5.6 to 6.0	18 to 22	100 to 105	Low		
A-6, A-7	2.0 to 6.3	.20	5.6 to 6.0	18 to 22	100 to 105	Moderate	Moderate	Moderate.
A-6, A-7	2.0 to 6.3	.20	5.1 to 5.5	18 to 22	100 to 105	Moderate	Moderate	Moderate.
A-4, A-6	2.0 to 6.3	.15	5.1 to 5.5			Low	Moderate	Moderate.
A-4, A-6	2.0 to 6.3	.14	5.1 to 5.5	15 to 20	100 to 110	Low		
A-6, A-7	0.63 to 2.0	.18	5.1 to 5.5	20 to 25	95 to 105	Moderate	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.18	5.1 to 5.5	20 to 25	95 to 105	Low	Low	Moderate.
A-4, A-6	0.63 to 2.0	.16	4.5 to 5.0	18 to 24	100 to 110	Low	Low	High.
A-4, A-6	2.0 to 6.3	.18	5.1 to 5.5	15 to 20	100 to 110	Low		
A-6, A-7	0.63 to 2.0	.18	5.1 to 5.5	20 to 25	95 to 105	Moderate	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.18	5.1 to 5.5	20 to 25	95 to 105	Low	Low	Moderate.
A-2	0.63 to 2.0	.16	4.5 to 5.0	18 to 24	100 to 110	Low	Low	High.
A-2, A-4	2.0 to 6.3	.16	5.1 to 5.5			Low		
A-1, A-2	2.0 to 6.3	.16	5.1 to 5.5	11 to 15	112 to 120	Low	Low	Moderate.
A-2, A-4	2.0 to 6.3	.16	5.1 to 5.5			Low		
A-1, A-2	2.0 to 6.3	.16	5.1 to 5.5	11 to 15	112 to 120	Low	Moderate	Moderate.
A-4, A-6	2.0 to 6.3	.13	5.6 to 6.0			Low		
A-6, A-7	0.63 to 2.0	.14	5.6 to 6.0	18 to 22	100 to 105	Moderate	Moderate	Moderate.
A-6, A-7	0.63 to 2.0	.14	5.6 to 6.0	18 to 22	100 to 105	Moderate	Moderate	Moderate.
A-4, A-6	0.63 to 2.0	.14	5.1 to 5.5	18 to 22	95 to 105	Low	Low	Moderate.
A-2, A-4	2.0 to 6.3	.12	5.1 to 5.5	17 to 22	95 to 105	Low	Low	Moderate.
A-4	0.63 to 2.0	.13	5.1 to 5.5			Low		
A-6, A-7	0.20 to 0.63	.16	5.1 to 5.5	18 to 24	100 to 110	Moderate	Moderate	Moderate.
A-6, A-7	<0.20	.16	4.5 to 5.0	12 to 18	105 to 115	Moderate	Moderate	High.

Shrink-swell potential is an indication of the volume change to be expected of soil material with changes in moisture content. The estimates in table 4 are based primarily on the amount and type of clay. If soil materials have a high shrink-swell potential, they are normally undesirable for engineering works. The change in volume is usually accompanied by a loss of bearing capacity or by high swelling pressures.

Metal and concrete corrode more rapidly in some soils than in others. The rate of corrosion depends on the physical and chemical properties of the soils. The estimates of *corrosion potential* for steel given in table 4 are based on the drainage and the texture of the soil, and those for concrete on texture and reaction. No estimates of corrosion potential are given for the surface layer, because pipes, tiles, and conduits are generally laid below the surface layer.

Engineering interpretations

Table 5, which begins on p. 76, shows engineering interpretations of the soils in this county. The suitability ratings and soil features are based on known data or estimates of physical properties.

The ratings given in the column headed "Suitability for winter grading" depend largely on texture, natural content of water, and depth to the water table in winter. Clayey soils are difficult to handle when wet and must be dried to the proper moisture content for compaction.

Susceptibility to frost action is high for silts and fine sands that, either because of seepage or because of a high water table, have a ready source of water.

In estimating the ratings of soils for suitability as a source of topsoil, only the uppermost 10 to 15 inches of soil material was ordinarily considered.

Suitability as a source of road fill depends largely upon texture and natural content of water.

Soil features that affect highway location include stoniness and rockiness, drainage, shrink-swell potential, slope, and the hazard of frost heaving. Organic soils are not suitable for highways.

Pipeline construction and maintenance are affected by depth to bedrock, stoniness, rock outcrops, seasonal high water table, flood hazard, and slope.

The soil features that affect use for farm pond reservoir areas relate to soils that have not been disturbed, but those that affect use for pond embankments relate to soils that have been moved from their natural position to a place in the pond embankment.

Engineering test data

Table 6, which begins on p. 84, gives the results of laboratory tests of samples of eight soils. The tests included mechanical analysis by the combined sieve and hydrometer methods, and determination of liquid limit and plasticity index.

The columns headed "Liquid limit" and "Plasticity index" show the measured effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Soil Interpretations for Nonfarm Uses

Table 7, which begins on p. 86, shows the estimated degree and kinds of limitations of each soil in Carroll County for building locations, septic-tank filter fields, sewage lagoons, roads, sanitary land fills, cemeteries, and camping and play-area facilities. The degrees are expressed as *slight*, *moderate*, and *severe*. "Moderate" or "severe" indicates that the site should be inspected to determine its suitability for a particular use.

Although the detailed soil map and the table serve as guides for evaluating most soils, a detailed investigation at the site of the proposed construction is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map. By comparing the soil description with the result of investigations at the site, the presence of an included soil can usually be determined.

The column headed "Building locations" refers only to the locations of buildings that have a basement and are not more than three stories high. These buildings may be dwellings, or they may be light industrial, commercial, or institutional buildings.

The degrees of limitation for use as septic-tank filter fields are based on depth to rock, slope, permeability, the hazard of flooding, and the presence or absence of a seasonal high water table. All sites should be inspected before they are used as septic-tank filter fields.

The limitations for roads apply only to hard-surfaced roads similar to the ones commonly used in residential areas or towns, not to freeways and interstate highways intended for heavy use.

The limitations for sewage lagoons are based on permeability, slope, depth to bedrock, size and amount of coarse fragments, texture, the hazard of flooding, and the content of organic matter. An on-site investigation is necessary before a sewage lagoon is built.

Sanitary land fills are places where ordinary household refuse, such as garbage and trash, can be dumped. They consist of excavations generally at least 10 feet wide and 6 feet deep. The refuse is covered with a thin layer of soil material each day. The limitations are based on depth to a seasonal high water table, permeability, slope, depth to rock, amount of coarse fragments more than 10 inches in diameter, texture of the surface soil, and the hazard of flooding.

Athletic fields should be nearly level when finished because they are used intensively. Transporting fill material or topsoil has not been considered in the ratings. The limitations are based on depth to a seasonal high water table, permeability, slope, depth to bedrock, amount of coarse fragments, and the hazard of flooding.

Picnic grounds are not used intensively but are used largely by persons walking individually or in small

groups. The problems of supplying water and disposing of sewage have not been considered. The requirements are the same as for athletic fields but not so exacting.

Formation and Classification of the Soils

This section has two main parts. The first part describes the factors of soil formation and their effect on the soils in Carroll County. In the second part, the soil series are placed in the higher categories of soil classification: the orders and the great soil groups.

Formation of the Soils

The environmental factors mainly responsible for soil formation are parent material, relief, climate, plants and animals, and time. Each of these factors is discussed, and some of its relationships to the kinds of soils in Carroll County are presented in the following paragraphs.

Parent material

The two broad classes of parent materials in Carroll County are residual material and transported materials. The residual material weathered in place from underlying consolidated rock. The transported materials are colluvium and alluvium, which have been deposited on lower slopes, in depressions, and along drainageways.

The parent materials of the soils in this county were derived from metamorphic, igneous, and sedimentary rocks. The metamorphic rocks include phyllite, quartzite, gneiss, and schist. These are the sources of the parent material of Elioak, Fletcher, Gilpin, Hazel, Madison, Manor, and Watauga soils. The igneous rocks are granite and hornblende gabbro. These are the sources of the parent material of Cecil, Louisburg, Myersville, and Rabun soils. The sedimentary rocks are shale, sandstone, conglomerate, and limestone. They supplied the parent material for Bolton, Clymer, Corydon, and Weikert soils. Metamorphic and igneous rocks are the sources of the parent material of Chester, Glenelg, and Porters soils, and sedimentary and metamorphic rocks are the sources of the parent material of Ramsey soils.

The characteristics of the parent material and the underlying rock strongly influence the kinds of changes that take place.

Rates of weathering vary. For example, phyllite, which is resistant to weathering, underlies Hazel soils, and these soils are shallow, but mica schist, which weathers quickly and deeply, generally underlies deep Chester and Glenelg soils.

The differences in parent material may be reflected in the texture and mineral content of the soils. For example, sandstone and granite underlie Clymer and Edneyville soils, which have sand-size particles and contain much quartz; limestone underlies the Corydon soils, which are fine textured; and mica schist underlies Elioak soils, which are also fine textured. Granite and gneiss underlie Cecil soils, which have a large amount of potash in the subsoil. Micaceous parent material underlies the Chester, Manor, Talladega, and Madison soils, and these soils contain a large amount of mica. Other characteristics of the parent materials, including color, base saturation, and type of clay, may be reflected. Soils that formed in transported parent materials have some characteristics of the upland soils from which the parent material was derived.

Relief

The relief, or lay of the land, affects the formation of soils by causing differences in internal drainage, surface runoff, soil temperature, and geologic erosion. In this county, relief ranges from flat to very steep. In steep areas the effects of relief are rapid surface runoff, little percolation of water through the soil, little movement of clay, little translocation of soil bases, and severe erosion that removes weathered rock and soil material as rapidly as they form. Weikert and Louisburg soils are steep. Gently sloping to rolling areas are well drained, and erosion is generally slight. The soils in such areas are mature; they include those of the Cecil, Chester, and Madison series. Low flat areas or depressions ordinarily are wet because seepage and surface water tend to accumulate and drainage is restricted. Mottled soils, such as the Worsham, form in these areas. Low areas on flood plains are wet because they are flooded frequently and have a seasonal high water table. Atkins, Hatboro, and Codorus soils occur in such areas, and they are gray and mottled because of the excess water.

Climate

Carroll County has a humid continental climate and probably has had the same climate throughout the period of soil formation. There has been enough rainfall during this time for soluble materials and colloidal material to move downward in the soil. For example, clay has moved downward and accumulated in the subsoil of the Cecil, Chester, Madison, and Bolton soils. Because the soils are frozen only for short periods and to no great depth, especially in the Piedmont, there are long periods when weathering and downward movement can proceed. As a result, most of the soils are leached and very strongly acid to medium acid.

This county is a transitional area in which both thermic and mesic soils occur. Both kinds of soils have differences of 9°F. or more between the average summer temperature and the average winter temperature, but the average annual temperature of thermic soils is more than 59°, and that of mesic soils is between 47° and 59°.

The climate varies locally with the degree of slope and with the position on the slope. Local variation in climate may cause some variation among soil types, but variations resulting from climate are not great enough to account for the wide differences that exist among the different kinds of soils in the county.

Plants and animals

Active and important agents in the formation of soils are micro-organisms, earthworms, animals, trees, shrubs, and herbaceous plants. The plants supply organic mat-

TABLE 5.—*Engineering*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—		Soil features affecting—	
			Topsoil	Road fill	Highway location	Pipeline construction and maintenance
Altavista (AlB)	Fair	High	Fair	Fair	Seasonal high water table; high frost action.	Seasonal high water table.
Atkins (At)	Poor	High	Fair	Poor	Frequent flooding; high water table.	High water table; frequent flooding.
Bolton (BoE)	Fair	Moderate	Fair	Fair	Steep slopes; fair trafficability.	Steep slopes
Braddock (BrC)	Fair	Moderate	Fair	Fair	Features generally favorable; cobblestones in varying amounts.	No unfavorable features.
Buncombe (Bu)	Good	Low	Poor	Good	Frequent flooding	Frequent flooding
Cecil (CeB, CeB2, CeC, CeC2)	Fair	Moderate	Fair	Fair	Features generally favorable.	No unfavorable features.
Chester (CgB, CgC, CgC2, CgE, CgE2, ChB, ChB2, ChC, ChC2, ChE, ChE2). (For Glenelg part of these units, see Glenelg series.)	Fair	Moderate	Fair	Fair	Features generally favorable; some steep slopes.	No unfavorable features.
Clymer (ClC, ClD)	Fair	Moderate	Fair	Fair	Features generally favorable; rock at a depth of 3½ feet in places; moderate slopes.	Rock at a depth of 3½ to 5 feet.
Codorus (Co, Cs) (For Hatboro part of the Cs unit, see Hatboro series.)	Poor	High	Good	Fair	Frequent flooding; seasonal high water table; high frost action.	Frequent flooding; seasonal high water table.
Comus (Cu)	Poor	Moderate	Good	Fair	Occasional flooding; fair stability; moderate frost action.	Occasional flooding
Corydon (CyE)	Poor	Moderate	Fair	Fair	Shallow to bedrock; steep slopes.	Shallow to bedrock
Edneyville (EdC)	Fair	Moderate	Fair	Fair	Features generally favorable; rock at a depth of 3 to 6 feet.	Rock at a depth of 3 to 6 feet.
Elioak (EkC, EkC2, EkD, EkD2)	Fair	Moderate	Fair	Fair	Features generally favorable; deeply weathered, highly micaceous substratum; moderate slopes.	No unfavorable features.

interpretations

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Grassed waterways
Reservoir area	Embankment				
Pervious substratum.	Fair stability; erodible on slopes.	Moderately well drained.	No unfavorable features.	Low relief; favorable features.	Erodible on slopes and in cuts.
Frequent flooding	Low stability	Frequent flooding; outlets may be difficult to obtain.	Frequent flooding; high water table.	Not applicable	Not applicable; frequent flooding.
Moderate permeability.	Fair stability	Not needed	Steep slopes	Terraces not applicable because of steep slopes.	Steep slopes; establishing vegetation is difficult.
Permeable substratum.	Fair stability; low resistance to piping.	Not needed	Slope; cobblestones.	Terraces not applicable on slopes of more than 8 percent; cobblestones.	Cobblestones; erodible.
Porous sand; frequent flooding.	Porous sand; highly erodible on slopes.	Not needed	Porous sand; low available moisture capacity.	Erodible, unstable sand.	Not applicable; loose, droughty sand.
Moderate permeability, which may result in high seepage losses.	Fair stability; erodible on slopes.	Not needed	Variable slope	Terraces not applicable on slopes of more than 8 percent.	Establishing vegetation in exposed cuts is difficult.
Moderate permeability, which may result in high seepage losses.	Fair stability, erodible on slopes.	Not needed	Some cobbly areas; some steep slopes.	Some cobbly areas; terraces not applicable on slopes of more than 8 percent.	Some cobbly areas; some steep slopes.
High seepage losses	Fair stability	Not needed	Variable slopes	Terraces not applicable because of slopes; rock at a depth of 3½ feet in places.	Moderate available moisture capacity.
Moderately rapid permeability; frequent flooding.	Poor to fair stability; subject to piping.	Frequent flooding; seasonal high water table; outlets difficult to obtain.	Frequent flooding; seasonal high water table.	Not applicable	Frequent flooding; seasonal high water table; level topography.
Occasional flooding; moderate permeability.	Fair stability; moderate permeability.	Not needed	No unfavorable features.	Not applicable	No unfavorable features.
Shallow to bedrock; solution channels may be present.	Fair stability; poor source of borrow because shallow to rock.	Not needed	Steep slopes; shallow to bedrock.	Terraces not applicable because of slopes; shallow to bedrock.	Steep slopes; shallow to bedrock.
Moderately rapid permeability; high seepage losses.	Fair stability; borrow may be difficult to obtain because of rock at a depth of 3 feet.	Not needed	Slope	Terraces not applicable because of slopes; rock at a depth of 3 feet in places.	No unfavorable features, except slope.
Highly weathered micaceous material in substratum; high seepage losses.	Lower part of soil and substratum is highly micaceous; poor stability.	Not needed	Variable slopes; erodible.	Terraces not applicable because of slopes; substratum micaceous and unstable in cuts.	No unfavorable features, except slopes and highly micaceous substratum.

