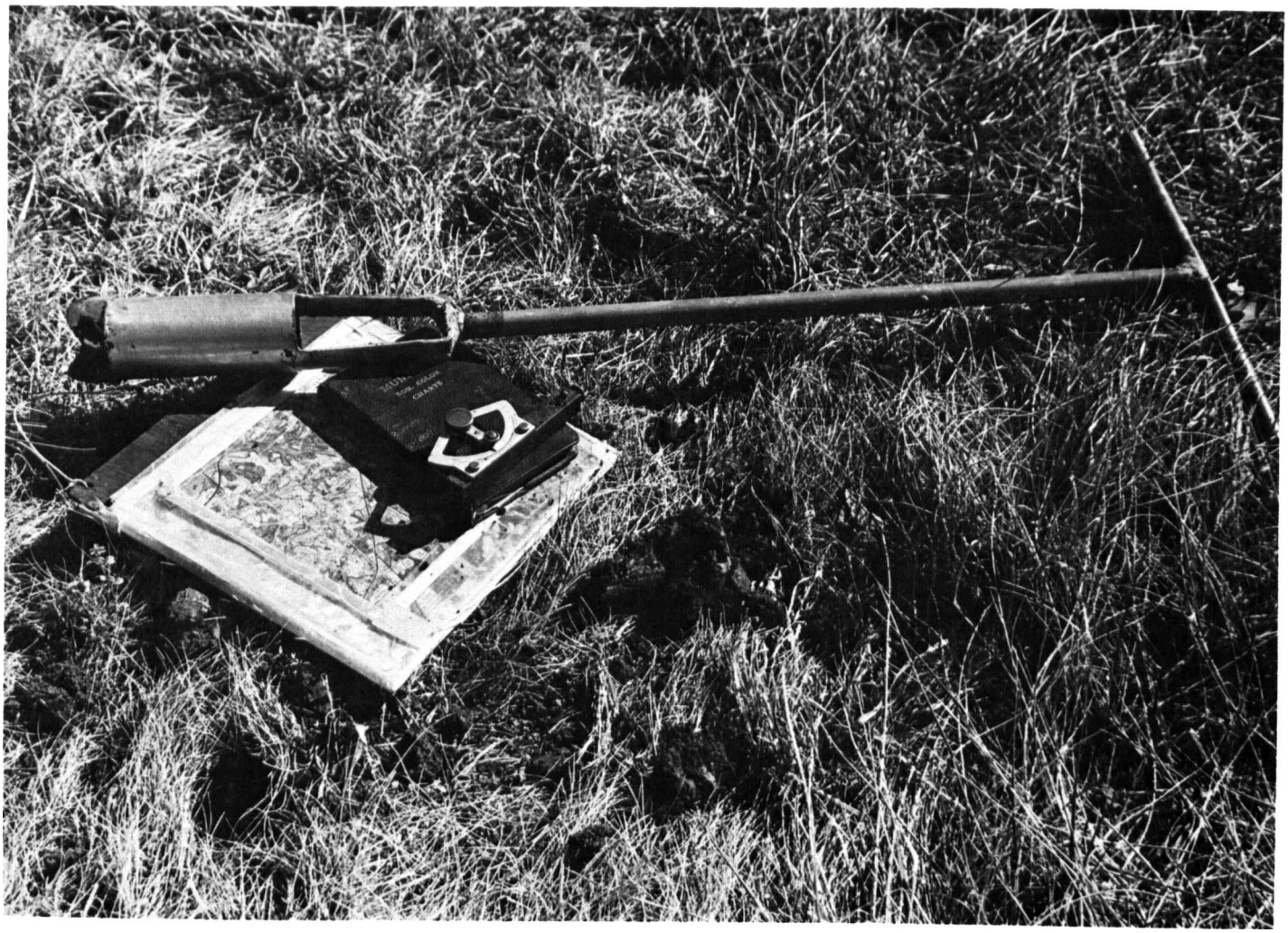
SOIL SURVEY OF

Durham County, North Carolina



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

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1966–69. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made cooperatively by the Soil Conservation Service and the North Carolina Agricultural Experiment Station. It is part of the technical assistance furnished to the Durham County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

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

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

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

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the sections "Engineering Uses of the Soils" and "Recreation."

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

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

Newcomers in Durham 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 information about the county given in the section "General Nature of the County."

Cover: Working tools of a soil scientist. (Photo courtesy Durham-Herald Sun)

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Issued June 1976

SOIL SURVEY OF DURHAM COUNTY, NORTH CAROLINA

REPORT BY ROBERT M. KIRBY, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY W. I. SHOPE, V. S. JENKINS, AND R. M. KIRBY[1]

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

DURHAM COUNTY is in the north-central part of North Carolina (fig. 1). It has a total land area of 188,928 acres, or 296 square miles. The population in 1969 was 132,681, of which 95,438 lived in the city of Durham, the county seat.

Durham County is in the Piedmont physiographic province. The topography of the county is dominantly rolling, but some steep areas parallel the major streams.

The county is mainly urban. Industry, government, educational and research institutions, and commercial trading outlets contribute to the economy of the county. Short, mild winters and long, hot summers permit a wide range in types of farming and choice of crops. The chief cash crop is tobacco, contributing about 84 percent of the gross farm income. Corn, small grain, hay crops, poultry, and beef cattle make up most of the remaining gross farm income. According to the 1969 U.S. Census of Agriculture, about 22,804 acres was used for crops, 6,300 acres was in pasture, and 32,531 acres was in woodland. Both Duke and North Carolina State Universities operate research forests in the county.

The soils of Durham County are dominantly acid and strongly leached and have low base saturation. For optimum crop yields, lime and fertilizer should be applied according to the results of soil tests in order to raise the level of calcium, magnesium, phosphorus, and potassium.

How This Survey Was Made

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

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Granville and Wilkes, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, White Store clay loam, 2 to 10 percent slopes, eroded, is one of several phases within the White Store series.

After a guide for classifying and naming the soil had been worked out, the soil scientists drew the boundaries of the 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 at the back of this publication was prepared from the aerial photographs.

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

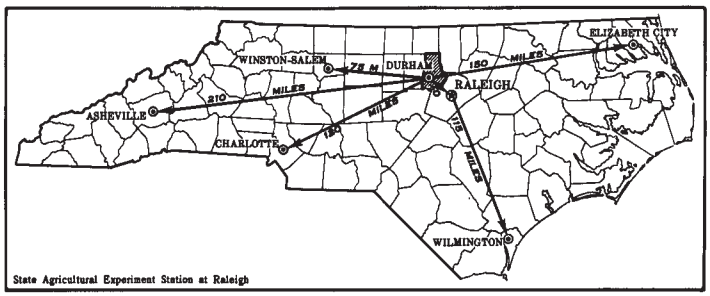

Figure 1.—**Location of Durham County in North Carolina.**

[1] Others contributing substantially to this survey were R. C. Pleasants, J. W. Cawthorn, and D. G. Spangler, Soil Conservation Service.

seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Durham County, soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. White Store-Urban land complex, 0 to 10 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Cartecay and Chewacla soils is an example.

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

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

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

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Durham 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 the county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this county have been grouped according to general kinds of landscape. The six groups and the nine soil associations are described on the following pages.

Well Drained and Moderately Well Drained, Nearly Level to Moderately Steep Soils Formed in Material Derived From Shale and Sandstone

The three associations in this group make up about 54 percent of the county. The landscape is dominantly one of broad smooth areas and rolling slopes. The soils formed in acid Triassic material.

1. White Store-Creedmoor association

Gently sloping to moderately steep, moderately well drained soils that have a subsoil of dominantly firm and very firm clay; on uplands

This association is characterized by fairly broad, gently sloping ridges and rolling to strongly sloping side slopes. It makes up about 40 percent of the county. It is 65 percent White Store soils, 10 percent Creedmoor soils, and 25 percent Mayodan, Pinkston, and Iredell soils.

White Store soils are moderately well drained. Their sandy loam surface layer is underlain by strong-brown firm clay loam and yellowish-red very firm clay.

Creedmoor soils also are moderately well drained. Their surface layer is sandy loam. The upper part of the subsoil is pale-brown or brownish-yellow, friable sandy clay loam; and the lower part is light yellowish-brown or light-gray, firm or very firm clay or silty clay.

Most of the association is forested. The rest is cultivated and pastured. The major soils are well suited to tobacco, corn, soybeans, small grain, and forage crops (fig. 2).

The chief limitations for farm and nonfarm purposes are the very slow permeability of the soils, the high shrink-swell potential, and the erosion hazard resulting from runoff and slope.

The city of Durham and most of its suburbs are on this association.

2. Mayodan-Granville-Creedmoor association

Nearly level to moderately steep, well drained and moderately well drained soils that have a subsoil of dominantly friable sandy clay loam; on uplands

This association is characterized by broad, smooth ridges and rolling side slopes. It makes up about 6 percent of the county. It is 50 percent Mayodan soils, 20 percent Granville soils, 10 percent Creedmoor soils, and 20 percent White Store and Pinkston soils.

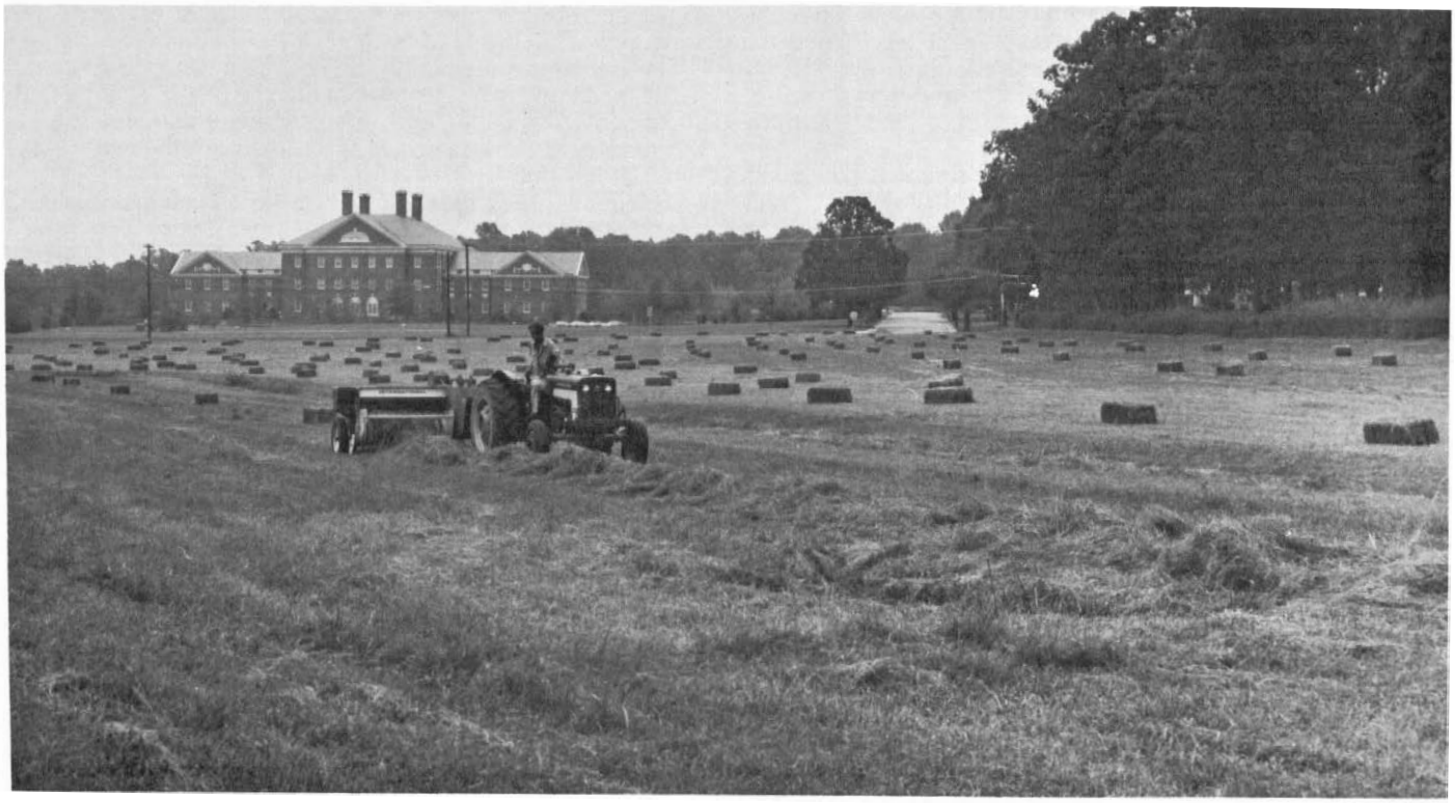

***Figure 2.*—Forage crops in the White Store-Creedmoor association.**

Mayodan soils are well drained. Their sandy loam surface layer is underlain by strong-brown, friable sandy clay loam and yellowish-red, firm sandy clay.

Granville soils are also well drained. Their grayish-brown sandy loam surface layer is underlain by olive, yellow, and brownish-yellow, friable sandy clay loam.

Creedmoor soils are moderately well drained soils. Their surface layer is sandy loam. The upper part of the subsoil is pale-brown or brownish-yellow, friable sandy clay loam; and the lower part is light yellowish-brown or light-gray, firm and very firm clay or silty clay

Most of this association is forested. The rest is cultivated or pastured. The soils are well suited to tobacco, corn, soybeans, small grain, and forage crops.