TABLE 5.—*Engineering*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—		Soil features affecting—	
			Topsoil	Road fill	Highway location	Pipeline construction and maintenance
Fletcher (FcC, FcD)	Fair	Moderate	Fair	Fair	Fair stability; weathered schist at a depth of 30 to 60 inches; moderate slope.	No unfavorable features.
Gilpin (GnC, GnC2, GnD)	Fair	Moderate	Fair	Fair	Fair stability; hard rock at a depth of 2½ to 5 feet; moderate slopes.	No unfavorable features, except slope.
Glenelg	Fair	Moderate	Fair	Fair	Features generally favorable; elastic in some areas.	No unfavorable features.
Gravelly alluvial land (Gr)	Poor	Moderate	Poor	Poor	Variable materials; coarse fragments; rock outcrops; frequent flooding.	Frequent flooding; coarse fragments; shallow to rock in places.
Gullied land (Gu)	Fair	Moderate	Poor	Poor	Variable; rock at or near the surface.	Variable; rock at or near the surface.
Hatboro (Ha, Hb) (For Toxaway part of the Hb unit, see Toxaway series.)	Poor	High	Poor	Poor	Poor stability; high frost action; very frequent flooding; seasonal high water table.	Very frequent flooding; seasonal high water table.
Hayesville (HcC, HcD2, HeB, HeB2, HeC, HeC2, HeD, HeD2).	Fair	Moderate	Fair	Fair	Features generally favorable, except moderate slopes in places.	No unfavorable features.
Hazel (HmE, HmF, HnC, HnE)	Fair	Moderate	Fair	Fair	Fair stability; hard rock at a depth of 1½ to 2 feet; steep slopes in places.	Bedrock at a depth of 1½ to 2 feet.
Hiwassee (HtB, HtC, HtD, HuC, HuD, HvC) (For Turbeville part of these units, see Turbeville series.)	Fair	Moderate	Fair	Poor	Clay materials that have some plastic characteristics; erodible in cuts; moderate slopes in places.	No unfavorable features, except slope.
Louisa (LcE)	Fair	Moderate	Fair	Fair	Steep slopes; micaceous substratum that has fair to poor stability; erodible on slopes; rock at a variable depth.	Steep slopes; mica schist rock at a variable depth.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Grassed waterways
Reservoir area	Embankment				
Moderate permeability, which may result in high seepage losses.	Fair stability; variable amount of mica at lower depths.	Not needed	Variable slopes	Terraces not applicable because of slopes; rock at depth of 2½ to 5 feet.	Maintaining grass in cuts is difficult.
Moderate permeability, which may result in high seepage losses.	Fair stability; some coarser materials needed to improve shear strength.	Not needed	Variable slopes; soil depth is 2½ feet in places.	Terraces not applicable because of slopes; rock at depth of 2½ to 5 feet.	Establishing grass in cuts is difficult.
Moderate permeability, which may result in high seepage losses.	Fair stability; erodible on slopes.	Not needed	Some cobbly areas; some steep slopes.	Some cobbly areas; terraces not applicable on slopes of more than 8 percent.	Some cobbly areas; some steep slopes.
Variable materials; frequent flooding.	Variable materials; rapid permeability; more than 20 percent gravel; frequent flooding.	Frequent flooding; variable materials.	Frequent flooding; variable materials.	Nearly level topography; variable materials; frequent flooding.	Nearly level topography; variable materials.
Variable permeability; rock at or near the surface; deeply weathered micaceous rock in places.	Variable depth; rock at or near the surface.	Not applicable	Not applicable	Not applicable	Rock at or near the surface; slope.
Very frequent flooding; variable materials in substratum; rock at a variable depth.	Poor compaction characteristics; poor stability; high frost action.	Very frequent flooding; seasonal high water table; outlets difficult to obtain because of level topography.	Very frequent flooding; seasonal high water table.	Nearly level topography; seasonal high water table; very frequent flooding.	Nearly level topography; seasonal high water table.
Moderate permeability; seepage losses are high.	Fair stability; erodible on slopes.	Not needed	Variable slopes; some cobbly areas.	Terraces not applicable on slopes of more than 8 percent; some cobbly areas.	Erodible in exposed cuts; establishing grass is difficult.
Moderately rapid permeability; high seepage losses.	Fair stability; poor source of borrow because of hard rock at a depth of 1½ to 2 feet.	Not needed	Shallow soils; low available moisture capacity; steep slopes in places.	Terraces not applicable on slopes of more than 8 percent; rock at a depth of 1½ to 2 feet.	Rock at a depth of 1½ to 2 feet.
Moderate permeability; seepage losses possible; core must cut through permeable substratum.	Large amount of clay; low shear strength; poor stability; some gravel and cobblestones.	Not needed	Variable slopes; erodible; some cobbly areas.	Terraces not applicable on slopes of more than 8 percent; some cobbly areas.	Erodible in exposed cuts; establishing grass is difficult; low available moisture capacity.
Moderately rapid permeability; porous substratum; excessive seepage losses.	Limited amount of material; large amount of mica; fair to poor stability; highly erodible on slopes.	Not needed	Steep slopes; shallow soils.	Terraces not applicable because of steep slopes; large amount of mica.	Highly erodible; steep slopes.

TABLE 5.—*Engineering*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—		Soil features affecting—	
			Topsoil	Road fill	Highway location	Pipeline construction and maintenance
Louisburg (LoD, LoE)	Fair	Low	Fair	Fair	Steep slopes; rock at a depth of 2 to 3 feet.	Steep slopes; granitic rock at a depth of 2 to 3 feet.
Madison (MaC, MaC2, MaD, MaD2, MaE, MdB, MdB2, MdC, MdC2, MdD, MdD2, MdE, MdE2).	Fair	Moderate	Fair	Fair	Micaceous within 3 feet of surface, and increasingly micaceous with depth; some steep slopes; erodible in cuts and on slopes.	No unfavorable features, except some steep slopes.
Manor (MnC, MnD, MnE, MnF, MoC, MoE, MoF).	Poor	Moderate	Fair	Poor	Deeply weathered micaceous materials, which have poor stability; rock generally at a depth of more than 5 feet, but in places only 2 feet; some steep slopes.	Deeply weathered micaceous materials.
Myersville (MrB, MrC, MrC2, MrE, MrE2, MsC, MsE, MyC, MyE).	Fair	Moderate	Fair	Fair	Fair stability; some plasticity in subsoil; some steep slopes; rock generally at a depth of more than 5 feet. For the MsC, MsE, MyC, and MyE units: Stones more than 10 inches in diameter; some rock outcrops; bedrock at a depth of 2 to 3 feet.	For MrB, MrC, MrC2, MrE, and MrE2 units: No unfavorable features. For the MsC, MsE, MyC, and MyE units: Stones more than 10 inches in diameter; some rock outcrops; some steep slopes; bedrock at a depth of 2 to 3 feet.
Porters (PoC, PoD, PoE, PoF)	Fair	Moderate	Good	Fair	Fair stability; rock at a depth of 2 to 3½ feet; some steep slopes.	Rock at a depth of 2 to 3½ feet; some steep slopes.
Rabun (RaC, RaD, RaD2, RaE)	Fair	Moderate	Fair	Poor soil	Poor stability and poor compaction characteristics because of clay content; some steep slopes.	Some steep slopes; rock at depth of 3 to 5 feet.
Ramsey (RmE, RmF)	Good	Moderate	Poor	Poor	Shallow to bedrock; steep slopes; many stones more than 10 inches in diameter.	Stones; steep slopes; rock at a depth of 1 foot to 2½ feet.
Rock land (Rg, Rl, Rr)	Poor	Moderate	Poor	Poor	Bedrock at or near surface; very little soil material; slopes of as much as 25 percent.	Bedrock exposed; small amount of soil material.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Grassed waterways
Reservoir area	Embankment				
Shallow to weathered granite; high seepage losses.	Limited amount of material; moderately rapid permeability; fair stability.	Not needed	Steep slopes; shallow soils.	Terraces not applicable because of steep slopes; rock at a depth of 2 to 3 feet.	Low available moisture capacity; rock at a depth of 2 to 3 feet.
Moderately rapid permeability; highly micaceous substratum; high seepage losses.	Fair to poor stability; large amount of mica; erodible on slopes.	Not needed	Variable slopes; some cobbly areas.	Terraces not applicable on slopes of more than 8 percent; exposed cuts erode easily; some cobbly areas.	Erodible in cuts; establishing cover is difficult; some cobbly areas.
Highly weathered micaceous materials; excessive seepage losses.	Poor stability; rapid permeability; high frost action.	Not needed	Shallow soils; low available moisture capacity; steep slopes in places.	Terraces not applicable because of slopes; shallow soils; highly weathered micaceous materials; poor stability.	Steep slopes in places; erodible materials; available moisture is variable; establishing cover is difficult.
Moderate permeability; core to hard rock is necessary; high seepage losses possible. For the MsC, MsE, MyC, and MyE units: Stones more than 10 inches in diameter; rock outcrops; possible high seepage losses.	Fair stability; some plastic materials; erodible on slopes. For the MsC, MsE, MyC, and MyE units: Stones more than 10 inches in diameter; rock outcrops.	Not needed	Variable slopes	Terraces not applicable on slopes of more than 8 percent; rock outcrops or stones in some areas.	Some steep slopes; erodible in cuts rock outcrops and stones in some areas.
Moderately rapid permeability; high seepage losses.	Permeable materials; rock at a depth of 2 to 3½ feet.	Not needed	Moderately deep soils; variable slopes.	Terraces not applicable on slopes of more than 8 percent; bedrock at a depth of 2 to 3½ feet.	Some steep slopes in places; rock at 2 to 3½ feet.
Moderate permeability; possible seepage losses.	Poor stability; erodible on slopes.	Not needed	Variable slopes	Terraces not applicable because of slopes.	Variable slopes.
Moderately rapid permeability; possible seepage losses.	Moderately rapid permeability; borrow material difficult to obtain as rock is at a depth of 10 to 22 inches.	Not needed	Very stony; shallow soils.	Stones; terraces not applicable because of steep slopes.	Shallow to rock; steep slopes; stones more than 10 inches in diameter.
Bedrock at or near surface.	Little or no borrow available.	Not applicable	Not applicable	Not applicable	Bedrock at or near surface.

TABLE 5.—*Engineering*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—		Soil features affecting—	
			Topsoil	Road fill	Highway location	Pipeline construction and maintenance
Shelocta (ScD, ShB, ShC, ShD)	Fair	Moderate	Fair	Fair	Features generally favorable, except moderately steep slopes in places.	No unfavorable features.
Starr (SrB, SrC)	Poor	Moderate	Good	Fair	Surface runoff from higher areas; seepage; high silt content.	Surface runoff from higher areas; some ground water seepage.
State (SsA, SsB)	Fair	Moderate	Good	Fair	Flooding during periods of extremely high water.	Flooding during periods of extremely high water.
Stony colluvial land (St)	Fair	Moderate	Poor	Poor	Large amount of stones, cobblestones, and gravel; some soil material.	Large amount of stones, cobblestones, and gravel.
Stony land, Porters materials (SuC, SuE, SuF).	Fair	Moderate	Fair	Fair	Bedrock within a depth of 1½ feet; limited amount of soil material for fill areas; some steep slopes.	Bedrock within a depth of 1½ feet.
Talladega (TaC, TaD, TaE)	Fair	High	Poor	Poor	Large amount of silt and mica; bedrock at a depth of 3 feet in places; some steep slopes in places.	Bedrock at a depth of 3 feet in places.
Toxaway (To)	Fair	High	Poor	Poor	Very frequent flooding; seasonal high water table; poor stability because of a high content of silt.	Very frequent flooding; seasonal high water table.
Turbeville	Fair	Moderate	Fair	Poor	Clay materials that have some plastic characteristics; erodible in cuts; moderate slopes in places.	No unfavorable features except slope.
Tusquitee (TsC, TuB, TuC, TuD, TvC, TvD).	Fair	Moderate	Good	Fair	Features generally favorable, except moderate slopes. For the TvC and TvD units: Large number of stones more than 10 inches in diameter.	For the TsC, TuB, TuC, and TuD units: No unfavorable features. For the TvC and TvD units: Large number of stones more than 10 inches in diameter.
Watauga (WaC, WaD, WaE, WgC, WgD, WgE).	Fair	Moderate	Fair	Fair	Deeply weathered micaceous substratum; some steep slopes.	No unfavorable features.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Grassed waterways
Reservoir area	Embankment				
Substratum porous in many places; other features of substratum variable.	No unfavorable features.	Not needed	Variable slopes	Terraces not applicable because of slopes of more than 8 percent.	Variable slopes.
High seepage losses; moderately rapid permeability.	Limited quantity of suitable material.	Not needed	No unfavorable features.	Terraces not applicable on slopes of more than 8 percent.	No unfavorable features.
Moderately rapid permeability; high seepage losses.	Fair compaction; fair stability.	Not needed	No unfavorable features.	No unfavorable features.	Flooding during periods of extremely high water.
Permeable material; high seepage losses.	Large amount of stones, cobblestones, and gravel; small amount of soil material.	Not applicable	Not applicable	Not applicable	Stones.
Bedrock within a depth of 1½ feet; steep slopes; high seepage losses.	Soil material permeable and of very limited extent; bedrock within a depth of 1½ feet.	Not applicable	Not applicable	Not applicable	Establishing and maintaining grass is difficult; low available moisture capacity.
High seepage losses; moderately rapid permeability.	Large amount of silt and mica; poor compaction; high frost action.	Not needed	Variable slopes; low available moisture capacity.	Terraces not applicable because of slopes; large amount of silt and mica.	Low available moisture capacity for vegetative cover; bedrock at a depth of 3 feet in places.
Very frequent flooding; substratum porous and variable.	Large amount of silt and organic matter; poor compaction; high frost action.	Very frequent flooding; seasonal high water table.	Level topography; seasonal high water table; very frequent flooding.	Level topography; seasonal high water table; very frequent flooding.	Level topography; high moisture content most of time.
Moderate permeability; seepage losses possible; core must cut through permeable substratum.	Large amount of clay; low shear strength; poor stability; deposits of gravel or of cobblestones may occur.	Not needed	Variable slopes; erodible; some cobbly areas.	Slope	Erodible in exposed cuts; establishing grass is difficult; low available moisture capacity.
Moderately rapid permeability; high seepage losses. For the TvC and TvD units: Large number of stones more than 10 inches in diameter; high seepage losses.	Fair compaction; some cobblestones. For the TvC and TvD units: Large number of stones more than 10 inches in diameter.	Not needed	Variable slopes; rapid permeability. For units TvC and TvD: Many stones more than 10 inches in diameter.	For the TsC, TuB, TuC, and TuD units: No unfavorable features. For the TvC and TvD units: Large number of stones more than 10 inches in diameter.	For the TsC, TuB, TuC, and TuD units: No unfavorable features. For the TvC and TvD units: Large number of stones more than 10 inches in diameter.
High seepage losses; deeply weathered micaceous material.	Poor compaction; low stability; weathered micaceous material.	Not needed	Cobblestones; some steep slopes.	Cobblestones; slope	Cobblestones.

TABLE 5.—*Engineering*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—		Soil features affecting—	
			Topsoil	Road fill	Highway location	Pipeline construction and maintenance
Weikert (WhC, WhD, WhE, WkD, WkE, WkF).	Good	Low	Poor	Poor	Large amount of silt; bedrock within a depth of 2 feet; moderate and steep slopes.	Bedrock within a depth of 2 feet.
Wickham (WmB, WmC, WsB, WsC, WsC2).	Fair	Moderate	Fair	Fair	No unfavorable features.	No unfavorable features.
Worsham (WtB)	Poor	High	Poor	Poor	Seasonal high water table; ponding in low areas; poor stability.	Seasonal high water table; ponding in low areas.

TABLE 6.—*Engineering*

[Tests performed by the Virginia Department of Highways in cooperation with the U.S. Department of Commerce, Bureau of

Soil name and location of sample	Parent material	Virginia report No.	Depth	Horizon	Moisture-density data [1]		Fragments larger than 3 inches in diameter discarded in field sampling (estimate)
					Maximum dry density	Optimum moisture	
			In.		*Lb. per cu. ft.*	*Pct.*	*Pct.*
Braddock cobbly fine sandy loam: 2 miles SE. of Lambsburg along Highway 691, 50 yd. NE. of Highway 620.	Colluvium.	SO-44686	2 to 8	A2	117	12	
		SO-44687	17 to 31	B21	108	18	
		SO-44688	31 to 40	B22	98	24	
		SO-44689	40 to 59	B2b	97	26	10
Cecil fine sandy loam: 50 yd. NW. of Cana Baptist Church and 0.3 mile NE. of Cana on Highway 841.	Quartz mica gneiss.	SO-44711	2 to 7	A2	108	17	
		SO-44712	10 to 19	B21	102	23	
		SO-44713	19 to 29	B22	96	26	
		SO-44714	34 to 52	C1	99	23	
		SO-44715	52 to 75	C2	100	22	
Chester loam: On State Route 697, near Fancy Gap Elementary School, 0.1 mile W. of Highway 685.	Quartz mica gneiss.	SO-44699	2 to 7	A2	85	31	
		SO-44700	11 to 26	B2	102	22	
		SO-44701	31 to 39	C1	99	21	
		SO-44702	39 to 58	C2	106	19	
Hiwassee loam: 1.1 miles N. of Highway 691 on Highway 620.	Colluvium.	SO-44682	0 to 7	Ap	114	15	
		SO-44683	11 to 25	B21	94	27	
		SO-44684	25 to 39	B22	97	25	
		SO-44685	49 to 60	B3b	107	19	15
Manor loam: 0.4 mile W. of Highway 701 on Highway 712.	Quartz mica gneiss.	SO-44695	3 to 8	A2	98	23	
		SO-44696	8 to 17	AC	103	21	
		SO-44697	17 to 31	C1	106	18	
		SO-44698	31 to 82	C2	103	19	

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Grassed waterways
Reservoir area	Embankment				
High seepage losses; bedrock within 2 feet of surface.	Limited amounts of soil material; low stability.	Not needed	Shallow; low available moisture capacity; some steep slopes.	Bedrock within a depth of 2 feet.	Shallow; droughty; maintaining cover is a problem; some steep slopes.
Permeable material; high seepage losses through porous substratum.	Limited borrow; coarse-textured, porous substratum.	Not needed	No unfavorable features.	Terraces not applicable on slopes of more than 8 percent.	No unfavorable features.
No unfavorable features.	Poor stability; high frost action.	Runoff and seepage from higher areas; obtaining outlets may be difficult.	Not applicable	Not applicable	Constant seepage; high water table; establishing cover is difficult.

test data

Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO) (*2*)]

Mechanical analysis [2]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO	Unified [3]
2 in.	¾ in.	No. 4 (4. 7 mm.)	No. 10 (2. 0 mm.)	No. 40 (0. 42 mm.)	No. 200 (0.074 mm.)	0. 05 mm.	0. 02 mm.	0. 005 mm.	0. 002 mm.				
100	97	91	90	74	31	24	21	13	8	21	[4]	A-2-4(0)	SM.
100	96	96	95	86	56	53	48	40	35	41	19	A-7-6(8)	CL.
100	99	98	98	89	66	62	60	55	52	48	16	A-7-5(10)	ML.
------	100	99	99	84	61	58	55	52	50	49	13	A-7-5(8)	ML.
100	87	84	83	75	42	37	29	19	14	30	7	A-4(1)	SM-SC.
100	97	95	95	87	61	55	50	41	35	51	23	A-7-6(12)	MH-CH.
------	100	96	95	87	67	62	58	57	44	64	28	A-7-5(17)	MH.
------	------	100	99	92	58	50	43	29	24	50	11	A-7-5(6)	ML.
------	------	100	99	89	50	41	28	19	15	48	6	A-5(4)	SM.
100	96	94	93	86	60	46	38	23	16	47	12	A-7-5(7)	ML.
------	------	------	100	93	64	53	46	35	30	42	10	A-5(6)	ML.
------	------	99	98	84	40	24	13	5	3	39	[4]	A-4(1)	SM.
------	------	------	100	82	37	22	11	5	4	39	[4]	A-4(0)	SM.
100	95	89	88	77	40	36	32	23	17	25	7	A-4(1)	SM-SC.
------	------	------	100	97	75	73	69	64	60	62	29	A-7-5(20)	MH-CH.
------	------	------	100	97	68	65	61	55	52	53	20	A-7-5(13)	MH.
100	95	89	87	75	47	42	37	32	30	48	17	A-7-5(5)	SM.
100	98	95	94	85	50	37	29	16	8	41	[4]	A-5(3)	SM.
------	100	98	97	87	55	46	34	24	17	38	7	A-4(4)	ML.
100	99	97	94	82	44	36	26	16	12	36	[4]	A-4(2)	SM.
------	100	94	90	75	32	21	12	6	5	41	[4]	A-2-5(0)	SM.

TABLE 6.—*Engineering*

Soil name and location of sample	Parent material	Virginia report No.	Depth	Horizon	Moisture-density data [1]		Fragments larger than 3 inches in diameter discarded in field sampling (estimate)
					Maximum dry density	Optimum moisture	
			In.		*Lb. per cu. ft.*	*Pct.*	*Pct.*
Porters loam:							
3 miles SW. of Gladesboro and 0.5 mile SE. of Blue Ridge Parkway Milepost No. 197.	Quartz mica gneiss.	SO–44703	3. 5 to 8. 5	A2	96	23	5
		SO–44704	8. 5 to 18	B	107	19	5
		SO–44705	18 to 30	C1	110	17	
		SO–44706	30 to 43	C2	112	15	
Rabun silt loam:							
100 yd. S. of Woodlawn and 200 yd. E. of junction of U.S. Highway 58 and Highway 620.	Hornblende gneiss.	SO–44707	0 to 8	Ap	103	22	
		SO–44708	13 to 22	B21	103	23	
		SO–44709	22 to 35	B22	92	28	
		SO–44710	50 to 60	C2	88	30	
Watauga silt loam:							
1 mile S. of Woodlawn and 1 mile E. of Crooked Creek.	Mica schist.	SO–44690	0 to 7	Ap	95	23	
		SO–44691	7 to 12	B21	100	19	
		SO–44692	12 to 21	B22	100	20	
		SO–44693	29 to 58	C11	102	17	
		SO–44694	58 to 96	C12	100	18	

[1] Based on AASHO Designation T 99–57, Method A (*2*).

[2] Mechanical analysis according to AASHO Designation: T 88–57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Altavista (AlB)	Moderate: seasonal high water table.	Moderate: moderate permeability; seasonal high water table.	Moderate: moderate permeability.	Moderate: seasonal high water table.
Atkins (At)	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.	Severe: seasonal high water table; frequent flooding.
Bolton (BoE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Braddock (BrC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Buncombe (Bu)	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding; rapid permeability.	Severe: frequent flooding.
Cecil:				
(CeB, CeB2)	Slight	Moderate: moderate permeability.	Moderate: moderate permeability.	Slight
(CeC, CeC2)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.

See footnotes at end of table.

test data.—Continued

Mechanical analysis [2]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO	Unified [3]
2 in.	¾ in.	No. 4 (4. 7 mm.)	No. 10 (2. 0 mm.)	No. 40 (0. 42 mm.)	No. 200 (0.074 mm.)	0. 05 mm.	0. 02 mm.	0. 005 mm.	0. 002 mm.				
100	96	90	87	78	47	26	18	10	6	36	6	A–4(2)	SM.
100	95	90	87	73	42	33	24	17	12	34	(4)	A–4(1)	SM.
100	97	87	85	71	33	23	16	11	8	35	(4)	A–2–4(0)	SM.
100	91	87	82	58	21	13	7	4	2	33	(4)	A–2–4(0)	SM.
------	------	99	98	85	65	54	41	20	10	38	11	A–6(6)	ML.
------	------	--------	100	95	78	70	60	48	39	47	22	A–7–6(14)	CL.
------	------	--------	100	96	82	71	61	48	41	55	14	A–7–5(13)	MH.
100	98	97	96	85	63	48	34	22	17	50	10	A–5(7)	ML.
------	100	99	98	94	57	51	37	19	11	47	9	A–5(5)	ML.
------	------	100	99	95	60	53	42	25	18	46	14	A–7–5(7)	ML.
------	------	--------	100	97	60	58	45	30	25	47	8	A–5(6)	ML.
------	------	--------	100	94	35	22	12	5	4	42	(4)	A–2–5(0)	SM.
------	------	100	99	86	25	14	6	3	2	38	(4)	A–2–4(0)	SM.

suitable for use in naming textural classes for soil. The data are based on samples received in the laboratory and were not corrected for amount discarded in field sampling.

[3] SCS and BPR have agreed that all soils having plasticity indexes within 2 points of the A-line are to be given a borderline classification. Examples of borderline classification obtained by this use are SM–SC and MH–CH.