The chief limitations for farm and nonfarm purposes are the erosion hazard resulting from runoff and the wetness and the very slow permeability of the soils.

3. White Store-Pinkston association

Gently sloping to moderately steep, moderately well drained and excessively drained soils that have a subsoil of dominantly firm and very firm clay and friable fine sandy loam; on uplands

This association is characterized by narrow, gently sloping ridges and strongly sloping to steep side slopes. It makes up about 8 percent of the county. It is 70 percent White Store soils, 20 percent Pinkston soils, and 10 percent Mayodan and Creedmoor soils.

White Store soils are moderately well drained. Their sandy loam surface layer is underlain by strong-brown, firm clay loam and yellowish-red, very firm clay.

Pinkston soils are excessively drained soils. Their fine sandy loam surface layer is underlain by yellowish-red, friable fine sandy loam.

Most of this association is forested. The rest is chiefly cultivated or pastured. The soils are well suited to most crops commonly grown in the county.

The chief limitation for farm and nonfarm purposes is the erosion hazard resulting from runoff and slope.

Dominantly Somewhat Poorly Drained and Poorly Drained, Nearly Level Soils Subject to Flooding; Formed in Alluvial Material

The one association in this group makes up about 9 percent of the county. The soils formed in recently deposited material on large flood plains.

4. Chewacla-Wehadkee-Congaree association

Somewhat poorly drained and poorly drained soils that have a subsoil of dominantly silty clay loam and well-drained soils that are dominantly silt loam throughout; on flood plains

This association is on nearly level flood plains along streams. It makes up about 9 percent of the county. It is 45 percent Chewacla soils, 30 percent Wehadkee soils, 15 percent Congaree soils, and 10 percent Cartecay, Roanoke, and Altavista soils.

Ordinarily Wehadkee soils are on the lowest parts of the landscape, farthest from the stream channels. Congaree soils generally are on the highest parts, adjacent to stream channels that are deep enough to allow rapid flow of water. Chewacla soils occupy intermediate positions between Wehadkee and Congaree soils.

Chewacla soils are somewhat poorly drained. Their silt loam surface layer is underlain by mottled dark-brown and light yellowish-brown, friable silt loam and mottled light brownish-gray, brown, and yellowish-brown silty clay loam.

Wehadkee soils are poorly drained. Their silt loam surface layer is underlain by light-gray, friable silty clay loam and mottled dark-brown and light-gray, friable clay loam.

Congaree soils are well drained. Their silt loam surface layer is underlain by yellowish-brown or dark yellowish-brown silt loam.

Most of this association is forested. A small acreage is pastured or cultivated. The major soils are well suited to hardwood forests and pasture and fairly well suited to some row crops.

The chief limitations for farm and nonfarm purposes are flooding and wetness.

Dominantly Moderately Well Drained, Nearly Level to Sloping Soils Formed in Material Derived From Diorite

The one association in this group makes up 5 percent of the county. It ranges from level and nearly level to moderately steep. The soils formed in basic residual material.

5. *Iredell-Mecklenburg association*

Moderately well drained and well drained soils that have a subsoil of dominantly very firm and firm clay; on uplands

This association is characterized by broad, gently sloping ridges and smooth intermediate side slopes. It makes up about 5 percent of the county. It is 60 percent Iredell soils, 20 percent Mecklenburg soils, and 20 percent Wilkes, Roanoke, and White Store soils.

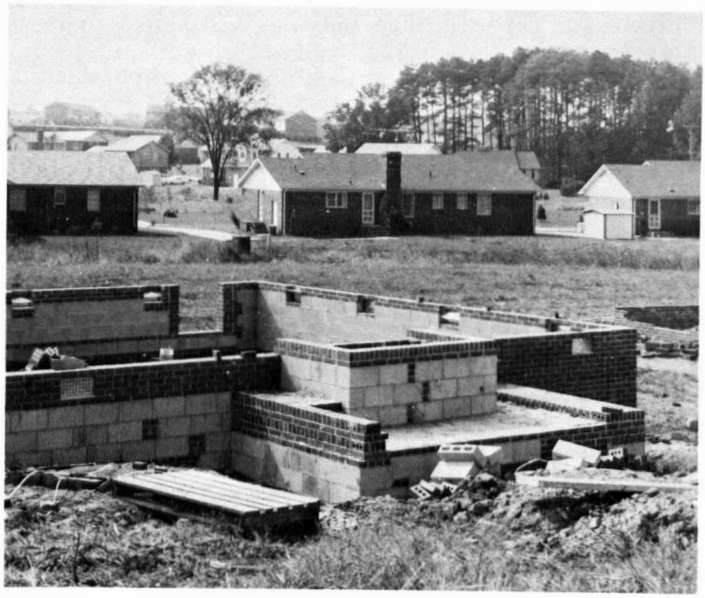

***Figure 3.*—Residential development in an area recently farmed. The soil is Iredell loam.**

The Iredell soils dominate the level and nearly level parts of the landscape. Mecklenburg and some gently sloping and sloping Iredell soils are on the broad ridges and side slopes. The moderately steep parts of these areas are the minor soils in the association.

Iredell soils are moderately well drained. Their loam surface layer is underlain by light olive-brown, very firm clay.

Mecklenburg soils are well drained. Their surface layer is loam. The upper part of the subsoil is mainly yellowish-red, firm clay or clay loam; and the lower part is mottled yellowish-red, yellowish-brown, and black, friable clay loam.

Most of the association is forested. The rest is chiefly used for pasture and nonfarm purposes, such as residential areas (fig. 3). Only a small acreage is cultivated, and most of this is in private gardens or pastures. The major soils are fairly well suited or well suited to corn, soybeans, small grain, hay, and pasture.

The chief limitations for farm and nonfarm purposes are the erosion hazard resulting from runoff and the slow permeability of the soils.

Well-Drained, Gently Sloping to Moderately Steep Soils Formed in Material Derived From Slates

The two associations in this group make up about 24 percent of the county. The landscape is dominantly one of gently sloping ridges and more strongly sloping side slopes. The soils formed in material known locally as "Carolina Slates." These acid slates and shales are dominant in the northern part of the county.

6. *Georgeville-Herndon association*

Gently sloping to strongly sloping, well-drained soils that have a subsoil of dominantly firm silty clay; on uplands

This association is characterized by broad, gently sloping ridges and smooth, intermediate side slopes. It makes up about 40 percent of the county. It is 35 percent Georgeville soils, 35 percent Herndon soils, and 30 percent Iredell, Davidson, Tatum, Wehadkee, and Nason soils.

Georgeville soils are well drained. Their silt loam surface layer is underlain by red, firm silty clay or silty clay loam.

Herndon soils also are well drained. Their silt loam surface layer is underlain by yellowish-red, firm silty clay and red, friable silty clay loam.

Most of the association is forested. The rest is pastured or cultivated. The soils are well suited to tobacco, corn, small grain, soybeans, hay, and pasture.

The chief limitation for farm and nonfarm purposes is the erosion hazard resulting from runoff.

7. *Nason-Tatum association*

Strongly sloping to moderately steep, well-drained soils that have a subsoil of dominantly firm clay; on uplands

This association is characterized by narrow ridges and strongly sloping to steep side slopes. It is in hilly areas and along rivers in the northern part of the county. It makes up about 4 percent of the county. It is 45 percent Nason soils, 25 percent Tatum soils, and 30 percent Georgeville, Wehadkee, Goldston, and Wilkes soils.

Nason soils are well drained. Their silt loam surface layer is underlain by yellowish-red, firm silty clay or friable silty clay loam. In many areas stones are numerous enough to interfere with farming.

Tatum soils are also well drained. Their gravelly silt loam surface layer is underlain by yellowish-red or red, friable or firm silty clay or silty clay loam.

Most of the association is forested. The major soils in this association are well suited to hay and pasture and are fairly well suited to tobacco, corn, soybeans, and small grain.

The chief limitations for farm and nonfarm purposes are slope and the erosion hazard resulting from runoff.

Well-Drained, Gently Sloping and Sloping Soils Formed in Material Derived From Granites

The one association in this group makes up 5 percent of the county. The major soils formed in acid crystalline rock.

8. Appling-Cecil association

Gently sloping to moderately steep, well-drained soils that have a subsoil of dominantly firm clay; on uplands

This association is characterized by intermediate to broad ridges and strongly sloping to steep side slopes. It makes up about 5 percent of the county. It is 60 percent Appling soils, 20 percent Cecil soils, and 20 percent Wilkes, Wedowee, Helena, and Georgeville soils.

The Appling and less sloping Cecil soils dominate the gently sloping ridges and intermediate side slopes. The steeper Cecil soils and some minor soils are in the strongly sloping and steeper parts of the association.

Appling soils have a surface layer of sandy loam. The upper part of the subsoil is brownish-yellow or yellowish-brown, firm clay loam or clay; and the lower part is mottled red, strong-brown, and light-gray, firm clay.

Cecil soils have a surface layer of fine sandy loam underlain by red, firm clay or clay loam.

Most of the association is cultivated or pastured. The rest is forested. The soils are well suited to most crops commonly grown in the county, including tobacco, corn, soybeans, small grain, and hay.

The chief limitation for farm or nonfarm purposes is the erosion hazard resulting from runoff.

Moderately Well Drained, Gently Sloping and Sloping Soils Formed in Material Derived From Granites and Slates

The one association in this group makes up 3 percent of the county. The soils formed in crystalline and slaty materials.

9. Helena-Lignum association

Gently sloping and sloping, moderately well drained soils that have a subsoil of dominantly firm to extremely firm silty clay and clay; on uplands

This association is characterized by broad, gently sloping ridges and smooth, wide side slopes that drain onto narrow flood plains. It makes up about 3 percent of the county. It is 50 percent Helena soils, 30 percent Lignum soils, and 20 percent Appling, Herndon, and Wehadkee soils. Lignum soils are on the more level and some of the gently sloping parts of the landscape. Helena soils are on the intermediate and more sloping parts.

Helena soils are moderately well drained. Their surface layer is sandy loam. The upper part of the subsoil is brownish-yellow, friable sandy clay loam and yellowish-brown and light yellowish-brown, firm to extremely firm clay. The lower part is light-gray, friable silty clay loam.

Lignum soils also are moderately well drained. Their surface layer is silt loam. The upper part of the subsoil is yellow, friable silty clay loam; the next layer is mottled brownish-yellow and light-gray, firm silty clay; and the lower part is light brownish-gray, very firm clay.

Most of the association is forested. The rest is cultivated or pastured. The major soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture.

The chief limitations for farm and nonfarm purposes are the erosion hazard resulting from runoff and the wetness and slow permeability of the soils.

Descriptions of the Soils

In this section the soils of Durham County are described in detail. Each soil series is described in detail, and then, briefly, the mapping units in that series. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the soil series is representative for mapping units in that series. If a given mapping unit has a profile that in some ways differs from the one described in the series, these differences are stated in the description of the mapping unit, or they are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Urban land, for example, does not belong to a soil series, but nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland suitability group in which the mapping unit has been placed. The page for the description of each mapping unit or other interpretative group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*4*).[2]

[2] Italic numbers in parentheses refer to Literature Cited, p. 73.

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

Mapping unit	Acres	Percent	Mapping unit	Acres	Percent
Altavista silt loam, 0 to 2 percent slopes	1,462	0.7	Mayodan sandy loam, 10 to 15 percent slopes	1,618	0.8
Altavista silt loam, 2 to 6 percent slopes	1,132	.6	Mayodan sandy loam, 15 to 25 percent slopes	1,132	.6
Appling sandy loam, 2 to 6 percent slopes	2,999	1.6	Mayodan-Urban land complex, 0 to 10 percent slopes	297	.1
Appling sandy loam, 6 to 10 percent slopes	3,538	1.9	Mayodan-Urban land complex, 10 to 15 percent slopes	37	(1)
Cartecay and Chewacla soils	3,052	1.6	Mecklenburg loam, 2 to 6 percent slopes	895	.5
Cecil fine sandy loam, 2 to 6 percent slopes	570	.3	Mecklenburg loam, 6 to 10 percent slopes	1,174	.6
Cecil fine sandy loam, 6 to 10 percent slopes	780	.4	Nason silt loam, 10 to 15 percent slopes	1,682	.9
Cecil fine sandy loam, 10 to 25 percent slopes	829	.5	Nason silt loam, 15 to 25 percent slopes	916	.5
Chewacla and Wehadkee soils	14,096	7.5	Nason stony silt loam, 10 to 15 percent slopes	842	.4
Congaree silt loam	3,279	1.7	Pinkston fine sandy loam, 2 to 10 percent slopes	746	.4
Creedmoor sandy loam, 2 to 6 percent slopes	5,991	3.2	Pinkston fine sandy loam, 10 to 25 percent slopes	3,800	2.0
Creedmoor sandy loam, 6 to 10 percent slopes	2,777	1.5	Roanoke silt loam	1,698	.9
Davidson clay loam, 2 to 6 percent slopes	577	.3	Tatum gravelly silt loam, 15 to 25 percent slopes	2,094	1.1
Davidson clay loam, 6 to 10 percent slopes	523	.3	Urban land	2,940	1.6
Georgeville silt loam, 2 to 6 percent slopes	5,410	2.9	Wahee loam, alkaline subsoil variant	819	.4
Georgeville silt loam, 6 to 10 percent slopes	6,768	3.6	Wedowee sandy loam, 10 to 15 percent slopes	1,100	.6
Georgeville silt loam, 10 to 15 percent slopes	2,309	1.2	Wedowee sandy loam, 15 to 25 percent slopes	605	.3
Goldston slaty silt loam, 10 to 25 percent slopes	1,453	.8	Wehadkee silt loam	2,288	1.2
Goldston slaty silt loam, 25 to 45 percent slopes	562	.3	White Store clay loam, 2 to 10 percent slopes, eroded	1,203	.6
Granville sandy loam, 2 to 6 percent slopes	1,543	.8	White Store clay loam, 10 to 25 percent slopes, eroded	508	.3
Granville sandy loam, 6 to 10 percent slopes	751	.4	White Store sandy loam, 2 to 6 percent slopes	22,995	12.2
Gullied land, clayey materials	1,311	.7	White Store sandy loam, 6 to 10 percent slopes	24,202	12.8
Helena sandy loam, 2 to 6 percent slopes	2,229	1.2	White Store sandy loam, 10 to 25 percent slopes	12,715	6.8
Helena sandy loam, 6 to 10 percent slopes	1,047	.6	White Store-Urban land complex, 0 to 10 percent slopes	6,358	3.4
Herndon silt loam, 2 to 6 percent slopes	6,338	3.4	White Store-Urban land complex, 10 to 25 percent slopes	488	.2
Herndon silt loam, 6 to 10 percent slopes	6,325	3.3	Wilkes sandy loam, 10 to 25 percent slopes	1,087	.5
Herndon stony silt loam, 2 to 10 percent slopes	925	.5			
Iredell loam, 2 to 6 percent slopes	3,661	2.0			
Iredell loam, 6 to 10 percent slopes	2,346	1.2			
Iredell-Urban land complex, 0 to 6 percent slopes	385	.2			
Iredell-Urban land complex, 6 to 10 percent slopes	120	(1)			
Lignum silt loam, 2 to 6 percent slopes	2,527	1.4			
Mayodan sandy loam, 2 to 6 percent slopes	3,611	1.9			
Mayodan sandy loam, 6 to 10 percent slopes	3,463	1.8	Total	188,928	100.0