[4] Nonplastic.

for selected nonfarm uses

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: slopes of of 2 to 7 percent; seasonal high water table.	Moderate: slopes of 2 to 7 percent; seasonal high water table.	Slight.
Severe: seasonal high water table; frequent flooding.	Severe: seasonal high water table; frequent flooding.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: slopes of 15 to 30 percent; cobblestones.	Severe: slopes of 15 to 30 percent; cobblestones.	Severe: slopes of more than 7 percent; 15 to 30 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 30 percent cobblestones.	Severe: 15 to 30 percent cobblestones.
Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Chester-Glenelg complexes:				
(ChB, ChB2)	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Slight
(ChC, ChC2)	Moderate: slopes of to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(ChE, ChE2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(CgB)	Slight	Slight	Moderate: slopes of 2 to 7 percent; 20 to 50 percent cobblestones.	Slight
(CgC, CgC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(CgE, CgE2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Clymer:				
(ClC)	Moderate: slopes of 7 to 15 percent.	Moderate: depth to rock is 3½ to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(ClD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Codorus (Co)	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.	Severe: frequent flooding; seasonal high water table.
Codorus-Hatboro complex (Cs).	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.	Severe: frequent flooding; seasonal high water table.
Comus (Cu)	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.
Corydon (CyE)	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is less than 1 foot to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is less than 1 foot to 2 feet.
Edneyville (EdC)	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Elioak:				
(EkC, EkC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(EkD, EkD2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Slight	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones; slopes of more than 7 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 7 percent.	Severe: 15 to 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 7 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 7 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent; depth to rock is 3½ to 5 feet.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.
Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.
Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: slopes of more than 15 percent; depth to rock is less than 1 foot to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is less than 1 foot to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is less than 2 feet.	Severe: slopes of more than 7 percent; depth to rock is less than 1 foot to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is less than 1 foot to 2 feet.	Severe: slopes of more than 15 percent.
Moderate: depth to rock is 3 to 5 feet; slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Fletcher: (FcC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: depth to rock is 3 to 5 feet; slopes of 7 to 15 percent.
(FcD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Gilpin: (GnC, GnC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(GnD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Gravelly alluvial land (Gr)	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding; moderately rapid permeability.	Severe: frequent flooding.
Gullied land (Gu)	Severe: slopes of more than 15 percent; depth to rock is 0 to 5 feet.	Severe: depth to rock is 0 to 5 feet.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent; depth to rock is 0 to 5 feet.
Hatboro (Ha)	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding; seasonal high water table.
Hatboro-Toxaway complex (Hb).	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding; seasonal high water table.
Hayesville: (HeB, HeB2)	Slight	Moderate: moderate permeability.	Moderate: slopes of 2 to 7 percent.	Slight
(HeC, HeC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(HeD, HeD2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(HcC)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(HcD2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Hazel: (HnC)	Severe: depth to rock is 1½ to 2 feet.	Severe: depth to rock is 1½ to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is less than 1½ to 2 feet.	Severe: depth to rock is less than 1½ to 2 feet.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Severe: slopes of more than 15 percent; depth to rock is 0 to 5 feet.	Severe: depth to rock is 0 to 5 feet.	Severe: slopes of more than 15 percent; depth to rock is 0 to 5 feet.	Severe: slopes of more than 7 percent; depth to rock is 0 to 5 feet.	Severe: slopes of more than 7 percent; depth to rock is 0 to 5 feet.	Severe: slopes of more than 15 percent.
Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.
Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 20 percent cobblestones.	Severe: slopes of more than 7 percent; 20 percent cobblestones.	Severe: 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent; 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: slopes of more than 7 percent; 20 percent cobblestones.	Severe: slopes of more than 7 percent; 20 percent cobblestones.	Severe: slopes of more than 15 percent; 20 percent cobblestones.
Severe: depth to rock is 1½ to 2 feet.	Severe: depth to rock is 1½ to 2 feet.	Severe: depth to rock is 1½ to 2 feet.	Severe: depth to rock is 1½ to 2 feet; slopes of more than 7 percent.	Severe: slopes of more than 7 percent; depth to rock is 1½ to 2 feet.	Moderate: slopes of 7 to 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Hazel—Continued (HmE, HmF, HnE)	Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.
Hiwassee and Turbeville group: (HtB)	Slight	Moderate: moderate permeability.	Moderate: slopes of 2 to 7 percent.	Slight
(HtC, HvC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(HtD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(HuC)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(HuD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Louisa (LcE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Louisburg (LoD, LoE)	Severe: slopes of more than 15 percent; depth to rock is 2 to 3 feet.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3 feet.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3 feet.
Madison: (MdB, MdB2)	Slight	Moderate: moderate permeability.	Moderate: slopes of 2 to 7 percent; moderate permeability.	Slight
(MdC, MdC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(MdD, MdD2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(MdE, MdE2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(MaC, MaC2)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(MaD, MaD2, MaE)	Severe: slopes of more than 15 percent.	Severe: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 1½ to 2 feet.	Severe: slopes of more than 15 percent.
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: slopes of more than 15 percent; depth to rock is 2 to 3 feet.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3 feet.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3 feet.	Severe: slopes of more than 15 percent.
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 10 percent cobblestones.	Severe: 15 to 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: 15 to 20 percent cobblestones; slopes of more than 15 percent.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 15 percent; 15 to 20 percent cobblestones.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Manor: (MnC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Moderate: slopes of 7 to 15 percent.
(MnD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Severe: slopes of more than 15 percent.
(MnE, MnF)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Severe: slopes of more than 15 percent.
(MoC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Moderate: slopes of 7 to 15 percent.
(MoE, MoF)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Severe: slopes of more than 15 percent.
Myersville: (MrB)	Slight	Moderate: moderate permeability.	Moderate: slopes of 2 to 7 percent; moderate permeability.	Slight
(MrC, MrC2, MsC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.
(MrE, MrE2, MsE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(MyC)	Moderate: slopes of 7 to 15 percent; depth to rock is 2 to 3 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 2 to 3 feet.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 2 to 3 feet.
(MyE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Porters: (PoC)	Severe: depth to rock is 2 to 3½ feet.	Severe: depth to rock is 2 to 3½ feet.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Severe: depth to rock is 2 to 3½ feet.
(PoD)	Severe: depth to rock is 2 to 3½ feet; slopes of more than 15 percent.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.
(PoE, PoF)	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.
Rabun: (RaC)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; depth to rock is 3 to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: very stony	Severe: very stony	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Moderate: very stony.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 15 percent.
Moderate: depth to rock is 3 to 5 feet.	Moderate: depth to rock is 3 to 5 feet.	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent; depth to rock is 3 to 5 feet.	Slight.
Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent; stony.	Severe: stony	Moderate: slopes of 7 to 15 percent; stony.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent; stony.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: depth to rock is 2 to 3½ feet.	Severe: depth to rock is 2 to 3½ feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Moderate: slopes of 7 to 15 percent.
Severe: depth to rock is 2 to 3½ feet; slopes of more than 15 percent.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent.
Severe: depth to rock is 2 to 3½ feet; slopes of more than 15 percent.	Severe: slopes of more than 15 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent; depth to rock is 2 to 3½ feet.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Rabun—Continued (RaD, RaD2)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(RaE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Ramsey (RmE, RmF)	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet.	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet.	Severe: slopes of more than 7 percent; depth to rock is 1 foot to 2½ feet.	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet.
Rock land (Rg, Rl, Rr)	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.
Shelocta: (ShB)	Slight	Moderate: moderate permeability; depth to rock is 3 to 5 feet.	Moderate: moderate permeability; slopes of 2 to 7 percent.	Slight
(ShC)	Moderate: slopes of 7 to 15 percent.	Moderate: moderate permeability; depth to rock is 3 to 5 feet.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.
(ScD, ShD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Starr (SrB, SrC)	Severe: local flooding from adjacent higher areas.	Severe: local flooding from adjacent higher areas.	Severe: local flooding; moderately rapid permeability.	Severe; local flooding from higher adjacent areas.
State (SsA, SsB)	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding; moderately rapid permeability.	Severe: occasional flooding.
Stony colluvial land (St)	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.
Stony land: (SuC)	Severe: depth to rock is 1½ feet.	Severe: depth to rock is 1½ feet.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet.	Severe: depth to rock is 1½ feet.
(SuE, SuF)	Severe: depth to rock is 1½ feet; slopes of more than 15 percent; very stony.	Severe: slopes of more than 15 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet.	Severe: slopes of more than 15 percent; depth to rock is 1½ feet.
Talladega: (TaC)	Moderate: depth to rock is 3 to 6 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 6 feet.
(TaD, TaE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet.	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet; very stony.	Severe: slopes of more than 15 percent; depth to rock is 1 foot to 2½ feet; very stony.	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1 foot to 2½ feet; very stony.	Severe: slopes of more than 15 percent; very stony.
Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.	Severe: depth to rock is 0 to 1 foot.
Moderate: depth to rock is 3 to 5 feet.	Moderate: depth to rock is 3 to 5 feet.	Slight	Moderate: slopes of 2 to 7 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 2 to 7 percent; depth to rock is 3 to 5 feet.	Slight.
Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 5 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: local flooding from higher adjacent areas.	Severe: local flooding from higher adjacent areas.	Severe: local flooding from higher adjacent areas.	Severe: local flooding from higher adjacent areas; slopes of more than 7 percent in some areas.	Moderate: local flooding from higher adjacent areas; slopes of more than 7 percent in some areas.	Moderate: local flooding from higher adjacent areas.
Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.	Moderate: occasional flooding.	Moderate: occasional flooding.
Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders.	Severe: numerous stones and boulders
Severe: depth to rock is 1½ feet; very stony.	Severe: depth to rock is 1½ feet; very stony.	Severe: depth to rock is 1½ feet; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet; very stony.	Severe: depth to rock is 1½ feet; very stony.
Severe: slopes of more than 15 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 15 percent, depth to rock is 1½ feet; very stony.	Severe: slopes of more than 15 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 7 percent; depth to rock is 1½ feet; very stony.	Severe: slopes of more than 15 percent; depth to rock is 1½ feet; very stony.
Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 6 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 3 to 6 feet.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Toxaway (To)	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding.	Severe: frequent flooding; seasonal high water table.
Tusquitee:				
(TuB)	Slight	Slight	Severe: moderately rapid permeability.	Slight
(TuC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Moderate: slopes of 7 to 15 percent.
(TsC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Moderate: slopes of 7 to 15 percent.
(TuD)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Severe: slopes of more than 15 percent.
(TvC)	Severe: very stony	Severe: very stony	Severe: slopes of more than 7 percent; moderately rapid permeability.	Moderate: slopes of 7 to 15 percent.
(TvD)	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 7 percent; moderately rapid permeability.	Severe: slopes of more than 15 percent.
Watauga:				
(WgC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(WgD, WgE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
(WaC)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent; moderate permeability.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
(WaD, WaE)	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Weikert:				
(WhC)	Severe: depth to rock is 2 feet.	Severe: depth to rock is 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 2 feet; moderately rapid permeability.	Severe: depth to rock is 2 feet.
(WhD, WhE, WkD, WkE, WkF).	Severe: slopes of more than 15 percent; depth to rock is 2 feet.	Severe: depth to rock is 2 feet; slopes of more than 15 percent.	Severe: slopes of more than 7 percent; depth to rock is 2 feet; moderately rapid permeability.	Severe: slopes of more than 15 percent; depth to rock is 2 feet.

See footnotes at end of table.

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Severe: frequent flooding: seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: frequent flooding; seasonal high water table.	Severe: flooding; seasonal high water table.
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Moderate: slopes of 7 to 15 percent; 15 to 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Severe: very stony	Severe: very stony	Severe: very stony	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Moderate: slopes of 7 to 15 percent; very stony.
Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 15 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 7 percent; very stony.	Severe: slopes of more than 15 percent; very stony.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 15 percent.
Moderate: slopes of 7 to 15 percent.	Severe: 15 to 20 percent cobblestones.	Severe: 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Moderate: slopes of 7 to 15 percent; 15 to 20 percent cobblestones.
Severe: slopes of more than 15 percent.	Severe: slopes of more than 15 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 15 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 7 percent; 15 to 20 percent cobblestones.	Severe: slopes of more than 15 percent; 15 to 20 percent cobblestones.
Severe: depth to rock is 2 feet.	Severe: depth to rock is 2 feet.	Severe: depth to rock is 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 2 feet.	Moderate: slopes of 7 to 15 percent; depth to rock is 2 feet.
Severe: depth to rock is 2 feet; slopes of more than 15 percent.	Severe: slopes of more than 15 percent; depth to rock is 2 feet.	Severe: slopes of more than 15 percent; depth to rock is 2 feet.	Severe: slopes of more than 7 percent; depth to rock is 2 feet.	Severe: slopes of more than 7 percent; depth to rock 2 feet.	Severe: slopes of more than 15 percent.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Building locations [1]	Septic-tank filter fields	Sewage lagoons	Roads [2]
Wickham: (WmB, WsB)	Slight	Slight	Moderate: slopes of 2 to 7 percent; moderate permeability.	Slight
(WmC, WsC, WsC2)	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Worsham (WtB)	Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: slow permeability; seasonal high water table; runoff and seepage from higher areas.	Slight	Severe: seasonal high water table; runoff and seepage from higher areas.

[1] Buildings that have a basement, are not more than 3 stories high, and may be classed as dwellings or as light industrial, commercial, and institutional buildings.

ter, and they transfer moisture and plant nutrients from lower horizons to upper horizons. Organic matter decomposes and is mixed into the soil by the action of micro-organisms and earthworms or by chemical reaction.

The dominant vegetation on the soils in this county during the period of soil formation was a hardwood forest, which was so nearly uniform in density, composition, and ground cover that it could not account for differences among soils. A possible exception is the Toxaway soils, which formed under swamp vegetation and have a thick layer of accumulated organic matter.

At present, most of the native trees are deciduous and have moderately deep or deep roots. Their leaves vary in content of plant nutrients but generally return more bases and phosphorus to the soils than the needles of coniferous trees do.

Man has also influenced the development of soils by such practices as irrigation, drainage, and fertilization, and by changing the vegetation in many areas.

Time

The length of time that soil materials have been exposed to soil-forming processes accounts for some differences in the soils. Soils that formed in recent alluvium or colluvium, such as Comus and Starr soils, have not been in place long enough for well-defined horizons to develop. But mature soils, such as Chester and Cecil soils, have been in place for a long time and have well-defined horizons. Soils or soil materials that have been exposed for the same length of time may differ in degree of development because the other factors of soil formation are different. For example, Ramsey soils, which formed in weathered sandstone and quartzite, have been exposed for a long time, but they are shallow and have poorly defined horizons.

Classification of the Soils

This section discusses the higher categories—order and great soil group—of the 1938 system of soil classification, which was outlined in "Soils and Men" (*8*) and later modified by Thorp and Smith (*6*). Table 8 shows the classification of the soils of Carroll County according to the 1938 system and according to the present Classification System (*9*), used since January 1, 1965, by the U.S. Department of Agriculture. Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Zonal order

Soils of the zonal order have well-developed characteristics that reflect the influence of the active factors of soil genesis—climate, and living organisms, chiefly vegetation.

The zonal order is represented in this county by the Red-Yellow Podzolic, Gray-Brown Podzolic, Reddish-Brown Lateritic, and Sols Bruns Acides great soil groups.

RED-YELLOW PODZOLIC SOILS

Red-Yellow Podzolic soils are acid soils having a thin O horizon; a thin organic-mineral A1 horizon; a light-colored, bleached A2 horizon; and a red, yellowish-red, or yellowish-brown B horizon that shows some accumulation of clay.

The Red-Yellow Podzolic soils in Carroll County formed in a warm, humid climate, under deciduous, coniferous, or mixed forest. In cultivated areas in this county, the O and A1 horizons are so intermixed that they cannot be identified, and in some places accelerated erosion has removed much or all of the A horizon and has exposed the B horizon.

The clay fraction of the soils in this group is mostly kaolinite, but it also includes montmorillonite, vermiculite, and gibbsite. The reticulate streaks common in the B horizon generally occur higher in the profile if the soil has a yellow B horizon than if it has a red B horizon. A few soils of this group, especially the very sandy ones, lack this streaked material.

The Red-Yellow Podzolic great soil group is represented in this county by the Altavista, Bolton, Braddock,

for selected nonfarm uses—Continued

Sanitary land fills (trench)	Cemeteries	Camping areas		Play areas	
		Tent sites with platforms	Trailer sites	Athletic fields (intensive use)	Picnic grounds (extensive use)
Slight	Slight	Slight	Moderate: slopes of 2 to 7 percent.	Moderate: slopes of 2 to 7 percent.	Slight.
Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Moderate: slopes of 7 to 15 percent.	Severe: slopes of more than 7 percent.	Severe: slopes of more than 7 percent.	Moderate: slopes of 7 to 15 percent.
Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: seasonal high water table; runoff and seepage from higher areas.	Severe: seasonal high water table; runoff and seepage from higher areas.

[2] Hard-surfaced roads similar to the ones used in residential areas or towns.

Cecil, Edneyville, Elioak, Fletcher, Hayesville, Madison, Turbeville, Watauga, and Wickham series. Wickham soils have some characteristics of the Gray-Brown Podzolic soils. Their profile is intermediate in color between that of the Red-Yellow Podzolic soils and that of the Gray-Brown Podzolic soils. Bolton soils have some characteristics of the Reddish-Brown Lateritic soils. Their profile is intermediate in color between that of the Red-Yellow Podzolic soils and that of the Reddish-Brown Lateritic soils.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils have a thin organic covering; a thin organic-mineral layer; a grayish-brown leached A horizon; and an illuvial B horizon. In forested areas the organic covering is leaf litter and the organic-mineral layer contains slightly acid or medium acid, dark humus. The A1 horizon is grayish brown and loamy and has crumb or granular structure. The A2 horizon is light grayish brown or grayish yellow. The B horizon is yellowish brown, brown, brownish yellow, or reddish yellow and moderately heavy; it is lighter colored with increasing depth. The thickness of the solum varies considerably, but it is seldom more than 4 feet.

The Gray-Brown Podzolic soils in this county developed in a moist, temperate climate, under deciduous forest.

The Gray-Brown Podzolic great soil group is represented in this county by the Chester, Clymer, Corydon, Gilpin, Glenelg, Myersville, Porters, Shelocta, State, and Tusquitee series. Only Porters soils fit the central concept. Chester, Clymer, Gilpin, Glenelg, Myersville, and Shelocta soils have some characteristics of the Red-Yellow Podzolic soils. Their profile is intermediate in color and in base saturation between that of Gray-Brown Podzolic soils and that of Red-Yellow Podzolic soils. Corydon soils are shallow and grade toward the Lithosols. State and Tusquitee soils have weakly defined horizons and grade toward the Alluvial soils.

REDDISH-BROWN LATERITIC SOILS

Reddish-Brown Lateritic soils are well drained and have a dark reddish-brown granular surface soil, a B horizon of red, friable clay, and red or reticulately mottled parent material. The A horizon is reddish brown or red. The B horizon is uniformly red or dark red and firm and is thicker and finer textured than the A horizon. The parent material is medium or high in bases.

The Reddish-Brown Lateritic great soil group is represented in this county by the Hiwassee and Rabun series.

SOLS BRUNS ACIDES

The soils of this group in Carroll County developed under forest vegetation.

Sols Bruns Acides (*3*) have a thin A1 horizon; a paler A2-like horizon that is poorly differentiated from the B2 horizon and is possibly a B1 horizon; a B2 horizon that is uniform in color from top to bottom, has weak subangular blocky structure, and shows little evidence or only traces of silicate clay accumulation. The solum of these soils is strongly acid or very strongly acid and has low base status.

The Sols Bruns Acides are represented in this county by soils of the Manor series.

Intrazonal order

Soils of the intrazonal order have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal influence of climate and vegetation.

The intrazonal order is represented in this county by the Humic Gley and Low-Humic Gley great soil groups.

HUMIC GLEY SOILS

Humic Gley soils are poorly drained or very poorly drained and have moderately thick, dark-colored organic-mineral horizons. The uppermost horizon is black, is 6 to 14 inches thick, and contains a large amount of organic matter. It is underlain by poorly drained or very poorly drained, gleyed mineral horizons.

TABLE 8.—*Soil series in Carroll County classified into higher categories*

Soil series	Classification according to the 1938 system		Probable classification according to the present system	
	Order	Great soil group	Subgroup	Family
Altavista	Zonal	Red-Yellow Podzolic	Paraquic Hapludults	Fine loamy, mixed, thermic.
Atkins	Intrazonal	Low-Humic Gley	Fluventic Haplaquepts	Fine loamy, mixed, acid, mesic.
Bolton	Zonal	Red-Yellow Podzolic (intergrading to Reddish-Brown Lateritic).	Typic Hapludults	Clayey, mixed, thermic.
Braddock	Zonal	Red-Yellow Podzolic	Typic Hapludults	Fine loamy, mixed, mesic.
Buncombe	Azonal	Alluvial	Fluventic Udipsamments	Sandy, siliceous, acid, thermic.
Cecil	Zonal	Red-Yellow Podzolic	Typic Paleudults (Hapludults)	Clayey, kaolinitic, thermic.
Chester	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Typic Hapludults	Fine loamy, mixed, mesic.
Clymer	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Typic Hapludults	Fine loamy, mixed, mesic.
Codorus	Azonal	Alluvial (intergrading to Low-Humic Gley).	Aquic Fluventic Dystrochrepts	Fine loamy, mixed, acid, mesic.
Comus	Azonal	Alluvial	Fluventic Dystrochrepts	Coarse loamy, mixed, acid, mesic.
Corydon	Zonal	Gray-Brown Podzolic (intergrading to Lithosols).	Lithic Mollic Hapludalfs	Clayey, illitic, mesic.
Edneyville	Zonal	Red-Yellow Podzolic	Typic Hapludults	Fine loamy, mixed, mesic.
Elioak	Zonal	Red-Yellow Podzolic	Typic Hapludults	Clayey, kaolinitic, mesic.
Fletcher	Zonal	Red-Yellow Podzolic	Typic Hapludults	Fine loamy, mixed, thermic.
Gilpin	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Alfic Hapludults	Fine loamy, mixed, mesic.
Glenelg	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Typic Hapludults	Fine loamy, micaceous, mesic.
Hatboro	Intrazonal	Low-Humic Gley	Fluventic Haplaquepts	Fine loamy, mixed, acid, mesic.
Hayesville	Zonal	Red-Yellow Podzolic	Typic Hapludults	Clayey, kaolinitic, thermic.
Hazel	Azonal	Lithosols	Typic Dystrochrepts	Loamy, mixed, mesic.
Hiwassee	Zonal	Reddish-Brown Lateritic	Typic Rhodudults	Clayey, kaolinitic, thermic.
Louisa	Azonal	Lithosols	Ruptic Ultic Dystrochrepts	Fine loamy, micaceous, thermic.
Louisburg	Azonal	Lithosols (intergrading to Red-Yellow Podzolic).	Typic Dystrochrepts	Coarse loamy, siliceous, acid, thermic.
Madison	Zonal	Red-Yellow Podzolic	Typic Hapludults	Clayey, micaceous, thermic.
Manor	Zonal	Sols Bruns Acides	Typic Dystrochrepts	Coarse loamy, micaceous, mesic.
Myersville	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Alfic Hapludults	Fine loamy, mixed, mesic.
Porters	Zonal	Gray-Brown Podzolic	Alfic Hapludults	Fine loamy, mixed, mesic.
Rabun	Zonal	Reddish-Brown Lateritic	Typic Rhodudults	Clayey, kaolinitic, mesic.
Ramsey	Azonal	Lithosols (intergrading to Sols Bruns Acides).	Lithic Dystrochrepts	Loamy, siliceous, mesic.
Shelocta	Zonal	Gray-Brown Podzolic (intergrading to Red-Yellow Podzolic).	Typic Hapludults	Fine loamy, mixed, mesic.
Starr	Azonal	Alluvial	Typic Rhodudults	Fine loamy, mixed, acid, thermic.
State	Zonal	Gray-Brown Podzolic (intergrading to Alluvial).	Alfic Hapludults	Fine loamy, mixed, thermic.
Talladega	Azonal	Lithosols	Typic Dystrochrepts	Fine loamy, micaceous, mesic.
Toxaway	Intrazonal	Humic Gley	Typic Humaquepts	Fine loamy, mixed, nonacid, thermic.
Turbeville	Zonal	Red-Yellow Podzolic	Typic Hapludults	Clayey, kaolinitic, thermic.
Tusquitee	Zonal	Gray-Brown Podzolic (intergrading to Alluvial).	Typic Hapludults	Fine loamy, mixed, mesic.
Watauga	Zonal	Red-Yellow Podzolic	Typic Hapludults	Fine loamy, micaceous, mesic.
Weikert	Azonal	Lithosols	Lithic Dystrochrepts	Loamy, skeletal, mixed, mesic.
Wickham	Zonal	Red-Yellow Podzolic (intergrading to Gray-Brown Podzolic).	Typic Hapludults	Fine loamy, mixed, thermic.
Worsham	Intrazonal	Low-Humic Gley	Typic Ochraquults	Clayey, mixed, thermic.

The Humic Gley great soil group is represented in this county by the Toxaway series.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils are poorly drained soils having a thin A horizon, moderately high in content of organic matter, over a mottled gray and brown, gleyed horizon.

The soils of this group in Carroll County are on first bottoms and in drainageways.

The Low-Humic Gley great soil group is represented in this county by the Atkins, Hatboro, and Worsham series.

Azonal order

Soils of the azonal order do not have well-developed profile characteristics, either because of their youth or because the relief or the nature of the parent material prevents the normal development of such characteristics.

The azonal order is represented in this county by the Lithosol and Alluvial great soil groups.

LITHOSOLS

Lithosols have no clearly expressed soil morphology and consist of a freshly or imperfectly weathered mass of rock fragments. These soils occur mainly on steep slopes. They have a definite A1 horizon and may have an A2 horizon, but there is little or no evidence of a B horizon.

The Lithosols are represented in Carroll County by the Hazel, Louisa, Louisburg, Ramsey, Talladega, and Weikert series. Louisburg soils have some characteristics of the Red-Yellow Podzolic soils, particularly a leached A2 horizon and a weakly developed, brown to yellowish-brown, cambic B horizon. Ramsey soils have uniform colors and weak structural development. They grade to Sols Bruns Acides.

ALLUVIAL SOILS

Alluvial soils consist of transported and recently deposited material and are characterized by little or no modification of the original material by soil-forming processes. Some organic matter may have accumulated in the surface layer. Other differences are attributed mainly to differences in the parent material.

The Alluvial soils are represented in Carroll County by soils of the Buncombe, Codorus, Comus, and Starr series. The Codorus soils have some characteristics of Low-Humic Gley soils, for they have a profile that is gleyed beginning at a depth of 10 to 20 inches.

Laboratory Data

Table 9 in this section shows the chemical characteristics of representative soils in Carroll County, as determined by laboratory analysis. The analytical procedures were mainly those developed by Peech, Alexander, Dean, and Reed (*4*). Exchangeable calcium, magnesium, and potassium were determined on original extracts with a Beckman DU flame spectrophotometer, and exchangeable manganese was determined with a Klett-Summerson photoelectric colorimeter. The procedures used to determine phosphorus were those described by Truog (*7*).

TABLE 9.—*Chemical characteristics of selected soils*

[Analyses by Virginia Agricultural Experiment Station, Blacksburg, Va.]

Soil type	Laboratory No.	Horizon	Depth from surface	Reaction	Phosphorus	Organic matter	Exchangeable Mn	Exchangeable cations (milliequivalents per 100 grams of soil)					Base saturation
								Ca	Mg	K	H	Sum	
			In.	*pH*	*P.p.m.*	*Pct.*	*P.p.m.*						*Pct.*
Bolton loam.	7649	A1	0 to 2	6. 40	15. 91	4. 32	5. 21	5. 95	2. 04	0. 23	5. 56	13. 78	59. 65
	7650	A2	2 to 9	5. 80	4. 82	1. 72	3. 93	1. 96	. 84	. 14	6. 28	9. 22	31. 89
	7651	B1	9 to 14	4. 66	3. 86	. 67	4. 48	1. 70	. 36	. 13	4. 66	6. 85	31. 97
	7652	B21t	14 to 21	5. 50	7. 72	. 41	4. 84	1. 74	. 35	. 11	4. 21	6. 41	34. 32
	7653	B22t	21 to 31	5. 32	2. 89	. 29	9. 23	2. 28	. 56	. 12	4. 48	7. 44	39. 78
	7654	B23t	31 to 52	5. 22	8. 20	. 38	3. 20	3. 56	1. 39	. 34	7. 94	13. 23	39. 98
	7655	C	52 to 58	5. 00	9. 16	. 14	15. 63	1. 70	. 94	. 39	8. 42	11. 45	26. 46
Cecil fine sandy loam.	7671	Ap	0 to 8	5. 60	8. 20	1. 66	1. 09	1. 70	. 43	. 02	3. 55	5. 70	37. 72
	7672	B1	8 to 11	5. 52	4. 34	. 67	. 36	1. 21	. 74	. 07	5. 68	7. 70	26. 23
	7673	B21t	11 to 21	5. 30	3. 86	. 31	. 36	1. 09	. 60	. 04	5. 89	7. 62	22. 70
	7674	B22t	21 to 32	5. 10	3. 38	. 17	. 36	. 61	. 30	. 07	5. 41	6. 39	15. 34
	7675	B3	32 to 48	4. 90	4. 82	. 10	. 36	. 13	. 09	. 04	4. 75	5. 01	5. 19
	7676	C	48 to 58	4. 78	2. 41	. 09	2. 19	. 18	. 14	. 08	2. 74	3. 14	12. 74
Chester loam.	7679	A1	0 to 2	5. 08	9. 16	11. 48	6. 21	1. 61	1. 99	. 46	19. 33	23. 39	17. 36
	7680	A2	2 to 7	4. 90	9. 16	5. 38	1. 82	. 26	. 74	. 27	14. 97	16. 24	7. 82
	7681	B1	7 to 11	4. 76	4. 34	1. 91	1. 82	. 13	. 50	. 16	10. 94	11. 73	6. 73
	7682	B2t	11 to 26	4. 86	2. 41	. 71	1. 28	. 10	. 64	. 18	8. 69	9. 61	9. 57
	7683	B3	26 to 31	5. 02	2. 41	. 26	10. 42	. 03	. 26	. 13	6. 85	7. 27	5. 78
	7684	C1	31 to 39	5. 04	3. 38	. 12	5. 12	. 03	. 14	. 15	5. 08	5. 40	5. 93
	7685	C2	39 to 58	5. 08	4. 34	. 04	3. 29	. 01	. 03	. 10	4. 24	4. 38	3. 20