[1] Less than 0.05 percent.

Altavista Series

The Altavista series consists of nearly level and gently sloping, moderately well drained soils on low stream terraces. These soils formed under forest vegetation, in alluvial deposits.

In a representative profile the surface layer is grayish-brown silt loam about 7 inches thick. It is underlain by a 4-inch layer of light yellowish-brown silt loam. The subsoil is about 30 inches thick. The upper part is mottled brownish-yellow, friable silty clay loam. The next layer is mottled yellowish-brown, friable clay loam. The lower part is mottled light brownish-gray, friable silty clay loam. The underlying material to a depth of 60 inches is mottled light-gray and yellowish-brown fine sandy loam.

Altavista soils are flooded infrequently for only brief periods. They are low in natural fertility and organic-matter content. Permeability is moderate and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is about 2½ feet late in winter and early in spring.

Most of the acreage is forested with mixed hardwoods and loblolly pine. The rest is in pasture or under cultivation. The soils are well suited to most crops commonly grown in the county, including corn, soybeans, and small grain. The major limitations are wetness, erosion, and flooding.

Representative profile of Altavista silt loam, 2 to 6 percent slopes, in a field 5.7 miles north of Durham on U.S. 501; 1,980 feet east of road and 500 feet north of the Eno River:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable; many fine roots; medium acid; abrupt, smooth boundary.

A2—7 to 11 inches, light yellowish-brown (10YR 6/4) silt loam; weak, coarse, granular structure; very friable; few fine roots; slightly acid; clear, smooth boundary.

B1t—11 to 15 inches, brownish-yellow (10YR 6/6) silty clay loam; weak, fine, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many fine and medium pores; medium acid; clear, wavy boundary.

B21t—15 to 20 inches, brownish-yellow (10YR 6/6) silty clay loam; common, fine, distinct, yellowish-red mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few, thin, discontinuous clay films on faces of peds; strongly acid; clear, wavy boundary.

B22t—20 to 36 inches, yellowish-brown (10YR 5/8) clay loam; common, medium, prominent, strong-brown (7.5YR 5/8) mottles and common, medium, distinct, gray (10YR 6/1) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few, thin, continuous clay films on faces of peds; strongly acid; clear, smooth boundary.

B3—36 to 41 inches, light brownish-gray (10YR 6/2) silty clay loam; common, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable, slightly sticky, slightly plastic; strongly acid; gradual, smooth boundary.

C—41 to 60 inches, mottled light-gray (10YR 6/1) and yellowish-brown (10YR 5/8) fine sandy loam; massive; loose; few pebbles as much as 1 inch in diameter; few lenses of clay loam that are sticky and slightly plastic; strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is strongly acid to medium acid.

The Ap horizon and Al horizon are light brown or grayish brown. The A2 horizon is light brown or light yellowish brown. The B1t and B2t horizons are brownish-yellow or yellowish-brown silty clay loam or clay loam. Gray mottles occur 10 to 20 inches below the top of the Bt horizon. The B3 horizon is light brownish-gray or brownish-yellow silty clay loam or clay loam mottled with yellowish brown. The C horizon is commonly mottled light-gray and yellowish-brown fine sandy loam or sandy loam mixed with a few pebbles and lenses of clay loam.

Altavista silt loam, 0 to 2 percent slopes (AlA).—This moderately well drained soil is on broad stream terraces. It has a surface layer of grayish-brown silt loam. Its subsoil is yellowish-brown, friable silty clay loam to clay loam mottled with gray. Areas are generally elliptical in shape and 5 to 30 acres in size. Included in mapping are a few areas of Congaree and Chewacla soils.

This Altavista soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is slow.

This soil is well suited to corn, soybeans, small grain, hay, and pasture. Improved drainage is needed if tobacco is grown. Wetness and flooding are the major concerns in management. Capability unit IIw-2; woodland suitability group 2w8.

Altavista silt loam, 2 to 6 percent slopes (AlB).—This moderately well drained soil is on broad stream terraces. It has the profile described as representative of the series. Areas are generally elliptical in shape and 5 to 30 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of loam or fine sandy loam and a few small areas where the soil is eroded. Also included are a few areas of Congaree and Chewacla soils.

This Altavista soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff and the wetness are the major concerns in management. Capability unit IIe-1; woodland suitability group 2w8.

Appling Series

The Appling series consists of gently sloping and sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum derived from acidic crystalline rock.

In a representative profile the surface layer is yellowish-brown sandy loam about 6 inches thick. It is underlain by a 2-inch layer of light yellowish-brown sandy loam. The subsoil is about 50 inches thick. It is dominantly firm clay or clay loam. The upper part is yellowish brown and brownish yellow, and the lower part is mottled red, strong brown, and light gray. The underlying material to a depth of 84 inches is mottled dark-red, brownish-yellow, and light-gray saprolite that crushes to silty clay loam.

Appling soils are low in natural fertility and organic matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is cultivated. The rest is pastured or forested with mixed hardwoods or pine. The soils are well suited to most row crops, including tobacco and corn. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Appling sandy loam, 2 to 6 percent slopes, in a pine forest 1.75 miles north of Mangum Store on State Road 1610; 50 feet east of road:

Ap—0 to 6 inches, yellowish-brown (10YR 5/6) sandy loam; weak, medium, granular structure; very friable; many medium woody roots; strongly acid; abrupt, smooth boundary.

A2—6 to 8 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, medium, granular structure; very friable; common medium roots; medium acid; abrupt, wavy boundary.

B1–8 to 11 inches, brownish-yellow (10YR 6/8) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common medium pores; very strongly acid; clear, wavy boundary.

B21t—11 to 20 inches, yellowish-brown (10YR 5/8) clay loam; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine pores; few discontinuous clay films; strongly acid; gradual, wavy boundary.

B22t—20 to 29 inches, brownish-yellow (10YR 6/8) clay loam; few, medium, prominent, red (2.5YR 4/8) mottles; strong, medium and coarse, subangular blocky structure; firm, sticky, plastic; few fine pores; many continuous clay films; strongly acid; gradual, wavy boundary.

B23t—29 to 37 inches, brownish-yellow (10YR 6/6) clay; many, medium, prominent, red (2.5YR 4/8) mottles; moderate, medium and coarse, subangular blocky and angular blocky structure; firm, sticky, plastic; few fine pores; few discontinuous clay films; strongly acid; gradual, wavy boundary.

B3t—37 to 58 inches, mottled red (2.5YR 4/8), strong-brown (7.5 YR 5/8), and light-gray (10YR 7/1) clay; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine pores; few discontinuous clay films; strongly acid; gradual, wavy boundary.

C—58 to 84 inches, mottled dark-red (10R 3/6), brownish-yellow (10YR 6/8), and light-gray (10YR 7/1) saprolite that crushes to silty clay loam; massive (rocklike); strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon is dark brown or yellowish brown. The A2 horizon is light yellowish brown or pale yellow. The B1 horizon is brownish yellow or yellowish brown. The B2t horizon ranges from yellowish-red to brownish-yellow clay loam or clay. The B3 horizon is mottled red, strong-brown, and light-gray clay. In places the lower part of the B horizon has red and light gray mottles. The C horizon is commonly mottled dark-red, brownish-yellow, and light-gray saprolite that crushes to silty clay loam or clay loam.

Appling sandy loam, 2 to 6 percent slopes (ApB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 15 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly sandy loam and a few small areas where the soil is eroded. Also included are a few areas of Cecil, Helena, and Iredell soils.

This Appling soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-1; woodland suitability group 3o7.

Appling sandy loam, 6 to 10 percent slopes (ApC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of yellowish-brown or grayish-brown sandy loam. Its subsoil is yellowish-brown to brownish-yellow, firm clay or clay loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are a few gravelly areas, places where the surface layer is stony, and a few areas where the soil is eroded. Also included are a few areas of Cecil and Iredell soils.

This Appling soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and erosion resulting from runoff are the major concerns in management. Capability unit IIIe-1; woodland suitability group 3o7.

Cartecay Series

The Cartecay series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in coarse loamy material washed from soils on uplands.

In a representative profile the surface layer is very dark grayish-brown and brown silt loam about 10 inches thick. The underlying material to a depth of about 50 inches is mottled brown, friable loam over mottled brown, very friable loamy sand and sandy loam. Below this to a depth of about 80 inches is mottled gray, firm fine sandy clay loam.

Cartecay soils are flooded very frequently, but for only brief periods. They are low in natural fertility and organic-matter content. Permeability is moderately rapid, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. The seasonal high water table is at a depth of approximately 1½ feet late in winter and early in spring.

Most of the acreage is forest of mixed hardwoods or pine. The soils are well suited to hardwoods and pines. They are also well suited to corn, soybeans, and pasture. Wetness and flooding are the major limitations.

Representative profile of Cartecay silt loam in an area of Cartecay and Chewacla soils in a wooded area, 6.9 miles south of Durham on State Road 1121; 300 feet south of road:

O1—2½ inches to ½ inch, undecomposed hardwood and pine litter.
O2—½ inch to 0, black decomposed organic material.
A11—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; many fine and medium roots; medium acid; abrupt, smooth boundary.
A12—2 to 10 inches, brown (7.5YR 5/4) silt loam; weak, medium, granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium pores; common fine flakes of mica; very strongly acid; clear, wavy boundary.
C1—10 to 18 inches, brown (10YR 5/3) loam; common, medium, faint, pale-brown (10YR 6/3) and light brownish-gray (10YR 6/2) mottles; massive; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium pores; medium acid; clear, smooth boundary.
C2—18 to 22 inches, brown (10YR 5/3) loamy sand; common, medium, distinct, light brownish-gray (10YR 6/2) and light yellowish-brown (10YR 6/4) mottles; massive; very friable; many coarse pores; few small black concretions; medium acid; abrupt, smooth boundary.
C3—22 to 50 inches, brown (10YR 5/3) sandy loam; many, coarse, prominent, gray (10YR 6/1) and brownish-yellow (10YR 6/6) mottles; massive; very friable; few small black concretions; medium acid; abrupt, smooth boundary.
IIC—50 to 80 inches, gray (10YR 6/1) fine sandy clay loam; common, fine, prominent, yellowish-red mottles; massive; firm, sticky, slightly plastic; slightly acid.

Depth to bedrock is more than 5 feet. The C horizon is medium acid or slightly acid to a depth of about 80 inches.

The Ap horizon, in plowed areas, is dark brown or brown, and the A1 horizon is very dark grayish brown or brown. The C horizon to a depth of about 50 inches is brown or pale-brown loam, loamy sand, sandy loam, or fine sandy loam mottled with gray, brown, and yellow. The lower part of the C horizon to a depth of about 80 inches is gray fine sandy clay loam or clay loam mottled with yellowish red.

Cartecay and Chewacla soils (Cc).—This mapping unit is about 60 percent Cartecay soil and 30 percent Chewacla soil. These are somewhat poorly drained soils on flood plains. In most areas they occur as narrow bands parallel to the smaller streams. Areas are 2 to 15 acres in size. Slopes are 0 to 2 percent.

The Cartecay soil has the profile described as representative of the series. The Chewacla soil is described under the heading "Chewacla Series." Both soils are at about the same elevation. Both commonly have a surface layer of silt loam. Below the surface layer the Cartecay soil is coarser textured than the Chewacla soil.

Included with these soils in mapping are a few areas where the surface layer is sandy loam or loam. Also included are a few areas of Wehadkee soils.

These soils are easy to keep in good tilth, and they can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is slow.

These soils are well suited to hardwood and pine forest. They are also well suited to corn, soybeans, and pasture. Flooding and wetness are the major concerns in management. Capability unit IIIw-1; woodland suitability group 2w8.

Cecil Series

The Cecil series consists of gently sloping to moderately steep, well-drained soils on uplands. The landscape is one of rounded divides. These soils developed under forest vegetation, in residuum from acidic crystalline rock.

In a representative profile the surface layer is reddish-brown fine sandy loam about 5 inches thick. The subsoil is red, firm or friable clay loam or loam about 46 inches thick. The underlying material to a depth of 60 inches is mottled red and reddish-yellow saprolite that crushes to silt loam.

Cecil soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is under cultivation or in pasture. The soils are well suited to most row crops commonly grown in the county, including tobacco and corn. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Cecil fine sandy loam, 2 to 6 percent slopes in a pine forest 9.5 miles east of Durham on State Road 1901; 50 feet west of road:

O1—1½ inches to ½ inch, undecomposed pine needles.
O2—½ inch to 0, decomposed and partly decomposed pine needles.
Ap—0 to 5 inches, reddish-brown (5YR 5/4) fine sandy loam; weak, medium, granular structure; very friable; few, fine woody roots; common medium quartz pebbles; strongly acid; abrupt, smooth boundary.
B1—5 to 8 inches, red (2.5YR 5/8) clay loam; moderate, fine, subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; many fine pores; strongly acid; abrupt, smooth boundary.
B21t—8 to 22 inches, red (2.5YR 4/8) clay; strong, fine, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine pores; few continuous clay films on faces of peds; few fine flakes of mica; very strongly acid; clear, wavy boundary.

B22t—22 to 33 inches, red (2.5YR 4/6) clay; few, fine, distinct, reddish yellow mottles; strong, fine, subangular blocky structure; firm, sticky, plastic; few fine roots; few, white (N 8/0), weathered, primary minerals; few fine flakes of mica; very strongly acid; clear, wavy boundary.

B3—33 to 51 inches, red (2.5YR 4/8) clay loam; common, fine and medium, distinct, reddish-yellow (7.5YR 6/8) mottles; weak, medium, subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; few fine pores; few discontinuous clay films; few fine flakes of mica; very strongly acid; gradual, wavy boundary.

C—51 to 60 inches, mottled red (2.5YR 4/8) and reddish-yellow (7.5YR 6/8) saprolite that crushes to silt loam; massive; friable; common fine pores; very strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon is brown or reddish brown. The A1 horizon is grayish-brown or brown sandy loam. The B1 horizon is yellowish-red or red sandy clay loam or clay loam. The B2t horizon is clay or clay loam. The B3 horizon is clay loam or sandy clay loam. The B horizon has some reddish-yellow mottles. The C horizon is commonly mottled red and reddish-yellow saprolite that crushes to loam, silt loam, or clay loam.

Cecil fine sandy loam, 2 to 6 percent slopes (CfB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 15 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly fine sandy loam and a few small areas where the soil is eroded. Also included are a few areas of Appling, Georgeville, and Wilkes soils.

This Cecil soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-1; woodland suitability group 3o7.

Cecil fine sandy loam, 6 to 10 percent slopes (CfC).—This well-drained soil is on narrow sides slopes on uplands. It has a surface layer of reddish-brown or grayish-brown fine sandy loam. Its subsoil is red, firm clay or clay loam that in most places is mottled with reddish yellow. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are a few areas where the soil is eroded, a few gravelly areas, and areas where the surface layer is coarse sandy loam. Also included are a few areas of Georgeville and Wilkes soils.

This Cecil soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IIIe-1; woodland suitability group 3o7.

Cecil fine sandy loam, 10 to 25 percent slopes (CfE).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of reddish-brown or grayish-brown fine sandy loam. Its subsoil is red, firm clay or sandy clay loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 8 acres in size.

Included with this soil in mapping are places where the surface layer is gravelly fine sandy loam and spots where the soil is eroded. Also included are areas of Wedowee and Wilkes soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forests and to pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 3r8.

Chewacla Series

The Chewacla series consists of nearly level, somewhat poorly drained soils on flood plains. These soils formed in fine loamy material washed from soils on uplands.

In a representative profile the surface layer is dark grayish-brown silt loam about 10 inches thick. The subsoil is about 50 inches thick. The upper part is mottled dark-brown and light yellowish-brown, friable silt loam. The lower part is mottled light brownish-gray, brown, and yellowish-brown, friable silty clay loam.

Chewacla soils are flooded very frequently for very brief periods. They are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is high. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is about 1½ feet late in winter and early in spring.

Most of the acreage is forested with mixed hardwoods. The rest is chiefly in pasture. The soils are fairly well suited to some row crops commonly grown in the county, including corn. The major limitations are wetness and flooding.

Representative profile of Chewacla silt loam in an area of Chewacla and Wehadkee soils in a pasture 4 miles north of Weaver on State Road 1004; 1.7 miles northeast on a farm road, 700 feet west of the Flat River:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint mottles of pale brown; moderate, medium, granular structure; very friable; slightly acid; abrupt, smooth boundary.

B21—10 to 17 inches, mottled dark-brown (10YR 4/3) and light yellowish-brown (10YR 6/4) silt loam; massive parting to weak, subangular blocky structure; friable, sticky, slightly plastic; many fine roots; many fine pores; medium acid; clear, smooth boundary.

B22—17 to 60 inches, mottled light brownish-gray (2.5Y 6/2), brown (7.5 YR 5/4), and yellowish-brown (10YR 5/4) silty clay loam; weak, medium, subangular blocky structure tending to massive; friable, slightly sticky, plastic; common fine roots; common, black partly disintegrated fragments; medium acid.

Depth to bedrock is more than 5 feet. The B horizon is strongly acid or medium acid.

The Ap horizon is dark grayish brown or brown, and the A1 horizon, if present, is very dark grayish brown or dark brown. The upper part of the B2 horizon is mottled dark-brown and light yellowish-brown or brown and yellowish-brown silt loam. The lower part is mottled light brownish-gray, brown, and yellowish-brown silty clay loam or silt loam. The number of gray mottles increases with increasing depth. The C horizon, if present, is stratified fine sand that contains some pebbles.

Chewacla and Wehadkee soils (Ch).—This mapping unit is about 60 percent Chewacla soil and 35 percent Wehadkee soil. These are somewhat poorly drained and poorly drained soils on flood plains. They occur as long, level areas parallel to the major streams and rivers. Areas are 5 to more than 100 acres in size. Slopes are 0 to 2 percent.

The Chewacla and Wehadkee soils have the profiles described as representative of their respective series. The Chewacla soil is better drained than the Wehadkee soil and is at slightly higher elevations. Both soils commonly have a surface layer of silt loam.

Included with these soils in mapping are small areas of

Figure 4.—**Good fescue and clover pasture on Chewacla soils.**

similar soils that have a surface layer of fine sandy loam or loam. Also included are areas of Congaree and Roanoke soils.

These soils are easy to keep in good tilth, and they can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is slow.

These soils are well suited to hardwood forest and pasture (fig. 4). The Chewacla soil is fairly well suited to corn and soybeans. Flooding and wetness are the major concerns in management. Capability unit IVw-1; woodland suitability group 1w8.

Congaree Series

The Congaree series consists of nearly level, well-drained soils on flood plains. These soils formed in fine loamy material washed from soils on uplands.

In a representative profile the surface layer is brown silt loam about 9 inches thick. The underlying material to a depth of about 52 inches is yellowish-brown and dark yellowish-brown, friable silt loam stratified with thin lenses of fine sandy loam. It is mottled in the lower part. Below this to a depth of about 65 inches is mottled very dark grayish-brown silty clay loam.

Congaree soils are flooded frequently for very brief periods. They are medium in natural fertility and low in organic-matter content. Permeability is moderate, and available water capacity is high. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is about 2½ feet late in winter and early in spring.

Most of the acreage is under cultivation or in pasture. The rest is forested with mixed hardwoods or pine. The soils are well suited to most crops commonly grown in the county, including corn and small grain. The major limitation is flooding.

Representative profile of Congaree silt loam in a cultivated field 4 miles north of Weaver on State Road 1004 and 1.5 miles northeast on a farm road (100 feet west of the Flat River):

Ap—0 to 9 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; few fine fibrous roots; slightly acid; abrupt, smooth boundary.

C1—9 to 24 inches, yellowish-brown (10YR 5/4) silt loam; thin stratified bands of brown fine sandy loam; massive parting to weak, medium, granular structure; friable; few fine roots; many fine and medium pores; slightly acid; gradual, wavy boundary.

C2—24 to 52 inches, dark yellowish-brown (10YR 4/4) silt loam; thin stratified bands of dark-brown fine sandy loam; few, fine, faint, yellowish-brown mottles; massive parting to weak, medium, granular structure; friable; many fine pores; few fine flakes of mica; slightly acid; gradual, wavy boundary.

C3—52 to 65 inches, very dark grayish-brown (10YR 3/2) silty clay loam; few, fine, faint, yellowish-brown mottles; massive; firm, sticky, slightly plastic; few black specks; slightly acid.

Depth to bedrock is more than 5 feet. The C horizon is slightly acid to a depth of about 65 inches.

The Ap horizon is dark brown or brown, and the A1 horizon, if present, is very dark brown or brown. The upper part of the C horizon is yellowish-brown or dark yellowish-brown silt loam or loam and in places has stratified bands of brown or dark-brown fine sandy loam. The lower part of the C horizon is very dark grayish-brown or dark-brown silty clay loam or silty clay.

Congaree silt loam (Cp).—This well-drained soil is on flood plains. Areas generally occur as narrow bands parallel to streams where channels are deep enough to provide good drainage. They are 2 to 50 acres in size. Slopes are 0 to 2 percent.

Included with this soil in mapping are a few areas where the surface layer is fine sandy loam. Also included are areas of Chewacla and Wehadkee soils.

This Congaree soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is slow.

This soil is well suited to tobacco, corn (fig. 5), soybeans, and small grain. It is also well suited to hay and pasture. Flooding is the major concern in management. Capability unit IIw-1; woodland suitability group 1o7.

Creedmoor Series

The Creedmoor series consists of gently sloping and sloping, moderately well drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from Triassic Mudstone.

In a representative profile the surface layer is dark-gray sandy loam about 2 inches thick. It is underlain by a 6-inch layer of pale-brown sandy loam. The subsoil is about 48 inches thick. The upper part is mottled pale-brown and brownish-yellow, friable sandy clay loam. The lower part is mottled light yellowish-brown and light-gray, firm and very firm clay and silty clay. The underlying material is light-gray and dark reddish-brown, firm very fine sandy loam that is mottled in the lower part. Dark reddish-brown hard siltstone is at a depth of about 77 inches.

Creedmoor soils are low in natural fertility and organic-matter content. Permeability is very slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is about 1½ feet.

Most of the acreage is forested with loblolly pine and mixed

Figure 5.—**Corn on Congaree silt loam.**

hardwoods. The rest is under cultivation or in pasture. The soils are well suited to most row crops, including tobacco and corn. The major limitations are wetness, very slow permeability, and the erosion hazard resulting from runoff and slope.

Representative profile of Creedmoor sandy loam, 2 to 6 percent slopes, in a loblolly pine forest 1.5 miles northeast of Nelson on State Road 1973; 0.5 mile northwest on farm road, 50 feet south of road:

A1—0 to 2 inches, dark-gray (10YR 4/1) sandy loam; weak, coarse, granular structure; very friable; many fine and medium woody roots; very strongly acid; abrupt, smooth boundary.

A2—2 to 8 inches, pale-brown (10YR 6/3) sandy loam; weak, medium, granular structure; very friable; few fine and medium woody roots; very strongly acid; clear, smooth boundary.

B1t—8 to 15 inches, pale-brown (10YR 6/3) sandy clay loam; many, coarse, faint, light yellowish-brown (10YR 6/4) mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine woody roots; many medium pores; very strongly acid; clear, wavy boundary.

B21t—15 to 19 inches, brownish-yellow (10YR 6/6) sandy clay loam; few, medium, prominent, reddish-yellow (5YR 7/8) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium woody roots; many fine pores; few, thin, discontinuous clay films on faces of peds; very strongly acid; clear, smooth boundary.

B22t—19 to 29 inches, light yellowish-brown (10YR 6/4) clay; common, medium, prominent, red (2.5YR 5/8) and light-gray (10YR 6/1) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky; firm, very sticky, very plastic; few fine woody roots; many continuous clay films on faces of peds; very strongly acid; clear, wavy boundary.

B23t—29 to 40 inches, light-gray (10YR 7/1) clay; many, coarse, distinct, brownish-yellow (10YR 6/6) mottles and few, fine, prominent, red mottles; moderate, medium, angular blocky structure; very firm, very sticky, very plastic; continuous clay films on faces of peds; extremely acid; clear, wavy boundary.

B31—40 to 46 inches, light-gray (10YR 7/1) clay; many, medium, prominent, red (2.5YR 5/8) mottles and few, fine, prominent, yellow mottles; massive; very firm, very sticky, very plastic; extremely acid; clear, wavy boundary.

B32—46 to 56 inches, light-gray (10YR 7/1) silty clay; many, coarse, prominent, dusky-red (2.5YR 3/2) mottles; massive; very firm, sticky, plastic; extremely acid; clear, smooth boundary.