TABLE 9.—*Chemical characteristics of selected soils*—Continued

Soil type	Laboratory No.	Horizon	Depth from surface	Reaction	Phosphorus	Organic matter	Exchangeable Mn	Exchangeable cations (milliequivalents per 100 grams of soil)					Base saturation
								Ca	Mg	K	H	Sum	
			In.	*pH*	*P.p.m.*	*Pct.*	*P.p.m.*						*Pct.*
Clymer fine sandy loam.	7776	A1	0 to 2	4.00	5.55	5.52	4.29	.04	.15	.14	13.57	13.90	2.37
	7777	A2	2 to 8	4.54	2.17	1.67	2.83	.06	.06	.22	6.63	6.97	4.88
	7778	B1	8 to 12	4.50	1.69	.52	1.55	.06	.07	.17	6.21	6.51	4.61
	7779	B2lt	12 to 24	4.60	1.69	.37	.45	.01	.15	.19	6.57	6.92	5.06
	7780	B22t	24 to 29	4.60	1.21	.22	.45	0	.21	.16	7.98	8.35	4.43
	7781	B3t	29 to 35	4.60	1.69	.15	.45	0	.22	.17	7.14	7.53	5.18
	7782	C1	35 to 52	4.60	1.69	.08	.45	.03	.11	.17	5.61	5.92	5.24
Comus fine sandy loam.	7704	Ap	0 to 10	5.00	8.68	1.71	2.28	1.01	.17	.23	6.28	7.69	18.34
	7705	C1	10 to 22	4.82	5.30	1.26	2.10	.23	.10	.14	6.01	6.48	7.25
	7706	C2	22 to 33	5.22	7.23	.31	.64	.15	.07	.08	1.65	1.95	15.38
Corydon rocky silty clay loam.	7770	Ap	0 to 6	7.10	10.37	2.91	1.00	7.79	3.27	.39	4.52	15.97	71.70
	7771	B2t	6 to 13	6.90	4.58	.55	.27	6.09	1.63	.30	5.94	13.96	57.45
	7772	B3	13 to 20	5.80	1.21	.68	4.29	3.60	1.63	.32	9.81	15.36	36.13
Edneyville fine sandy loam.	7722	Ap	0 to 8	5.60	2.89	1.93	1.00	2.97	.97	.34	4.48	8.76	48.86
	7723	B1	8 to 12	5.42	2.41	.32	.45	2.25	.80	.34	3.43	6.82	49.71
	7724	B2t	12 to 20	5.00	2.89	.13	.45	1.55	.65	.34	3.55	6.09	41.71
	7725	B3	20 to 30	4.70	2.89	.10	1.37	.66	.35	.33	4.18	5.52	24.28
	7726	C	30 to 39	4.80	2.89	.01	1.37	.18	.22	.31	3.73	4.44	15.99
Elioak silt loam.	7729	A1	0 to 3	3.80	9.64	9.09	4.29	.15	.39	.33	19.12	19.99	4.35
	7730	A2	3 to 8	4.66	4.82	2.91	2.47	.08	.28	.29	10.28	10.93	5.95
	7731	B1	8 to 14	4.66	2.41	1.04	.64	.05	.57	.35	9.92	10.89	8.91
	7732	B2t	14 to 24	5.04	2.41	.48	1.01	.06	.64	.45	9.83	10.98	10.47
	7733	B3	24 to 29	5.06	.96	.26	.46	0	.30	.41	6.94	7.65	9.28
	7734	C1	29 to 37	5.12	1.93	.17	1.56	.02	.15	.24	4.39	4.80	8.54
	7735	C2	37 to 41	5.12	.48	.06	2.47	0	.09	.11	2.92	3.12	6.41
Fletcher loam.	7738	A1	0 to 1	3.70	8.20	8.91	.64	.05	.16	.21	20.02	20.44	2.05
	7739	A2	1 to 4	4.14	3.38	3.22	.46	.08	.06	.22	10.79	11.15	3.23
	7740	A3	4 to 7	4.40	3.38	2.14	1.01	.06	.07	.23	7.85	8.21	4.38
	7741	B1	7 to 12	4.24	.48	1.26	.64	.01	.11	.18	8.45	8.75	3.43
	7742	B2t	12 to 26	4.28	1.93	1.21	.64	.01	.10	.16	8.60	8.87	3.04
	7743	B3	26 to 31	4.80	.48	.19	.46	0	.24	.13	6.79	7.16	5.17
	7744	C1	31 to 42	4.80	.96	.12	.46	0	.13	.15	2.89	3.17	8.83
	7745	C2	42 to 50	4.90	1.96	.10	.64	.01	.09	.12	3.16	3.38	6.51
Gilpin silt loam.	7878	A1	0 to 2	5.40	45.33	18.35	9.60	10.89	3.65	.82	18.49	33.85	45.38
	7879	A2	2 to 8	4.84	5.30	2.82	1.92	.96	.54	.48	9.41	11.39	17.38
	7880	B1	8 to 14	4.70	5.30	1.39	1.19	.51	.55	.54	9.08	10.68	14.98
	7881	B2t	14 to 24	4.90	3.38	.48	2.65	.22	.57	.46	8.18	9.43	13.26
	7882	B3	24 to 31	4.82	2.89	.29	7.41	.02	.35	.40	7.55	8.32	9.25
	7883	C11	31 to 38	4.68	3.86	.36	2.29	.04	.32	.33	7.20	7.89	8.75
	7884	C12	38 to 52	4.72	2.41	.28	3.93	.06	.16	.26	3.29	3.77	12.73
Glenelg loam.	7746	A1	0 to 2	4.40	11.57	18.74	8.14	1.17	.89	.66	27.84	30.56	8.90
	7747	A2	2 to 7	4.52	.48	2.70	1.19	.02	.14	.32	12.14	12.62	3.80
	7748	B1	7 to 14	4.58	1.93	.92	.10	.01	.34	.19	9.77	10.31	5.24
	7749	B2lt	14 to 23	4.78	1.93	.55	.46	0	.36	.20	7.97	8.53	6.57
	7750	B22t	23 to 32	5.00	2.41	.24	.83	.01	.11	.17	6.94	7.23	4.01
	7751	B3	32 to 40	5.00	2.41	.12	1.56	0	.04	.12	5.47	5.63	2.84
	7752	C1	40 to 49	5.10	2.89	.15	1.19	.10	.06	.15	4.69	4.41	4.48
	7753	C2	49 to 72	5.18	2.89	.06	2.11	0	.04	.17	3.07	3.28	6.40
Hayesville loam.	7786	A1	0 to 2	4.42	14.23	10.46	5.94	.61	.80	.74	21.27	23.42	9.18
	7787	A2	2 to 6	4.68	6.03	4.60	2.10	.06	.17	.47	12.82	13.52	5.18
	7788	B1	6 to 13	4.62	3.13	1.18	.09	.06	.26	.26	8.73	9.31	6.23
	7789	B2lt	13 to 19	4.78	4.58	.52	.18	.01	.41	.29	7.77	8.48	8.37
	7790	B22t	19 to 28	5.18	3.13	.30	.18	.06	.26	.29	8.07	8.68	7.03
	7791	B3	28 to 41	5.10	3.62	.19	4.94	.02	.18	.24	6.03	6.47	6.80
	7792	C1	41 to 59	5.10	3.62	.19	7.68	.03	.15	.29	4.85	5.32	8.83
	7793	C2	59 to 86	4.90	3.62	.15	2.56	0	.09	.27	3.62	3.48	9.05
Hazel silt loam.	7796	A1	0 to 2	4.30	6.51	8.69	5.12	.12	.15	.20	13.72	14.19	3.31
	7797	A2	2 to 11	4.66	5.06	3.39	3.11	.04	.13	.18	9.72	10.07	3.48
	7798	B	11 to 17	4.78	3.13	1.18	3.29	.04	.30	.11	7.23	7.68	5.86
	7799	C	17 to 25	4.90	3.13	.78	1.64	.07	.65	.12	6.60	7.44	11.29
	7800	R	25	4.80	4.10	1.02	13.53	.12	.29	.13	7.05	7.59	7.11

TABLE 9.—*Chemical characteristics of selected soils*—Continued

Soil type	Laboratory No.	Horizon	Depth from surface	Reaction	Phosphorus	Organic matter	Exchangeable Mn	Exchangeable cations (milliequivalents per 100 grams of soil)					Base saturation
								Ca	Mg	K	H	Sum	
			In.	*pH*	*P.p.m.*	*Pct.*	*P.p.m.*						*Pct.*
Hiwassee loam.	7815	Ap	0 to 9	5. 80	9. 89	2. 36	2. 74	3. 54	1. 25	. 15	5. 52	10. 46	47. 23
	7816	B1	9 to 16	5. 80	7. 47	. 90	. 45	3. 93	. 95	. 11	6. 90	11. 89	41. 97
	7817	B21	16 to 26	5. 40	4. 10	. 50	. 64	3. 30	. 59	. 12	8. 13	12. 14	33. 03
	7818	B22	26 to 34	4. 92	2. 65	. 34	. 27	1. 40	. 29	. 17	10. 21	12. 07	15. 41
	7819	B3b	34 to 40	4. 92	3. 62	. 18	. 27	. 54	. 10	. 18	10. 51	11. 33	7. 24
Madison fine sandy loam.	7857	A1	0 to 2	3. 92	5. 55	9. 00	. 46	0	. 07	. 13	13. 65	13. 85	1. 44
	7858	A2	2 to 7	4. 40	3. 62	2. 27	. 64	0	. 09	. 09	7. 24	7. 42	2. 43
	7859	B1	7 to 10	4. 22	1. 69	1. 18	. 64	. 04	. 07	. 07	8. 00	8. 18	2. 20
	7860	B21t	10 to 19	4. 52	. 72	. 48	. 64	. 03	. 14	. 09	8. 15	8. 41	3. 09
	7861	B22t	19 to 29	4. 80	1. 69	. 41	. 27	. 04	. 07	. 11	8. 33	8. 55	2. 57
	7862	B3	29 to 34	4. 90	2. 17	. 15	. 46	. 09	. 09	. 22	7. 36	7. 76	5. 15
	7863	C1	34 to 52	5. 02	2. 17	. 11	. 46	0	. 06	. 10	5. 29	5. 45	2. 94
	7864	C2	52 to 75	5. 10	1. 21	. 08	. 46	. 04	. 03	. 04	4. 24	4. 35	2. 53
Manor loam.	7868	A1	0 to 3	4. 40	4. 58	3. 46	4. 30	. 18	. 17	. 21	12. 90	13. 46	4. 16
	7869	A2	3 to 8	4. 50	2. 17	2. 60	3. 02	. 05	. 16	. 18	11. 78	12. 17	3. 20
	7870	AC	8 to 17	4. 62	2. 65	. 79	. 09	. 11	. 60	. 16	9. 44	10. 31	8. 44
	7871	C1	17 to 31	4. 80	3. 86	. 24	2. 29	. 07	. 64	. 16	6. 31	7. 18	12. 12
	7872	C2	31 to 82	4. 90	5. 79	. 06	2. 83	. 08	. 30	. 27	4. 69	5. 34	12. 17
Myersville loam.	7697	A1	0 to 2	4. 40	7. 72	8. 72	14. 44	. 18	. 28	. 52	20. 29	21. 27	4. 61
	7698	A2	2 to 7	4. 62	4. 34	2. 12	2. 92	. 09	. 19	. 32	10. 07	10. 67	5. 62
	7699	B1	7 to 12	4. 62	5. 30	1. 41	1. 64	. 08	. 37	. 29	9. 14	9. 88	7. 49
	7700	B21t	12 to 20	4. 90	1. 93	. 44	7. 40	. 05	. 53	. 33	7. 30	8. 21	11. 08
	7701	B22t	20 to 31	5. 00	3. 38	. 30	5. 03	. 01	. 30	. 26	9. 86	10. 43	5. 47
	7702	B3	31 to 47	5. 00	2. 41	. 17	7. 77	. 01	. 21	. 24	9. 29	9. 75	4. 72
	7703	C	47 to 74	4. 98	2. 41	. 08	12. 71	. 03	. 17	. 27	8. 99	9. 46	4. 97
Porters loam.	7888	A11	0 to 2	4. 42	12. 54	9. 25	10. 88	2. 07	. 80	. 64	22. 20	25. 71	13. 65
	7889	A12	2 to 4	4. 42	5. 30	5. 52	7. 04	. 39	. 28	. 35	18. 47	19. 49	5. 23
	7890	A2	4 to 9	4. 52	3. 38	3. 64	3. 56	. 19	. 16	. 25	14. 50	15. 10	3. 97
	7891	B	9 to 18	4. 40	3. 38	1. 54	2. 28	. 22	. 15	. 32	10. 36	11. 05	6. 24
	7892	C1	18 to 30	4. 90	9. 16	. 47	1. 73	. 27	. 14	. 22	6. 60	7. 23	8. 71
	7893	C2	30 to 43	5. 00	6. 27	. 25	1. 19	. 12	. 10	. 12	3. 38	3. 72	9. 14
Rabun silt loam.	7894	Ap	0 to 8	6. 90	17. 36	3. 51	1. 73	6. 05	2. 51	. 47	5. 70	14. 73	61. 30
	7895	B1	8 to 13	6. 90	3. 38	. 75	. 09	3. 03	2. 03	. 19	4. 49	9. 74	53. 00
	7896	B21t	13 to 22	5. 72	3. 86	. 33	2. 10	2. 25	2. 43	. 19	7. 65	12. 52	38. 90
	7897	B22t	22 to 35	4. 88	3. 86	. 24	6. 67	. 72	. 95	. 28	11. 86	13. 81	14. 12
	7898	B3	35 to 42	4. 88	6. 27	. 14	9. 41	. 46	. 84	. 34	13. 63	15. 27	10. 74
	7899	C1	42 to 50	4. 90	4. 34	. 17	12. 34	. 32	. 64	. 09	12. 88	13. 93	7. 54
	7900	C2	50 to 60	4. 90	3. 38	. 10	10. 33	. 28	. 50	. 06	11. 89	12. 73	6. 60
Shelocta fine sandy loam.	7820	Ap	0 to 7	6. 90	6. 03	2. 53	. 45	4. 16	1. 61	. 21	1. 79	7. 77	76. 96
	7821	B1	7 to 15	5. 70	2. 17	. 52	. 82	1. 19	1. 17	. 15	3. 14	5. 65	44. 42
	7822	B21t	15 to 26	4. 60	2. 65	. 21	. 45	1. 00	1. 10	. 22	9. 60	11. 92	19. 46
	7823	B22t	26 to 34	4. 60	2. 17	. 20	. 45	. 55	. 86	. 32	17. 12	18. 85	9. 18
	7824	B31	34 to 50	4. 40	2. 17	. 10	. 45	. 14	. 26	. 29	16. 22	16. 91	4. 08
	7825	IIB32	50 to 65	4. 40	3. 62	. 13	. 64	0	. 08	. 21	16. 22	16. 51	1. 76
State fine sandy loam.	7901	Ap	0 to 10	5. 42	52. 56	1. 78	1. 92	2. 05	. 35	. 22	7. 47	10. 09	25. 97
	7902	B1	10 to 19	5. 60	10. 61	. 77	1. 92	1. 97	. 40	. 15	5. 85	8. 37	30. 11
	7903	B2t	19 to 31	5. 70	10. 61	. 29	. 09	2. 44	. 46	. 12	4. 61	7. 63	39. 58
	7904	IIC1	31 to 49	5. 50	10. 13	. 17	. 09	. 67	. 10	. 10	2. 03	2. 90	30. 00
Talladega silt loam.	7908	A1	0 to 1	4. 70	5. 30	4. 42	8. 13	. 91	. 79	. 44	10. 33	12. 47	17. 16
	7909	A2	1 to 6	4. 80	3. 38	2. 66	5. 39	. 22	. 56	. 35	8. 10	9. 23	12. 24
	7910	B	6 to 12	5. 12	2. 41	1. 00	2. 28	. 20	. 83	. 38	4. 28	5. 69	24. 78
	7911	C1	12 to 39	5. 12	2. 89	. 26	1. 92	. 04	. 54	. 33	2. 39	3. 30	27. 58
	7912	C2	39 to 57	5. 10	4. 82	. 14	2. 65	0	. 08	. 41	2. 78	3. 27	14. 98
Toxaway silt loam, thick surface.	7919	Apg	0 to 7	5. 38	29. 42	8. 49	3. 38	8. 40	3. 42	. 23	19. 78	31. 83	37. 86
	7920	A11g	7 to 15	5. 10	4. 82	4. 02	1. 19	4. 36	1. 50	. 08	13. 68	19. 62	30. 28
	7921	A12g	15 to 23	5. 20	6. 75	3. 44	2. 65	3. 19	1. 48	. 09	10. 85	15. 61	30. 49
	7922	A13g	23 to 28	5. 02	9. 16	5. 30	3. 20	2. 94	1. 28	. 10	12. 05	16. 37	26. 39
	7923	A14g	28 to 38	4. 78	7. 72	3. 74	1. 55	1. 65	. 87	. 09	7. 85	10. 46	24. 95
	7924	IICg	38 to 48	4. 46	8. 68	1. 08	. 27	. 68	. 45	. 27	2. 43	3. 83	36. 55