C1—56 to 68 inches, light-gray (10YR 7/1) very fine sandy loam; many, coarse, prominent, dusky-red (2.5YR 3/2) mottles and common, medium, distinct, yellow (10YR 7/6) mottles; massive; firm; very strongly acid; clear, smooth boundary.

C2—68 to 77 inches, dark reddish-brown (2.5YR 3/4) very fine sandy loam; massive; firm; many hard shale fragments; very strongly acid.

R—77 inches, dark reddish-brown hard siltstone.

Depth to bedrock is more than 5 feet. The B horizon is extremely acid or very strongly acid.

The Ap horizon, if present, is pale yellow or gray, and the A1 horizon is dark gray or very dark gray. The A2 horizon is pale brown, light brownish gray, or light yellowish brown. The B1 horizon is pale-brown, pale-yellow, or strong-brown sandy clay loam, clay, or sandy clay. The B2t horizon is light yellowish-brown, brownish-yellow, reddish-brown, or light-gray sandy clay loam or clay. The B3 horizon is clay or silty clay. The B horizon has some gray, red, or reddish-yellow mottles. The C horizon is commonly light-gray to weak-red and dark reddish-brown fine sandy loam, very fine sandy loam, or sandy loam.

Creedmoor sandy loam, 2 to 6 percent slopes (CrB).—This moderately well drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 15 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly sandy loam or fine sandy loam and a few small areas where the soil is eroded. Also included are a few areas of Mayodan and White Store soils.

This Creedmoor soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco (fig. 6), corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff, the wetness, and the very slow permeability are major concerns in management. Capability unit IIe-3; woodland suitability group 3w8.

Creedmoor sandy loam, 6 to 10 percent slopes (CrC).—This moderately well drained soil is on narrow side slopes on uplands. It has a surface layer of dark-gray or pale-yellow sandy loam. The upper part of its subsoil is pale-yellow, friable sandy clay loam; and the lower part is light brownish-yellow and light-gray, very firm clay or silty clay. Most areas occur as narrow bands that are roughly rectangular in shape and range from 3 to 30 acres in size.

Included with this soil in mapping are a few areas where the soil is eroded, a few gravelly areas, and areas where the surface layer is fine sandy loam. Also included are a few areas of Mayodan and White Store soils.

This Creedmoor soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is rapid.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope, erosion resulting from runoff, wetness, and very slow permeability are the major concerns in management. Capability unit IIIe-3; woodland suitability group 3w8.

Davidson Series

The Davidson series consists of gently sloping and sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from dark-colored, basic crystalline rock.

In a representative profile the surface layer is dark-red clay loam about 6 inches thick. The subsoil is about 85 inches thick. The upper 33 inches is dark-red, firm clay; the next 18 inches is mottled dark-red and red, firm clay; and the lower 34 inches is mottled red, friable silty clay loam.

Davidson soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture. The soils are well suited to most crops grown in the county, including corn and small grain. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Davidson clay loam, 2 to 6 percent slopes, in a cultivated field 0.6 mile north of Quail Roost on State Road 1601; 1,000 feet east of road:

Ap—0 to 6 inches, dark-red (2.5YR 3/6) clay loam; weak, coarse, granular structure; friable, sticky; few fine roots; common

Figure 6.—**Good crop of tobacco on gently sloping Creedmoor sandy loam.**

small black concretions; slightly acid; clear, smooth boundary.

B21t—6 to 24 inches, dark-red (2.5YR 3/6) clay; weak, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine and medium pores; few, thin, discontinuous clay films on faces of peds; common small black concretions; slightly acid; gradual, wavy boundary.

B22t—24 to 39 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky and blocky structure; firm, very sticky, plastic; few fine roots; common medium pores; many, thin, continuous clay films on faces of peds; neutral; gradual, wavy boundary.

B23t—39 to 48 inches, dark-red (2.5YR 3/6) clay; few, medium, prominent, reddish-yellow (7.5YR 6/8) mottles; moderate, fine, subangular blocky structure; firm, sticky, plastic; many, thin, continuous clay films on faces of peds; neutral; gradual, wavy boundary.

B24t—48 to 57 inches, red (2.5YR 4/6) clay; few, medium, prominent, reddish-yellow (7.5YR 6/8) mottles; moderate, medium, subangular blocky structure; firm, sticky, plastic; few, thin, discontinuous clay films on faces of peds; common fine black minerals; medium acid; clear, wavy boundary.

B31—57 to 80 inches, red (2.5YR 4/8) silty clay loam; many, medium, prominent, reddish-yellow (5YR 6/8) mottles and few, fine, prominent, very pale brown mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine black minerals; medium acid; gradual, wavy boundary.

B32—80 to 91 inches, red (2.5YR 4/6) silty clay loam; few, fine, prominent, reddish-yellow mottles; massive parting to weak, medium, subangular blocky structure; friable, sticky, slightly plastic; common soft black minerals; medium acid.

Depth to bedrock is more than 5 feet. The B horizon is medium acid to neutral.

The Ap horizon is dark reddish brown to dark red. The A1 horizon, where present, is grayish brown. The B2t horizon is dark-red, dark reddish-brown, or red clay. The B3 horizon is red or dark-red clay loam or silty clay loam. In places the lower part of the B2t horizon and the B3 horizon have reddish-yellow or yellowish-brown mottles. The C horizon, if present, is commonly red or reddish-brown clay loam and many fragments of weathered rock.

Davidson clay loam, 2 to 6 percent slopes (DaB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 15 acres in size.

Included with this soil in mapping are a few acres of similar soils that have a loam surface layer. Also included are a few areas of Georgeville and Mecklenburg soils.

This Davidson soil is easy to keep in good tilth, but it can be worked within only a narrow range of moisture content because the surface layer has a high content of clay. Infiltration is moderate, and runoff is medium.

This soil is well suited to corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-2; woodland suitability group 3o7.

Davidson clay loam, 6 to 10 percent slopes (DaC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of dark-red or grayish-brown clay loam. Its subsoil is dark-red or red, firm clay or silty clay loam that in most places is mottled with reddish yellow. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are a few stony areas and places where the surface layer is silt loam or loam. Also included are a few acres of Georgeville and Mecklenburg soils.

This Davidson soil is easy to keep in good tilth, but it can be worked within only a narrow range of moisture content because the surface layer has a high content of clay. Infiltration is moderate, and runoff is rapid.

This soil is well suited to corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IIIe-2; woodland suitability group 3o7.

Georgeville Series

The Georgeville series consists of gently sloping to strongly sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from phyllite, which is locally known as "Carolina Slates."

In a representative profile the surface layer is reddish-brown silt loam about 6 inches thick. The subsoil is red, firm silty clay and silty clay loam about 38 inches thick. It is mottled at a depth of 26 to 34 inches. The underlying material to a depth of 60 inches is red silt loam.

Georgeville soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with mixed hardwoods or pine. The rest is chiefly in pasture or under cultivation. The soils are well suited to most crops grown in the county, including tobacco, corn, and small grain. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Georgeville silt loam, 2 to 6 percent slopes, in a cultivated field 9.5 miles north of Durham, 0.5 mile east on State Road 1002; 100 feet south of road:

Ap—0 to 6 inches, reddish-brown (5YR 4/4) silt loam; weak, medium, granular structure; very friable; common fine roots; many fine and medium pores; few ¼-inch quartz pebbles; medium acid; abrupt, smooth boundary.

B21t—6 to 26 inches, red (2.5YR 4/8) silty clay; strong, fine and medium, subangular structure; firm, slightly sticky, slightly plastic; few fine woody roots; few small and medium pores; many, thin, continuous clay films on faces of peds; strongly acid; clear, wavy boundary.

B22t—26 to 34 inches, red (2.5YR 4/8) silty clay; few, fine, prominent, reddish-yellow mottles; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine pores; many, thin, continuous clay films on faces of peds; few fine white minerals; strongly acid; gradual, wavy boundary.

B3t—34 to 44 inches, red (2.5YR 4/8) silty clay loam; weak, medium and coarse, subangular blocky structure; firm, slightly sticky, slightly plastic; few fine pores; few, thin, discontinuous clay films on faces of peds; many, fine, prominent white and yellow specks; strongly acid; gradual, wavy boundary.

C—44 to 60 inches, red (10R 5/8) silt loam; common, fine, prominent, light reddish-brown and very pale brown streaks; weak, coarse, platy (rock-controlled) structure; very friable; few fine pores; many white specks; very strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is strongly acid.

The A horizon is reddish brown or brown. The Bt horizon is red clay, silty clay, or silty clay loam. In places the B horizon has white and yellow mottles. The C horizon is commonly light reddish-brown, gray, red, or very pale brown weathered shale or slate that crushes to silt loam or loam.

Georgeville silt loam, 2 to 6 percent slopes (GeB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 5 to 20 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly silt loam and a few small areas where the soil is eroded. Also included are a few areas of Davidson, Goldston, and Herndon soils.

This Georgeville soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-2; woodland suitability group 3o7.

Georgeville silt loam, 6 to 10 percent slopes (GeC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of reddish-brown or brown silt loam. Its subsoil is red, firm silty clay or silty clay loam that in most places is mottled with white and yellow. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 20 acres in size.

Included with this soil in mapping are a few gravelly areas and a few areas where the soil is eroded. Also included are a few acres of Davidson, Goldston, and Herndon soils.

This Georgeville soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IIIe-2; woodland suitability group 3o7.

Georgeville silt loam, 10 to 15 percent slopes (GeD).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of reddish-brown or brown silt loam. Its subsoil is red, firm silty clay or silty clay loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 5 to 20 acres in size.

Included with this soil in mapping are areas where the surface layer is clay loam and spots where the soil is eroded. Also included are areas of Goldston, Wedowee, and Wilkes soils.

This Georgeville soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-2; woodland suitability group 3o7.

Goldston Series

The Goldston series consists of strongly sloping to steep, well-drained to excessively drained soils on uplands. The landscape is one of steep side slopes and rounded divides. These soils formed under forest vegetation, in residuum from fine-grained, acid slaty rock.

In a representative profile the surface layer is grayish-brown slaty silt loam about 3 inches thick. It is underlain by a 4-inch layer of yellowish-brown slaty silt loam. The subsoil is yellowish-brown or strong-brown, very friable and friable slaty silt loam. The underlying material to a depth of about 25 inches is yellowish-red, friable slaty silt loam and tongues of silty clay loam. Fractured, hard, fine-grained slate is at a depth of 25 inches.

Goldston soils are low in natural fertility and organic-matter content. Permeability is moderately rapid, and available water capacity is low. The root zone is moderately deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with mixed hardwoods or loblolly pine. The rest is chiefly in pasture. The major limitation is the erosion hazard resulting from runoff, the steep slopes, the slaty surface layer, and the depth to bedrock.

Representative profile of Goldston slaty silt loam, 25 to 45 percent slopes, in Duke forest 6.8 miles west from Durham on U.S. 15-501; 600 feet north of road:

O1—2½ inches to ½ inch, undecomposed hardwood leaves and pine needles.

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

A1—0 to 3 inches, grayish-brown (10YR 5/2) slaty silt loam; moderate, fine, granular structure; very friable; many fine roots; 50 percent coarse slate fragments; very strongly acid; abrupt, smooth boundary.

A2—3 to 7 inches, yellowish-brown (10YR 5/4) slaty silt loam; moderate, fine, granular structure; very friable; many fine roots; 50 percent 1-inch slate fragments; strongly acid; abrupt, smooth boundary.

B1—7 to 13 inches, yellowish-brown (10YR 5/6) slaty silt loam; weak, fine, subangular blocky structure; very friable; common medium roots; 55 percent slate fragments; strongly acid; abrupt, smooth boundary.

B2—13 to 18 inches, strong-brown (7.5YR 5/8) slaty silt loam; tongues of yellowish-brown (10YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; friable, slightly sticky; common medium roots; 60 percent ¼- to ½-inch coarse slate fragments; medium acid; clear, wavy boundary.

C—18 to 25 inches, yellowish-red (5YR 5/8) slaty silt loam; tongues of silty clay loam; massive parting to medium, angular blocky structure; friable; few medium roots; many small and medium slate fragments that crush to silt loam; strongly acid.

R—25 inches, fractured, hard, fine-grained slate.

Depth to bedrock is more than 2 feet. The B horizon is strongly acid or medium acid.

The Ap horizon, if present, is light yellowish brown or brown, and the A1 horizon is grayish brown or dark gray. The A2 horizon, if present, is yellowish brown or brown. The B1 horizon is yellowish-brown or brown slaty silt loam. The B2 horizon is yellowish brown or strong brown. The B horizon is broken within distances of a few feet by thin discontinuous tongues of yellowish-brown silty clay loam. The C horizon is commonly strong-brown or yellowish-red slaty silt loam and pockets of silty clay loam.

Goldston slaty silt loam, 10 to 25 percent slopes (GlE).—This well-drained to excessively drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of grayish-brown slaty silt loam. Its subsoil is yellowish-brown to strong-brown, friable slaty silt loam. Areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size. Included in mapping are a few areas where the slope is less than 10 percent and areas of Nason, Tatum, and Wilkes soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to hardwood and pine forest and to some pasture. Slope, erosion resulting from runoff, the slaty surface layer, and depth to bedrock are the major concerns in management. Capability unit VIIe-1; woodland suitability group 4r2.

Goldston slaty silt loam, 25 to 45 percent slopes (GlF).—This well-drained to excessively drained soil is on side slopes adjacent to the major drainageways on uplands. It has the profile described as representative of the series. Areas occur as narrow bands that are roughly rectangular in shape and range from 4 to 10 acres in size. Included in mapping are areas of Nason, Tatum, and Wilkes soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to hardwood and pine forest. Slope, erosion resulting from runoff, and depth to bedrock are the major concerns in management. Capability unit VIIe-1; woodland suitability group 4r2.

Granville Series

The Granville series consists of gently sloping and sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from Triassic Sandstone.

In a representative profile the surface layer is grayish-brown sandy loam about 3 inches thick. It is underlain by a 13-inch layer of light yellowish-brown sandy loam. The subsoil is dominantly mottled olive-yellow and brownish-yellow, friable sandy clay loam about 29 inches thick. The underlying material to a depth of 60 inches is mottled brownish-yellow, friable sandy clay loam.

Granville soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is under cultivation. The rest is pasture or in mixed hardwood or pine forest. The soils are well suited to most row crops commonly grown in the county, including tobacco and corn.

The major limitation is the hazard of erosion resulting from runoff and slope.

Representative profile of Granville sandy loam, 2 to 6 percent slopes, in a wooded area 7.5 miles north of Durham on State Road 1004 (1.4 miles northeast of Little River), 110 feet east of road:

O1—1 inch to 0, very dark brown layer of partly decomposed hardwood leaves and mold mixed with small amounts of mineral soil.

A1—0 to 3 inches, grayish-brown (2.5Y 5/2) sandy loam; weak, fine, granular structure; very friable; many medium and large woody roots; strongly acid; abrupt, smooth boundary.

A2—3 to 16 inches, light yellowish-brown (2.5Y 6/4) sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; strongly acid; clear, smooth boundary.

B1—16 to 22 inches, olive-yellow (2.5Y 6/6) sandy clay loam; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; many fine pores; strongly acid; clear, smooth boundary.

B21t—22 to 27 inches, brownish-yellow (10YR 6/6) sandy clay loam; moderate, medium, subangular blocky structure;

friable, sticky, slightly plastic; common fine and medium roots; common fine pores; common discontinuous clay films on vertical faces of peds; strongly acid; gradual, smooth boundary.

B22t—27 to 37 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, faint, pale-brown (10YR 6/3) mottles and common, medium, distinct, yellowish-red (5YR 5/8) mottles; moderate, medium, subangular blocky structure; friable, sticky, slightly plastic; common fine pores; common discontinuous clay films on ped faces; few 1-inch quartz pebbles; strongly acid; gradual, smooth boundary.

B3t—37 to 45 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, medium, faint, pale-brown (10YR 6/3) mottles and common, medium, prominent, yellowish-red (5YR 5/8) mottles; weak, medium, subangular blocky structure; friable, sticky, slightly plastic; few 1- to 2-inch quartz pebbles; strongly acid; gradual, smooth boundary.

C—45 to 60 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, coarse, faint, pale-brown (10YR 6/3) mottles and common, medium, prominent, yellowish-red (5YR 5/8) and red (2.5YR 4/8) mottles; massive; friable, sticky, slightly plastic; few 1- to 2-inch quartz pebbles; strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is yellowish brown or grayish brown and the A1 horizon is grayish brown or light grayish brown. The A2 horizon is pale brown, pale yellow, or light yellowish brown. The B1 horizon is light yellowish-brown, yellowish-brown, or olive-yellow sandy clay loam or sandy loam. The B2t horizon is brownish-yellow, yellowish-brown, or strong-brown sandy clay loam or clay loam. The B3t horizon is brownish-yellow or yellowish-brown sandy clay loam, loam, or sandy loam. The B horizon has yellowish-red mottles. The C horizon is commonly brownish-yellow clay loam, sandy clay loam, or sandy loam mottled with pale brown, yellowish red, red, or gray.

Granville sandy loam, 2 to 6 percent slopes (GrB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 10 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of loamy sand or gravelly sandy loam. Also included are a few areas of Creedmoor and Mayodan soils.

This Granville soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-1; woodland suitability group 3o7.

Granville sandy loam, 6 to 10 percent slopes (GrC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of grayish-brown or yellowish-brown sandy loam. Its subsoil is brownish-yellow or olive-yellow, friable sandy clay loam or clay loam that in most places is mottled with red or yellow in the lower part. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are a few gravelly areas and places where the surface layer is fine sandy loam. Also included are a few acres of Mayodan soils.

This Granville soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and erosion resulting from runoff are the major concerns in management. Capability unit IIIe-1; woodland suitability group 3o7.

Gullied Land, Clayey Materials

Gullied land, clayey materials (Gu) is so severely eroded and gullied that it cannot be identified by soil series. In most areas the surface layer is clay, but in a few spots it is sandy loam. Areas are 2 to 30 acres in size and roughly elliptical in shape. More than one-fourth of each area mapped is gullied. Many gullies are more than 2 feet deep. Some have cut into the underlying red sandstone or siltstone. Included in mapping are a few areas of White Store and Creedmoor soils.

This gullied land has slow infiltration and rapid runoff. It is best suited to trees. Capability unit VIIe-3; woodland suitability group unclassified.

Helena Series

The Helena series consists of gently sloping and sloping, moderately well drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from mixed acidic and basic rocks.

In a representative profile the surface layer is grayish-brown sandy loam about 8 inches thick. It is underlain by a 4-inch layer of light yellowish-brown sandy loam. The subsoil is about 34 inches thick. The upper part is mottled brownish-yellow, friable sandy clay loam. The next layer is mottled yellowish-brown and light yellowish-brown, firm to extremely firm clay. The lower part is mottled light-gray, friable silty clay loam. The underlying material to a depth of 60 inches is strong-brown, friable coarse sandy loam.

Helena soils are low in natural fertility and organic-matter content. Permeability is slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is more than one-half foot.

Most of the acreage is forested with loblolly pine and mixed hardwoods. The rest is chiefly in pasture. The soils are well suited to most row crops grown in the county, including tobacco and corn. The major limitations are the erosion hazard resulting from runoff, the slope, the slow permeability, and the wetness.

Representative profile of Helena sandy loam, 2 to 6 percent slopes, in a cultivated field 0.4 mile west of Mangum Store on State Road 1603; 400 feet north on a farm road, 400 feet east of farm road:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, medium and coarse, granular structure; very friable; many fine fibrous roots; medium acid; abrupt, smooth boundary.

A2—8 to 12 inches, light yellowish-brown (10YR 6/4) sandy loam; massive; very friable; few fine fibrous roots; few, small, soft and hard black concretions; strongly acid; clear, wavy boundary.

B1t—12 to 19 inches, brownish-yellow (10YR 6/6) sandy clay loam; common, fine, faint, pale-brown mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky; friable, sticky, plastic; few fine fibrous roots; few fine pores; few, thin, discontinuous clay films on faces of peds; few, small, rounded quartz pebbles; very strongly acid; clear, wavy boundary.

B21t—19 to 24 inches, yellowish-brown (10YR 5/8) clay; few, fine, prominent, light brownish-gray mottles; weak, coarse, angular blocky structure; firm, sticky, plastic; few fine fibrous roots; few fine pores; few, thin, discontinuous clay films on faces of peds; very strongly acid; clear, wavy boundary.

B22t—24 to 39 inches, yellowish-brown (10YR 5/8) clay; many, medium, prominent, gray (10YR 5/1) mottles; subangular blocky and angular blocky structure; very firm, sticky, very plastic; few, thin, discontinuous clay films

on faces of peds; very strongly acid; clear, wavy boundary.

B31—39 to 43 inches, light yellowish-brown (10YR 6/4) clay loam; common, medium, prominent, light-gray (10YR 7/1) mottles; massive parting to weak, medium, subangular blocky structure; extremely firm, sticky, very plastic; few, thin, discontinuous clay films on faces of peds; few brown concretions; very strongly acid; clear, wavy boundary.

B32—43 to 46 inches, light-gray (10YR 7/1) sandy clay loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; massive, friable, slightly sticky, slightly plastic; very strongly acid; clear, wavy boundary.

C—46 to 60 inches, strong-brown (7.5YR 5/8) coarse sandy loam; many, coarse, prominent, light-gray (10YR 7/1) streaks; massive parting to weak, medium, platy structure; friable; few coarse veins of gray clay; very strongly acid.

Depth to bedrock is more than 5 feet.

The Ap horizon is grayish brown or gray, and the A1 horizon, if present, is dark gray, gray, or light gray. The A2 horizon is light yellowish brown, pale olive, or light olive brown. The B1t horizon, if present, is brownish-yellow or brown sandy clay loam. The B2t horizon is strong-brown, brownish-yellow, yellowish-brown, or light yellowish-brown sandy clay to clay. The B3 horizon is light-gray, gray, yellowish-brown, or light yellowish-brown clay to sandy clay loam. The B horizon has some strong-brown, brown, and gray mottles. The C horizon is commonly strong-brown, brown, or light-gray coarse sandy loam or sandy loam and in places has veins of gray clay loam.

Helena sandy loam, 2 to 6 percent slopes (HeB).—This moderately well drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 30 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly sandy loam, a few small areas where the soil is eroded, and a few areas of nearly level, somewhat poorly drained soils. Also included are a few areas of Appling soils.

This Helena soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff, the wetness, and the slow permeability are the major concerns in management. Capability unit IIe-3; woodland suitability group 3w8.

Helena sandy loam, 6 to 10 percent slopes (HeC).—This moderately well drained soil is on narrow side slopes on uplands. It has a surface layer of grayish-brown or dark-gray sandy loam. The upper part of its subsoil is brownish-yellow, friable sandy clay loam, and the lower part is mottled yellowish-brown and light-gray, very firm clay or silty clay. Most areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 20 acres in size.

Included with this soil in mapping are a few gravelly areas, places where the surface layer is fine sandy loam or loam, and a few areas where the soil is eroded. Also included are a few acres of Appling and Iredell soils.

This Helena soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope, erosion resulting from runoff, wetness, and slow permeability are the major concerns in management. Capability unit IIIe-3; woodland suitability group 3w8.

Herndon Series

The Herndon series consists of gently sloping to sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from phyllite, which is locally known as "Carolina Slates."

In a representative profile the surface layer is yellowish-brown silt loam about 8 inches thick. The subsoil is about 36 inches thick. The upper 4 inches is strong-brown, friable silty clay loam; the next 22 inches is yellowish-red, firm silty clay that is mottled at a depth of 19 to 28 inches; and the lower 10 inches is mottled red, friable silty clay loam. The underlying material to a depth of 60 inches is light-red, friable silt loam and bands of partly disintegrated slate fragments.

Herndon soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with hardwood or pine. The rest is chiefly in pasture or under cultivation. The soils are well suited to most crops grown in the county, including tobacco, corn, and small grain. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Herndon silt loam, 2 to 6 percent slopes, in a cultivated field 1.5 miles west from Rougemont on State Road 1472; 50 feet south of road:

Ap—0 to 8 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary.

B1—8 to 12 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; few, thin, discontinuous silt coats on faces of peds; few ¼-inch pebbles; medium acid; abrupt, smooth boundary.

B21t—12 to 19 inches, yellowish-red (5YR 5/8) silty clay; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine pores; few, thin, discontinuous clay films on faces of peds; few thin intrusions of A horizon in old root channels; strongly acid; clear, wavy boundary.

B22t—19 to 28 inches, yellowish-red (5YR 5/8) silty clay; common, fine, prominent, yellow mottles; moderate, fine, subangular blocky structure; firm, sticky, plastic; few fine roots; few fine pores; many, thin, continuous clay films on faces of peds; strongly acid; gradual, wavy boundary.

B23t—28 to 34 inches, yellowish-red (5YR 5/8) silty clay; common, medium, distinct, red (2.5YR 5/8) mottles and few, fine, prominent, light-gray and brownish-yellow mottles; strong, medium, subangular blocky structure; firm, sticky, plastic; common continuous clay films on faces of peds; strongly acid; abrupt, wavy boundary.

B3t—34 to 44 inches, red (2.5YR 5/8) silty clay loam; common, medium, prominent, brownish-yellow (10YR 6/8) mottles and few, fine, prominent, light-gray mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few discontinuous clay films on faces of peds; common weathered slate fragments; strongly acid; gradual, irregular boundary.

C—44 to 60 inches, light-red (2.5YR 6/8) silt loam; common bands of partly weathered slate fragments; platy structure; friable; few, thin, patchy clay films on silt coats in vertical cracks; very strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is medium acid or strongly acid.

The A horizon is silt loam or stony silt loam. The Ap horizon is pale olive or yellowish brown, and the A1 horizon, if present, is dark grayish brown, grayish brown, or olive brown. The B1 horizon is strong brown, yellowish brown, or pale yellow. The

B2t horizon is yellowish-red, yellowish-brown, or red silty clay or silty clay loam. The B3t horizon is reddish-yellow or red silty clay loam or clay loam. In places the lower part of the B horizon has brownish-yellow or light-gray mottles. The C horizon is light-red or strong-brown silt loam containing many, small, very pale brown slate fragments.

Herndon silt loam, 2 to 6 percent slopes (HrB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 10 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly silt loam and a few small areas where the soil is eroded. Also included are a few areas of Appling and Georgeville soils.

This Herndon soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-2; woodland suitability group 3o7.