TABLE 9.—*Chemical characteristics of selected soils*—Continued

Soil type	Laboratory No.	Horizon	Depth from surface	Reaction	Phosphorus	Organic matter	Exchangeable Mn	Exchangeable cations (milliequivalents per 100 grams of soil)					Base saturation
								Ca	Mg	K	H	Sum	
			In.	*pH*	*P.p.m.*	*Pct.*	*P.p.m.*						*Pct.*
Turbeville fine sandy loam.	7801	A1	0 to 2	3.60	11.81	12.56	.18	.16	.32	.20	24.87	25.55	2.66
	7802	A2	2 to 8	4.58	3.13	1.70	.36	.05	.03	.23	7.53	7.84	3.95
	7803	B1	8 to 12	4.40	3.13	.97	.18	.09	.11	.22	7.95	8.37	5.02
	7804	B21t	12 to 21	4.42	5.55	1.03	.18	.09	.41	.21	9.18	9.89	7.18
	7805	B22t	21 to 36	4.90	6.03	.39	.18	.05	.63	.27	8.43	9.38	10.13
	7806	IIB23t	36 to 52	5.00	4.58	.21	.18	.07	.10	.15	8.22	8.54	3.75
	7807	IIIB24t	52 to 80	5.10	2.65	.14	.36	.08	.06	.14	6.66	6.94	4.03
Tusquitee loam.	7925	Ap	0 to 8	5.40	27.00	3.67	5.21	3.02	.65	.19	10.64	14.50	26.62
	7926	A3	8 to 15	5.30	8.68	2.99	4.66	1.80	.47	.20	11.72	14.19	17.41
	7927	B1	15 to 24	5.08	8.68	1.19	7.04	1.15	.50	.22	9.47	11.34	16.49
	7928	B2t	24 to 40	4.92	2.17	.43	1.00	1.66	.86	.15	7.55	10.22	26.13
	7929	B3	40 to 48	4.82	2.17	.32	1.00	.70	.67	.15	7.85	9.37	16.22
	7930	IIC	48 to 53	4.80	2.65	.36	1.37	.53	.58	.22	6.37	7.70	17.27
Watauga silt loam.	7931	Ap	0 to 7	5.66	12.78	4.08	2.47	4.08	1.44	1.05	8.30	14.87	44.18
	7932	B21t	7 to 12	4.90	3.13	1.55	1.00	1.02	.73	.45	8.45	10.65	20.66
	7933	B22t	12 to 21	4.90	1.21	.33	.27	.80	.69	.50	6.16	8.15	24.42
	7934	B3	21 to 29	4.50	1.69	.22	.45	.41	.73	.34	4.72	6.20	23.87
	7935	C11	29 to 58	4.70	1.69	.10	2.28	.13	.38	.33	3.19	4.03	20.84
	7936	C12	58 to 96	4.80	1.21	.03	1.37	.05	.34	.27	2.71	3.37	19.58
	7937	C13	96 to 102	5.00	1.69	.05	2.65	.01	.33	.24	2.28	2.86	20.28
Wickham loam.	7940	A1	0 to 2	4.12	18.08	12.78	2.10	1.35	.81	.48	23.75	23.39	10.00
	7941	A2	2 to 7	4.60	4.58	3.44	.45	.10	.25	.31	10.40	11.06	5.97
	7942	A3	7 to 10	4.68	1.69	1.30	.46	.10	.05	.34	7.20	7.69	6.37
	7943	B1	10 to 14	4.68	2.17	.98	.46	.16	.24	.35	7.50	8.25	9.09
	7944	B2lt	14 to 28	4.78	2.65	.50	.46	.18	.45	.41	9.12	10.16	10.24
	7945	B22t	28 to 36	5.38	2.65	.25	.46	.06	.41	.36	7.65	8.48	9.79
	7946	B3	36 to 46	5.40	2.65	.20	.46	.09	.33	.29	6.87	7.58	9.37
	7947	IIC1	46 to 72	5.20	1.69	.15	.46	.18	.17	.44	3.44	4.23	18.68

Additional Facts About the County

This section describes the climate, physiography, relief, drainage, and water supply in Carroll County. It also discusses industry and agriculture.

The early settlers in this county came chiefly from eastern Virginia and made their living mainly by hunting and fishing. During the Revolutionary War many more settlers came and farming began to increase, mostly in the stream valleys, which were fertile and productive.

At present industrial plants in the county employ about 4,100 persons, mostly in or near the larger communities. They manufacture a wide assortment of products, including electronic equipment, glass products, furniture, clothing, and lumber. A few growers grade, pack, and store fruit in the county. Trucks collect milk daily, and several small trucking companies haul other farm products to market. Most cattle are sold at livestock markets in Galax and other towns outside the county. There are twice as many part-time or residential farms as there are commercial farms in the county, and more than half the farms have family income from other sources that exceeds the income from farm products.

The Blue Ridge Parkway and Jefferson National Forest offer varied recreational facilities. In addition nearly all of the mountain streams have native trout, and a number of them are stocked with rainbow trout.

Climate

The climate varies somewhat from one part of Carroll County to another. It is characterized by cool, pleasant summers and rather cold, severe winters in the Blue Ridge Mountains and by warm summers and mild winters on the Piedmont Plateau. The prevailing wind is from the west. The wind blows hardest in spring, and there is usually a good breeze at all times of the year. In winter, fields and roads are normally open long enough for some outside work to be done. Winter crops, such as wheat, oats, and alfalfa, withstand the cold and are damaged to only a slight extent by winterkilling.

The temperature and precipitation data from the United States Weather Bureau Station at Wytheville in Wythe County were used because data at the station in Carroll County are incomplete. These data are shown in table 10.

In the Blue Ridge Mountains the average temperature is 35.9° F. in winter and 70.0° in summer, and in the Piedmont it is 39.5° in January and 75.7° in July. The average temperature is 2° or 3° lower in the Blue Ridge Mountains than at the Wytheville Station.

At Wytheville the average frost-free period, or growing season, is 176 days. This period extends from April 22 to October 16, but killing frost has occurred as late in spring as May 27 and as early in fall as September 19.

TABLE 10.—*Temperature and precipitation data*

[All data from Weather Bureau Station at Wytheville, Wythe County, Va.; elevation 2,400 ft.]

Month	Temperature [1]			Precipitation					
	Average	Absolute maximum	Absolute minimum	Average	Days with 0.1 inch [2]	Days with 0.5 inch [3]	Wettest year (1957) [4]	Driest year (1941) [4]	Average snowfall [5]
	°F.	°F.	°F.	Inches	Number	Number	Inches	Inches	Inches
January	35. 4	78	−8	2. 90	6	2	5. 13	1. 33	5. 7
February	36. 3	73	−6	2. 93	7	2	6. 21	. 84	4. 9
March	43. 6	84	3	3. 44	9	3	2. 68	2. 31	3. 7
April	52. 0	89	14	2. 97	7	2	4. 31	2. 56	. 5
May	60. 8	91	28	3. 58	8	3	2. 96	. 65	[6]
June	68. 3	96	36	3. 92	6	2	4. 31	3. 52	[6]
July	71. 4	96	42	4. 14	9	3	4. 82	3. 75	0
August	70. 3	95	42	4. 04	8	3	1. 93	2. 42	0
September	64. 9	93	28	3. 14	5	2	6. 66	. 71	0
October	54. 4	89	15	2. 54	6	2	1. 40	. 90	. 2
November	43. 3	78	0	2. 21	6	1	3. 95	1. 44	1. 4
December	36. 0	72	−7	2. 69	6	2	2. 77	2. 18	5. 1
Year	53. 0	----------	----------	38. 50	83	27	47. 13	22. 61	21. 5

[1] 48-year record.
[2] 7-year record.
[3] 10-year record.
[4] 30-year record through 1960.
[5] 49-year record through 1952.
[6] Trace.

In the Blue Ridge Mountains the growing season is 160 to 170 days. Most crops can mature in this time if varieties that require only a medium-length growing season are used. The grazing season extends from about May 1 to October 15. Beef cattle stay out on the range in winter, unless the weather is unusually severe, but dairy cattle are kept in the barn most of the time. In the Piedmont the average length of the growing season is 193 days.

Rainfall is well distributed, but the supply of moisture is low at times in July, August, and September. In winter and in spring the rains are generally slow and steady, and in summer heavy showers and thunderstorms are frequent. The weather is often wet for a short time and then dry for a short time. The resulting fluctuations in moisture affect the growth of crops and, in turn, the yield. Long periods of wet weather are not frequent, but in some years the harvesting of small grain and early hay crops has been delayed by wet weather. In summer the pasture plants are short, and it is necessary to provide supplementary feed for the cattle. The annual rainfall averages 42 inches in the Blue Ridge Mountains and 49 inches in the Piedmont.

Hailstorms are infrequent and affect only small areas.

Physiography, Relief, and Drainage

The Blue Ridge province is one of three physiographic provinces in the county. It consists of the Blue Ridge Mountains and the outlying mountains and foothills and is characterized by relatively broad, rounded ridges that have many steep to precipitous slopes. Spurs and sharp knobs stand out above the foothills. The Blue Ridge is an old plateau that has been deeply cut by streams. The elevation is 1,200 to 3,500 feet. Large rock outcrops and loose rocks are scattered over most of the mountain slopes. This province makes up about 90 percent of the county. Most areas are well drained, but some small areas at the base of slopes and at the foot of mountains are poorly drained.

The Piedmont province is an old plain that is strongly dissected by many small streams flowing in narrow winding valleys. The divides between the streams are fairly wide, sloping, and rolling, except those along the lower tributaries of larger streams where entrenchment has been rapid. As a result there are numerous bluffs and V-shaped valleys, and steep slopes rise abruptly from the flood plains. This province makes up about 8 percent of the county and occurs at elevations between 1,000 and about 1,500 feet. Most areas are well drained, but some areas along the major streams are poorly drained.

In the Ridge and Valley province, the valley formed because the underlying limestone dissolved. Generally the valley is gently sloping to steep. It is steep in places where streams have cut it. This province makes up about 2 percent of the county and occurs at elevations between 2,000 and 2,700 feet. Most of the area is well drained, but some of it is poorly drained.

Water Supply

Streams are numerous in all parts of Carroll County, and they supply adequate water except in long periods of drought. The water is soft and of good quality.

Ground water varies in quality and in quantity from place to place, depending upon the underlying rock formation. In areas underlain by granite, soft water is obtained at a depth of between 70 and 200 feet and flows at a rate of between 1 gallon and 15 gallons a minute. In areas underlain by schist, water is obtained at a depth of 100 feet or less and flows at a rate of between 1 gallon and 8 gallons a minute. In areas underlain by limestone, the water is generally hard. In areas underlain by sandstone and shale, water is obtained at a depth of between 70 and 200 feet and is likely to contain too much iron.

Natural springs and drilled or dug wells supply water in rural areas. Central systems that include reservoirs and modern filtration facilities supply water to the larger communities. Many farm ponds furnish water for irrigation and water for livestock, and provide recreational facilities.

Literature Cited

(1) ALLAN, P. F., GARLAND, L. E., and DUGAN, R. F.
1963. RATING NORTHEASTERN SOILS FOR THEIR SUITABILITY FOR WILDLIFE HABITAT. N. Am. Wildlife and Natural Res. Trans., pp. 247–261, illus.

(2) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 8, 2 v., illus.