Herndon silt loam, 6 to 10 percent slopes (HrC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of yellowish-brown or grayish-brown silt loam. Its subsoil is red or yellowish-red, firm silty clay or silty clay loam that in most places is mottled with brownish yellow. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are a few gravelly spots and a few areas where the soil is eroded. Also included are a few acres of Georgeville, Goldston, and Wilkes soils.

This Herndon soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IIIe-2; woodland suitability group 3o7.

Herndon stony silt loam, 2 to 10 percent slopes (HsC).—This well-drained soil is on broad, smooth ridges and narrow side slopes on uplands. It has a surface layer of yellowish-brown or grayish-brown silt loam. Stones and cobblestones cover 15 to 25 percent of the surface area. The subsoil is red to yellowish-red, firm silty clay or silty clay loam that in most places is mottled with brownish yellow or light gray. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 20 acres in size.

Included with this soil in mapping are a few areas where the soil is eroded. Also included are a few acres of Georgeville, Goldston, and Wilkes soils.

Infiltration is moderate, and runoff is rapid.

The soil is well suited to permanent pasture and pine and hardwood forest. The stones, the slope, and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-2; woodland suitability group 3x8.

Iredell Series

The Iredell series consists of nearly level to sloping, moderately well drained soils on uplands. The landscape is one of broad flat areas and rounded divides. These soils formed under forest vegetation, in residuum from basic diorite rock.

In a representative profile the surface layer is very dark grayish-brown and grayish-brown loam about 7 inches thick. The subsoil is light olive-brown, very firm clay about 29 inches thick. The underlying material to a depth of 60 inches is variegated green, strong-brown, black, and gray saprolite that crushes to sandy loam.

Iredell soils are medium in natural fertility and low in organic-matter content. Permeability is slow, and available water capacity is high. The root zone is deep. Shrink-swell potential is high. Depth to the seasonal high water table is more than 1½ feet.

Most of the acreage is forested with mixed hardwoods and loblolly pine. The rest is used for nonfarm purposes and pasture. The soils are fairly well suited to crops, such as small grain and corn. The major limitation is the erosion hazard resulting from runoff, the steep slopes, the slow permeability, the high shrink-swell potential, and the ponding in nearly level areas.

Representative profile of Iredell loam, 2 to 6 percent slopes, in a hardwood forest 5.8 miles north from Durham on U.S. 501, 1.6 miles east on State Road 1639; 100 feet north of road:

O1—2 inches to 1 inch, undecomposed hardwood forest litter.
O2—1 inch to 0, black decomposed organic material.
A11—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; strong, fine, granular structure; very friable; many fine and medium woody roots; many small black concretions; neutral; abrupt, smooth boundary.
A12—2 to 7 inches, grayish-brown (2.5Y 5/2) loam; moderate, fine, granular structure; very friable; many fine and medium roots; many small black concretions; neutral; abrupt, smooth boundary.
B2t—7 to 24 inches, light olive-brown (2.5Y 5/4) clay; coarse, angular blocky structure; very firm, very sticky, very plastic; common medium roots which extend to a depth of 13 inches and become horizontally oriented at that depth; common, thin and medium, discontinuous clay films on faces of peds; common small black concretions; slightly acid; clear, wavy boundary.
B3—24 to 36 inches, light olive-brown (2.5Y 5/4) clay; massive; very firm, very sticky, very plastic; many, thin, discontinuous clay films on faces of peds; common small black concretions; many partly disintegrated rock fragments containing weatherable minerals; slightly acid; gradual, wavy boundary.
C—36 to 60 inches, variegated green, strong-brown, black, and gray saprolite that crushes to sandy loam; massive; friable, sticky, plastic; few, thin, discontinuous clay films in vertical cracks; mildly alkaline.

Depth to bedrock is more than 3½ feet. The B horizon is slightly acid to mildly alkaline.

The Ap horizon, if present, is dark grayish brown or olive brown, and the A1 horizon is very dark grayish brown to grayish brown. The B2t horizon is light olive brown or brown. The B3 horizon is light olive brown or light olive gray. The C horizon is commonly variegated green, strong-brown, black, and gray saprolite that crushes to sandy loam or sandy clay loam.

Iredell loam, 2 to 6 percent slopes (IrB).—This moderately well drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 15 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of fine sandy loam or gravelly loam, a few places where stones are on the surface, and a few small areas where the soil is eroded. Also included are areas of similar soils where slopes are less than 2 percent and a few areas of Mecklenburg soils.

This Iredell soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is fairly well suited to corn, soybeans, small grain,

hay, and pasture. Erosion resulting from runoff, the slow permeability, the high shrink-swell potential, and the ponding in nearly level areas are the major concerns in management. Capability unit IIe-3; woodland suitability group 4c2.

Iredell loam, 6 to 10 percent slopes (IrC).—This moderately well drained soil is on narrow side slopes on uplands. It has a surface layer of very dark grayish-brown or dark grayish-brown loam. Its subsoil is light olive-brown, very firm clay that is mottled with gray. Areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 25 acres in size.

Included with this soil in mapping are a few gravelly areas, places where the surface layer is fine sandy loam, a few areas where the soil is eroded, areas of similar soils where slopes are more than 10 percent, and a few places where stones are on the surface. Also included are a few acres of Mecklenburg and Wilkes soils.

This Iredell soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is rapid.

The soil is fairly well suited to corn, soybeans, and small grain. It is also suited to hay and pasture. Slope, erosion resulting from runoff, the slow permeability, and the high shrink-swell potential are the major concerns in management. Capability unit IIIe-3; woodland suitability group 4c2.

Iredell-Urban land complex, 0 to 6 percent slopes (IuB).—This complex consists of Iredell soils and Urban land that is mainly Iredell soil material. About 30 percent of each mapped area is covered by streets, houses, and other structures. About 35 percent is an undisturbed Iredell soil. About 25 percent is an Iredell soil that has been covered with as much as 18 inches of fill material or from which as much as two-thirds of the original soil material has been removed. The rest of each mapping unit consists of fills, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is commonly a mixture of silt, sand, and very plastic clay. Included with this complex in mapping are areas of Mecklenburg and White Store soils.

This complex will crack when dry and swell when wet. The nearly level areas are ponded during periods of heavy rain. Capability unit unassigned; woodland suitability group unassigned.

Iredell-Urban land complex, 6 to 10 percent slopes (IuC).—This complex consists of Iredell soils and Urban land. In each mapped area the Iredell soil can be identified, but it is not practical to map it separately. About 25 percent of each mapped area is covered by streets, buildings, and other structures. About 30 percent is an undisturbed Iredell soil (fig. 7). About 45 percent is an Iredell soil that has been covered with as much as 18 inches of fill material or from which as much as two-thirds of the original soil material has been removed. The rest of each mapped area consists of fills, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is commonly a mixture of silt, sand, and very plastic clay.

The major concern in management is the tendency of this complex to crack when dry and swell when wet. Capability unit unassigned; woodland suitability group unassigned.

Figure 7.—**Townhouses on Iredell loam.**

Lignum Series

The Lignum series consists of gently sloping, moderately well drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from fine-grained slate.

In a representative profile the surface layer is dark-gray silt loam about 2 inches thick. It is underlain by a 4-inch layer of light-gray silt loam. The subsoil is about 28 inches thick. The upper part is dominantly mottled yellow, friable silty clay loam. The next layer is mottled brownish-yellow and light-gray, firm silty clay. The lower part is mottled light brownish-gray, very firm clay. The underlying material to a depth of 46 inches is mottled light-gray and yellowish-brown saprolite, which crushes to silt, and a few flat slate fragments. Light-gray slate is at a depth of 46 inches.

Lignum soils are low in natural fertility and organic-matter content. Permeability is slow, and available water capacity is high. The root zone is deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is more than 1½ feet.

Most of the acreage is forested with loblolly pine and mixed hardwoods. The rest is chiefly under cultivation or in pasture. The soils are well suited to clover, lespedeza, and grasses. The major limitations are the erosion hazard resulting from runoff, the slope, the wetness, and the slow permeability.

Representative profile of Lignum silt loam, 2 to 6 percent slopes, in a pine forest 1.6 miles east from Mangum Store on State Road 1610, 0.75 mile north on a lane through the National Guard rifle range, 25 feet east of lane:

A1—0 to 2 inches, dark-gray (10YR 4/1) silt loam; strong, fine, granular structure; very friable; many fine fibrous roots; few flat slaty fragments 1 inch to 2 inches long; very strongly acid; abrupt, smooth boundary.

A2—2 to 6 inches, light-gray (10YR 7/1) silt loam; common, fine and coarse, prominent, brownish-yellow (10YR 6/6) mottles; weak, coarse, granular structure; very friable; common fine fibrous roots; few, small, soft, dark-brown concentrations; few flat slate fragments 1 inch to 2 inches long; very strongly acid; abrupt, wavy boundary.

B1—6 to 9 inches, very pale brown (10YR 7/4) silt loam; weak, fine, subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine fibrous roots; common medium pores; very strongly acid; clear, wavy boundary.

B21t—9 to 17 inches, yellow (10YR 7/6) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and common, coarse, faint, very pale brown (10YR 7/3) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine fibrous roots; common medium pores; few, thin, discontinuous clay films; few, small, soft, dark-brown concretions; few flat slate fragments 1 inch to 3 inches long; very strongly acid; gradual, wavy boundary.

B22t—17 to 22 inches, mottled brownish-yellow (10YR 6/8) and light-gray (10YR 7/2) silty clay; moderate, fine and medium, angular blocky structure; firm, sticky, plastic; few fine roots; common medium pores; common, thin, discontinuous clay films; few flat slate fragments ¼ inch to 2 inches long; very strongly acid; clear, wavy boundary.

B3t—22 to 34 inches, light brownish-gray (10YR 6/2) clay; many, coarse, prominent, brownish-yellow (10YR 6/6) mottles; weak, medium, blocky structure; very firm, very sticky, very plastic; few fine roots; few medium pores; common, thin, discontinuous, gray (10YR 6/1) clay films on faces of peds; few flat slate fragments; very strongly acid; clear, wavy boundary.

C—34 to 46 inches, mottled light-gray (10YR 7/1) and yellowish-brown (10YR 5/6) saprolite that crushes to silt; massive; friable; few pockets of clay; few flat slate fragments 3 inches long; very strongly acid.

R—46 inches, light-gray, fine-grained slate.

Depth to bedrock is more than 5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is grayish brown, yellowish brown, or brown, and the A1 horizon is dark gray or dark grayish brown. The A2 horizon, if present, is light gray, grayish brown, or pale brown. The B1 horizon is very pale brown or brown silt loam or loam. The B2t horizon is yellow, brownish-yellow, light-gray, and light brownish-gray silty clay loam, silty clay, or clay. The B3 horizon, if present, is light brownish-gray or brownish-yellow clay, silty clay loam, or clay loam. The lower part of the B horizon has mottles in shades of brown, yellow, and gray. The C horizon is commonly light-gray and yellowish-brown or strong-brown saprolite that crushes to silt or silt loam.

Lignum silt loam, 2 to 6 percent slopes (LgB).—This is a moderately well drained soil on uplands. Areas are generally elliptical in shape and 3 to 40 acres in size.

Included with this soil in mapping are areas of similar soils where slopes are less than 2 percent. Also included are spots where the soil is eroded and a few areas of Herndon soils.

This Lignum soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is well suited to some hay and pasture. Erosion resulting from runoff, the wetness, and the slow permeability are the major concerns in management. Capability unit IIe-3; woodland suitability group 3w8.

Mayodan Series

The Mayodan series consists of nearly level to moderately steep, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from Triassic Mudstone.

In a representative profile the surface layer is grayish-brown sandy loam about 3 inches thick. It is underlain by a 9-inch layer of light yellowish-brown sandy loam. The subsoil is about 35 inches thick. The upper part is strong-brown, friable sandy clay loam; and the lower part is yellowish-red, firm and friable sandy clay. The underlying material to a depth of 60 inches is mottled dark-red and very pale brown, weathered sandstone that crushes to sandy loam.

Mayodan soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is under cultivation. The rest is in pasture or is forested with mixed hardwoods or loblolly pine. The soils are well suited to most row crops grown in the county, including tobacco and corn. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Mayodan sandy loam, 2 to 6 percent slopes, in a wooded area 1 mile east of Nelson on State Road 1973; 75 feet east of road:

A1—0 to 3 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many medium and coarse roots; strongly acid; clear, smooth boundary.

A2—3 to 12 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, fine, granular structure; very friable; many medium and coarse roots; strongly acid; clear, smooth boundary.

B1t—12 to 18 inches, strong-brown (7.5YR 5/8) sandy clay loam; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; strongly acid; clear, smooth boundary.

B2t—18 to 36 inches, yellowish-red (5YR 4/8) sandy clay; moderate, medium, subangular blocky structure; firm, sticky, slightly plastic; few fine and medium roots; common fine and medium pores; few, thin, continuous clay films on faces of peds; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B3t—36 to 47 inches, yellowish-red (5YR 4/8) sandy clay; many, coarse, distinct, red (2.5YR 4/8) mottles; moderate, medium, subangular blocky structure; friable, sticky, plastic; common, thin, discontinuous clay films on faces of peds; few fine flakes of mica; few pockets of weathered sandstone that crushes to sandy loam; strongly acid; gradual boundary.