(3) BAUR, A. J., and LYFORD, W. H.
1957. SOLS BRUNS ACIDES OF THE NORTHEASTERN UNITED STATES. Soil Sci. Soc. Am. Proc. 21: 533–536.

(4) PEECH, M., ALEXANDER, L. T., DEAN, L. A., and REED, J. F.
1947. METHODS OF SOIL ANALYSIS FOR SOIL-FERTILITY INVESTIGATIONS. U.S. Dept. Agr. Cir. 757, 25 pp.

(5) PORTLAND CEMENT ASSOCIATION.
1957. PCA SOIL PRIMER. 86 pp., illus.

(6) THORP, JAMES, and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.

(7) TRUOG, E.
1930. THE DETERMINATION OF THE READILY AVAILABLE PHOSPHORUS OF SOILS. Am. Soc. Agron. Jour. 22: 874–882.

(8) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. Agr. Ybk., 1,232 pp., illus.

(9) ———
1960. SOIL CLASSIFICATION: A COMPREHENSIVE SYSTEM. Soil Survey Staff, Soil Cons. Serv. [Supplement issued in March 1967]

(10) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1953. UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. No. 3–357, 2 v., illus.

Glossary

Acidity. See Reaction, soil.

Alluvium. Soil material, such as silt or clay, that has been deposited on land by streams.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Loose.—Noncoherent; will not hold together in a mass.

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.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Erosion, soil. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Leaching. The removal of soluble materials from soils or other material by percolating water.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Natural drainage. Drainage that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time. If podzolic, they commonly have mottling below 6 to 16 inches in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil and carbon, hydrogen, and oxygen obtained largely from the air and water, are plant nutrients.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Permeability. The quality that enables a soil to transmit water and air. Unless otherwise indicated, the terms used in this

report to describe permeability can be expressed in inches per hour as follows:

	Inches per hour
Slow	Less than 0.20
Moderately slow	0.20 to 0.63
Moderate	0.63 to 2.0
Moderately rapid	2.0 to 6.3
Rapid	More than 6.3

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values and in words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of the land surface, considered collectively.

Runoff (hydrology). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stone line. A concentration of coarse fragments in soils. In a cross section, the line may be one stone or more thick. The line generally overlies material that weathered in place, and it is ordinarily overlain by sediment of variable thickness.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are— *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. Stream terraces are frequently called *second bottoms*, as contrasted to *flood plains*, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, page 7, for approximate acreage and proportionate extent of the soils; table 2, page 46, for estimated average yields; tables 4, 5, and 6, on pages 58, 76, and 84, for information significant to engineering; table 3, page 54, for wildlife interpretations, and table 7, page 86, for nonfarm uses of soils]

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
AlB	Altavista silt loam, gently sloping	8	IIe-4	41	10	52
At	Atkins loam	9	IVw-1	44	4	51
BoE	Bolton loam, steep	9	VIe-1	45	13	53
BrC	Braddock cobbly fine sandy loam, sloping	10	IVe-5	44	7	52
Bu	Buncombe loamy fine sand	10	IIIs-2	43	1	50
CeB	Cecil fine sandy loam, gently sloping	11	IIe-3	40	7	52
CeB2	Cecil fine sandy loam, gently sloping, eroded	11	IIe-3	40	7	52
CeC	Cecil fine sandy loam, sloping	11	IIIe-4	42	7	52
CeC2	Cecil fine sandy loam, sloping, eroded	11	IIIe-4	42	7	52
CgB	Chester-Glenelg cobbly loams, gently sloping	12	IIIs-1	43	7	52
CgC	Chester-Glenelg cobbly loams, sloping	12	IVe-5	44	7	52
CgC2	Chester-Glenelg cobbly loams, sloping, eroded	12	IVe-5	44	7	52
CgE	Chester-Glenelg cobbly loams, steep	12	VIe-3	45	7	52
CgE2	Chester-Glenelg cobbly loams, steep, eroded	12	VIe-3	45	7	52
ChB	Chester-Glenelg loams, gently sloping	12	IIe-3	40	7	52
ChB2	Chester-Glenelg loams, gently sloping, eroded	12	IIe-3	40	7	52
ChC	Chester-Glenelg loams, sloping	12	IIIe-4	42	7	52
ChC2	Chester-Glenelg loams, sloping, eroded	13	IIIe-4	42	7	52
ChE	Chester-Glenelg loams, steep	13	IVe-2	43	7	52
ChE2	Chester-Glenelg loams, steep, eroded	13	IVe-2	43	7	52
ClC	Clymer fine sandy loam, sloping	13	IIIe-5	42	14	53
ClD	Clymer fine sandy loam, moderately steep	13	IVe-3	43	14	53
Co	Codorus silt loam	14	IIIw-1	42	3	51
Cs	Codorus-Hatboro silt loams	14	IVw-1	44	3	51
Cu	Comus fine sandy loam	15	IIw-1	41	2	51
CyE	Corydon rocky soils, steep	15	VIIs-1	46	12	52
EdC	Edneyville fine sandy loam, sloping	16	IIIe-5	42	7	52
EkC	Elioak silt loam, sloping	16	IIIe-4	42	7	52
EkC2	Elioak silt loam, sloping, eroded	16	IIIe-4	42	7	52
EkD	Elioak silt loam, moderately steep	16	IVe-2	43	7	52
EkD2	Elioak silt loam, moderately steep, eroded	16	IVe-2	43	7	52
FcC	Fletcher loam, sloping	17	IIIe-4	42	7	52
FcD	Fletcher loam, moderately steep	17	IVe-2	43	7	52
GnC	Gilpin silt loam, sloping	18	IIIe-5	42	7	52
GnC2	Gilpin silt loam, sloping, eroded	18	IIIe-5	42	7	52
GnD	Gilpin silt loam, moderately steep	18	IVe-3	43	7	52
Gr	Gravelly alluvial land	18	IIs-1	41	7	52
Gu	Gullied land	19	VIIe-1	45	11	52
Ha	Hatboro silt loam	19	IVw-1	44	4	51
Hb	Hatboro-Toxaway silt loams	19	IVw-1	44	4	51
HcC	Hayesville cobbly loam, sloping	20	IVe-5	44	7	52
HcD2	Hayesville cobbly loam, moderately steep, eroded	20	IVe-5	44	7	52
HeB	Hayesville loam, gently sloping	20	IIe-3	40	7	52
HeB2	Hayesville loam, gently sloping, eroded	20	IIe-3	40	7	52
HeC	Hayesville loam, sloping	20	IIIe-4	42	7	52
HeC2	Hayesville loam, sloping, eroded	20	IIIe-4	42	7	52
HeD	Hayesville loam, moderately steep	20	IVe-2	43	7	52
HeD2	Hayesville loam, moderately steep, eroded	20	IVe-2	43	7	52
HmE	Hazel channery complex, steep	21	VIIs-1	46	8	52
HmF	Hazel channery complex, very steep	21	VIIs-1	46	8	52
HnC	Hazel complex, sloping	21	IVe-4	44	8	52

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
HnE	Hazel complex, steep	21	VIIe-1	45	8	52
HtB	Hiwassee and Turbeville loams, gently sloping	22	IIe-2	40	6	51
HtC	Hiwassee and Turbeville loams, sloping	22	IIIe-3	42	6	51
HtD	Hiwassee and Turbeville loams, moderately steep	22	IVe-1	43	6	51
HuC	Hiwassee and Turbeville cobbly fine sandy loams, sloping	22	IVe-5	44	7	52
HuD	Hiwassee and Turbeville cobbly fine sandy loams, moderately steep	22	IVe-5	44	7	52
HvC	Hiwassee and Turbeville fine sandy loams, sloping	22	IIIe-4	42	7	52
LcE	Louisa complex, steep	23	VIIe-1	45	5	51
LoD	Louisburg complex, moderately steep	23	VIe-2	45	5	51
LoE	Louisburg complex, steep	23	VIIe-1	45	5	51
MaC	Madison cobbly fine sandy loam, sloping	24	IVe-5	44	7	52
MaC2	Madison cobbly fine sandy loam, sloping, eroded	24	IVe-5	44	7	52
MaD	Madison cobbly fine sandy loam, moderately steep	24	IVe-5	44	7	52
MaD2	Madison cobbly fine sandy loam, moderately steep, eroded	24	IVe-5	44	7	52
MaE	Madison cobbly fine sandy loam, steep	24	VIe-3	45	7	52
MdB	Madison fine sandy loam, gently sloping	25	IIe-3	40	7	52
MdB2	Madison fine sandy loam, gently sloping, eroded	25	IIe-3	40	7	52
MdC	Madison fine sandy loam, sloping	25	IIIe-4	42	7	52
MdC2	Madison fine sandy loam, sloping, eroded	25	IIIe-4	42	7	52
MdD	Madison fine sandy loam, moderately steep	25	IVe-2	43	7	52
MdD2	Madison fine sandy loam, moderately steep, eroded	25	IVe-2	43	7	52
MdE	Madison fine sandy loam, steep	25	VIe-1	45	7	52
MdE2	Madison fine sandy loam, steep, eroded	25	VIe-1	45	7	52
MnC	Manor loam, sloping	26	IVe-4	44	5	51
MnD	Manor loam, moderately steep	26	VIe-2	45	5	51
MnE	Manor loam, steep	26	VIIe-1	45	5	51
MnF	Manor loam, very steep	26	VIIe-1	45	5	51
MoC	Manor very stony loam, sloping	26	VIs-1	45	5	51
MoE	Manor very stony loam, steep	26	VIIs-1	46	5	51
MoF	Manor very stony loam, very steep	26	VIIs-1	46	5	51
MrB	Myersville loam, gently sloping	27	IIe-2	40	6	51
MrC	Myersville loam, sloping	27	IIIe-3	42	6	51
MrC2	Myersville loam, sloping, eroded	27	IIIe-3	42	6	51
MrE	Myersville loam, steep	27	IVe-1	43	6	51
MrE2	Myersville loam, steep, eroded	27	IVe-1	43	6	51
MsC	Myersville loam, thin solum, sloping	27	IIIe-5	42	9	52
MsE	Myersville loam, thin solum, steep	27	VIe-1	45	9	52
MyC	Myersville stony loam, thin solum, sloping	28	IVe-5	44	9	52
MyE	Myersville stony loam, thin solum, steep	28	VIe-3	45	9	52
PoC	Porters loam, sloping	28	IIIe-5	42	9	52
PoD	Porters loam, moderately steep	28	IVe-3	43	9	52
PoE	Porters loam, steep	28	VIe-1	45	9	52
PoF	Porters loam, very steep	28	VIIe-1	45	9	52
RaC	Rabun silt loam, sloping	29	IIIe-3	42	6	51
RaD	Rabun silt loam, moderately steep	29	IVe-1	43	6	51
RaD2	Rabun silt loam, moderately steep, eroded	29	IVe-1	43	6	51
RaE	Rabun silt loam, steep	29	VIe-1	45	6	51
RmE	Ramsey very stony loam, steep	30	VIIs-1	46	8	52
RmF	Ramsey very stony loam, very steep	30	VIIs-1	46	8	52
Rg	Rock land, gneiss and schist	30	VIIs-1	46	11	52
Rl	Rock land, limestone	30	VIIs-1	46	11	52
Rr	Rock land, quartzite	30	VIIs-1	46	11	52
ScD	Shelocta cobbly fine sandy loam, moderately steep	31	IVe-5	44	7	52
ShB	Shelocta fine sandy loam, gently sloping	31	IIe-3	40	7	52
ShC	Shelocta fine sandy loam, sloping	31	IIIe-5	42	7	52
ShD	Shelocta fine sandy loam, moderately steep	31	IVe-3	43	7	52
SrB	Starr loam, gently sloping	31	I-1	40	2	51
SrC	Starr loam, sloping	32	IIIe-1	41	2	51
SsA	State fine sandy loam, nearly level	32	I-2	40	2	51

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
SsB	State fine sandy loam, gently sloping	32	IIe-1	40	2	51
St	Stony colluvial land	32	VIs-1	45	11	52
SuC	Stony land, Porters materials, sloping	32	VIs-1	45	9	52
SuE	Stony land, Porters materials, steep	32	VIIs-1	46	9	52
SuF	Stony land, Porters materials, very steep	32	VIIs-1	46	9	52
TaC	Talladega soils, sloping	33	IVe-4	44	8	52
TaD	Talladega soils, moderately steep	33	VIe-2	45	8	52
TaE	Talladega soils, steep	33	VIIe-1	45	8	52
To	Toxaway silt loam, thick surface	34	IVw-1	44	4	51
TsC	Tusquitee cobbly loam, sloping	35	IVe-5	44	6	51
TuB	Tusquitee loam, gently sloping	35	IIe-1	40	6	51
TuC	Tusquitee loam, sloping	35	IIIe-2	41	6	51
TuD	Tusquitee loam, moderately steep	35	IVe-3	43	6	51
TvC	Tusquitee very stony loam, sloping	35	VIs-1	45	6	51
TvD	Tusquitee very stony loam, moderately steep	35	VIs-1	45	6	51
WaC	Watauga cobbly silt loam, sloping	36	IVe-5	44	7	52
WaD	Watauga cobbly silt loam, moderately steep	36	IVe-5	44	7	52
WaE	Watauga cobbly silt loam, steep	36	VIe-3	45	7	52
WgC	Watauga silt loam, sloping	36	IIIe-4	42	7	52
WgD	Watauga silt loam, moderately steep	36	IVe-2	43	7	52
WgE	Watauga silt loam, steep	37	VIe-1	45	7	52
WhC	Weikert channery silt loam, sloping	37	IVe-5	44	8	52
WhD	Weikert channery silt loam, moderately steep	37	VIe-3	45	8	52
WhE	Weikert channery silt loam, steep	37	VIIe-1	45	8	52
WkD	Weikert very shaly silt loam, moderately steep	37	VIs-1	45	15	53
WkE	Weikert very shaly silt loam, steep	37	VIIs-1	46	15	53
WkF	Weikert very shaly silt loam, very steep	37	VIIs-1	46	15	53
WmB	Wickham loam, gently sloping	38	IIe-1	40	7	52
WmC	Wickham loam, sloping	38	IIIe-2	41	7	52
WsB	Wickham fine sandy loam, gently sloping	38	IIe-3	40	7	52
WsC	Wickham fine sandy loam, sloping	38	IIIe-4	42	7	52
WsC2	Wickham fine sandy loam, sloping, eroded	38	IIIe-4	42	7	52
WtB	Worsham loam, gently sloping	39	Vw-1	45	4	51

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