C—47 to 60 inches, mottled dark-red (2.5YR 3/6) and very pale brown (10YR 8/3), weathered sandstone that crushes to sandy loam; massive; friable; strongly acid.

Depth to bedrock is more than 5 feet.

The Ap horizon, if present, is yellowish brown, and the A1 horizon is grayish brown or dark yellowish brown. The A2 horizon is light yellowish brown or very pale brown. The B1t horizon, if present, is yellowish-brown, strong-brown, or yellowish-red sandy clay loam or clay loam. The B2t horizon is yellowish-red or reddish-yellow sandy clay, clay loam, or clay. The B3t horizon is yellowish-red to weak-red sandy clay or sandy clay loam. In places the B horizon has red mottles. The C horizon is commonly dark-red and very pale brown weathered sandstone that crushes to sandy loam, loamy sandy clay loam, or clay loam.

Mayodan sandy loam, 2 to 6 percent slopes (MfB).—This well-drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 30 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly sandy loam and a few areas where the soil is eroded. Also included are a few areas of Appling, Granville, and Creedmoor soils.

This Mayodan soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Erosion resulting from runoff is a concern in management. Capability unit IIe-1; woodland suitability group 3o7.

Mayodan sandy loam, 6 to 10 percent slopes (MfC).—This well-drained soil is on narrow side slopes on uplands. It has a surface layer of grayish-brown or yellowish-brown sandy loam. Its subsoil is yellowish-red, firm clay or sandy clay that in most places is mottled with red. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 20 acres in size.

Included with this soil in mapping are a few gravelly areas and a few areas where the soil is eroded. Also included are a few areas of Granville and Creedmoor soils.

This Mayodan soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from

runoff are the major concerns in management. Capability unit IIIe-1; woodland suitability group 3o7.

Mayodan sandy loam, 10 to 15 percent slopes (MfD).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of grayish-brown sandy loam. Its subsoil is yellowish-red, firm sandy clay. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 20 acres in size.

Included with this soil in mapping are places where the surface layer is gravelly sandy loam and spots where the soil is eroded. Also included are areas of Pinkston and White Store soils.

This Mayodan soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-1; woodland suitability group 3o7.

Mayodan sandy loam, 15 to 25 percent slopes (MfE).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of yellowish-brown sandy loam. Its subsoil is yellowish-red, firm sandy clay. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 40 acres in size.

Included with this soil in mapping are spots where the soil is eroded. Also included are areas of Pinkston and White Store soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. Slope and erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 3r8.

Mayodan-Urban land complex, 0 to 10 percent slopes (MrC).—This complex consists of Mayodan soil and Urban land that is mainly Mayodan soil material. A considerable part of many mapped areas is covered by streets, houses, and other structures. About 30 percent is an undisturbed Mayodan soil. About 25 percent is a Mayodan soil that in places has been covered with as much as 18 inches of fill material and in other places has had as much as two-thirds of the original soil material removed. The rest of each mapped area consists of fills, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is commonly a mixture of sandy loam and clay.

Included with this complex in mapping are areas of Creedmoor and White Store soils. Capability unit unassigned; woodland suitability group unassigned.

Mayodan-Urban land complex, 10 to 15 percent slopes (MrD).—This complex consists of Mayodan soil and Urban land that is mainly Mayodan soil material. About 25 percent of each mapped area is covered by streets, houses, and other structures. About 40 percent is an undisturbed Mayodan soil. About 35 percent is a Mayodan soil that has been terraced or graded. In these terraced or graded areas, most of the original soil material has been cut away. In other areas 18 inches or more of fill material has been added to the Mayodan soil. The fill material is commonly a mixture of sandy loam and clay.

Included with this complex in mapping are some areas of White Store soils. Capability unit unassigned; woodland suitability group unassigned.

Mecklenburg Series

The Mecklenburg series consists of gently sloping and sloping, well-drained soils on uplands. The landscape is one of rounded divides. These soils formed under forest vegetation, in residuum from dark-colored basic crystalline rock.

In a representative profile the surface layer is reddish-brown loam about 5 inches thick. The subsoil is about 33 inches thick. The upper part is yellowish-red, firm clay. The lower part is mottled yellowish-red, yellowish-brown, and black, firm and friable clay loam. The underlying material to a depth of 60 inches is mottled yellowish-red, yellowish-brown, and black saprolite that crushes to friable loam.

Mecklenburg soils are low in natural fertility and organic-matter content. Permeability is slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with low-quality hardwoods and pines. The rest is chiefly in pasture. The soils are well suited to most row crops grown in the county, including oats and corn. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Mecklenburg loam, 6 to 10 percent slopes, in a wooded area 5.8 miles north from Durham on U.S. 501; 60 feet east of road:

O1—2 inches to 0, undecomposed hardwood and pine litter.

A1—0 to 5 inches, reddish-brown (5YR 4/3) loam; strong, medium, granular structure; friable; many fine roots; many angular ¼- to 3-inch pebbles; slightly acid; abrupt, smooth boundary.

B21t—5 to 15 inches, yellowish-red (5YR 4/6) clay; strong, medium, subangular blocky structure; firm, sticky, very plastic; common fine roots; common, thin, continuous clay films on faces of peds; common black specks; slightly acid; clear, wavy boundary.

B22t—15 to 24 inches, yellowish-red (5YR 4/6) clay; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common, thin, discontinuous clay films on faces of peds; many black specks and concretions; slightly acid; clear, wavy boundary.

B31—24 to 30 inches, yellowish-red (5YR 4/6) clay loam; many, fine, prominent reddish-yellow mottles; moderate, medium, blocky structure; firm, sticky, plastic; few fine roots; thin discontinuous clay films on faces of peds; many black specks and common black concretions; slightly acid; clear, wavy boundary.

B32—30 to 38 inches, mottled yellowish-red (5YR 4/6), yellowish-brown (10YR 5/6), and black (10YR 2/1) clay loam; weak, medium, angular blocky structure; friable; sticky, slightly plastic; common, thin, reddish-brown, discontinuous clay films on faces of peds; slightly acid; gradual, wavy boundary.

C—38 to 60 inches, mottled yellowish-red (5YR 4/6), yellowish-brown (10YR 5/6), and black (10YR 2/1) saprolite that crushes to loam; massive; friable; slightly acid.

Depth to bedrock is more than 4 feet. The B horizon is medium acid to slightly acid.

The Ap or A1 horizon is reddish brown, brown, or yellowish brown. The B2t horizon is yellowish-red, reddish-brown, or red clay. The B3 horizon is yellowish-red, reddish-brown, or red clay loam. In places the lower part of the B horizon has reddish-yellow, yellowish-brown, and black mottles. The C horizon is commonly mottled yellowish-red, yellowish-brown, and black saprolite that crushes to loam or silt loam.

Mecklenburg loam, 2 to 6 percent slopes (MuB).—This well-drained soil is on broad ridges on uplands. It has a surface layer of yellowish-brown or reddish-brown loam. Its subsoil is yellowish-red or red, firm clay that is mottled with yellowish brown and black. Areas are generally elliptical in shape and 2 to 8 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of gravelly loam and a few small areas where the soil is eroded. Also included are a few areas of Herndon and Iredell soils.

This Mecklenburg soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is medium.

This soil is well suited to corn, small grain, and pasture. Erosion resulting from runoff is the major concern in management. Capability unit IIe-3; woodland suitability group 4o1.

Mecklenburg loam, 6 to 10 percent slopes (MuC).—This well-drained soil is on narrow side slopes on uplands. It has the profile described as representative of the series. Areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 8 acres in size.

Included with this soil in mapping are a few gravelly areas, places where the slope is more than 10 percent, and a few areas where the soil is eroded. Also included are similar soils where the surface layer is stony and a few acres of Herndon and Wilkes soils.

This Mecklenburg soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to corn, small grain, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IIIe-3; woodland suitability group 4o1.

Nason Series

The Nason series consists of strongly sloping to moderately steep, well-drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum weathered from fine-grained slate and schist.

In a representative profile the surface layer is brown silt loam about 2 inches thick. It is underlain by a 6-inch layer of yellowish-brown silt loam. The subsoil is about 25 inches thick. The upper part is yellowish-brown, firm silty clay loam. The lower part is mottled yellowish-red, firm silty clay and friable silty clay loam. The underlying material to a depth of 47 inches is light-red saprolite that crushes to silt loam and very pale brown and yellowish-brown, thin layers of silt. Schist is at a depth of 47 inches.

Nason soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with hardwoods and loblolly pine. A few acres are in pasture or under cultivation. The soils are fairly well suited to most row crops grown in the county. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Nason silt loam, 10 to 15 percent slopes, in a hardwood forest 0.9 mile north from Rougemont on U.S. Highway 501; 0.5 mile east on private road, 50 feet south of road:

A1—0 to 2 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; very friable; many fine roots; few ¼- to 1-inch quartz pebbles; strongly acid; abrupt, smooth boundary.

A2—2 to 8 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, granular structure; friable; common fine roots; few, thin, discontinuous silt films on faces of peds; few 1-inch pebbles; strongly acid; abrupt, smooth boundary.

B1t—8 to 12 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, subangular blocky structure; firm, sticky, slightly plastic; few fine roots; common fine pores; few, thin, discontinuous clay films; common fine quartz and slate fragments; strongly acid; clear, wavy boundary.

B21t—12 to 17 inches, yellowish-red (5YR 5/8) silty clay; common, fine, prominent, yellow mottles; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; few fine pores; few, thin, discontinuous clay films; strongly acid; gradual, wavy boundary.

B22t—17 to 28 inches, yellowish-red (5YR 5/8) silty clay; common, fine, distinct, red (2.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm, sticky, plastic; common, thin, discontinuous clay films; strongly acid; abrupt, wavy boundary.

B3t—28 to 33 inches, yellowish-red (5YR 4/8) silty clay loam; common, medium, prominent, brownish-yellow (10YR 6/8) mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few, thin, discontinuous clay films on horizontal and vertical faces of peds; common, fine, prominent, white minerals; few small slate fragments; strongly acid; gradual, irregular boundary.

C—33 to 47 inches, light-red (2.5YR 6/8) saprolite that crushes to silt loam; common very pale brown (10YR 7/3) and yellowish-brown (5YR 4/8) thin layers of silt; friable; many flakes of mica; very strongly acid.

R—47 inches, sericite schist that is difficult to dig with a spade.

Depth to bedrock is more than 3½ feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is brown or yellowish red, and the A1 horizon is brown, dark grayish brown, or dark brown. The A2 horizon is yellowish brown or brown. Stones, 6 to 24 inches in diameter, are on the surface in places. The B1t horizon is silty clay loam or silty clay. The B2t horizon is yellowish-red or strong-brown silty clay or silty clay loam mottled with red and yellow. The B3t horizon is red or yellowish red. The C horizon commonly is mottled light-red, yellowish-red, very pale brown, or yellowish-brown saprolite that crushes to silt loam.

Nason silt loam, 10 to 15 percent slopes (NaD).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has the profile described as representative of the series. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are spots where the soil is eroded. Also included are areas of Tatum and Wedowee soils.

This Nason soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

This soil is fairly well suited to tobacco, corn, soybeans, and small grain. It is well suited to hay and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-2; woodland suitability group 3o7.

Nason silt loam, 15 to 25 percent slopes (NaE).—This well-drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of brown silt loam. Its subsoil is strong-brown, firm silty clay. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 8 acres in size.

Included with this soil in mapping are spots where the soil is eroded. Also included are areas of Tatum and Wedowee soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. Slope and the erosion resulting from runoff are the

major concerns in management. Capability unit VIe-1; woodland suitability group 3r8.

Nason stony silt loam, 10 to 15 percent slopes (NoD).—This well-drained soil is on side slopes adjacent to the major drainageways in uplands. It has a surface layer of dark grayish-brown or brown stony silt loam. Stones and cobbles cover 15 to 25 percent of the surface area. The subsoil is yellowish-red, firm silty clay. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are a few areas where a few cobblestones are in the surface layer and spots where the soil is eroded. Also included are a few areas of Tatum and Wedowee soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. The stones, the slope, and the erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 3x8.

Pinkston Series

The Pinkston series consists of gently sloping to moderately steep, well-drained or excessively drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum from Triassic Sandstone.

In a representative profile the surface layer is dark-brown fine sandy loam about 5 inches thick. The subsoil is yellowish-red, friable fine sandy loam about 16 inches thick. The underlying material to a depth of about 35 inches is dark reddish-brown, weathered sandstone that crushes to very friable sandy loam or fine sandy loam. Dark reddish-brown sandstone is at a depth of 35 inches.

Pinkston soils are low in natural fertility and organic-matter content. Permeability is moderately rapid, and available water capacity is medium. The root zone is moderately deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with pine or mixed hardwoods. The rest is chiefly under cultivation or in pasture. The soils are well suited to most row crops grown in the county, including tobacco and corn. The major limitations are the erosion hazard resulting from runoff and slope and the depth to bedrock.

Representative profile of Pinkston fine sandy loam, 2 to 10 percent slopes, in a hardwood forest 2 miles west of Bethesda on State Road 1951; 300 feet south of road:

O1—2½ inches to ¼ inch, hardwood leaves.
O2—¼ inch to 0, decomposed and partly decomposed leaves and forest litter.
A11—0 to 2 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; many medium roots; very strongly acid; abrupt, smooth boundary.
A12—2 to 5 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, medium, granular structure; very friable; common medium roots; few rounded pebbles; very strongly acid; clear, wavy boundary.
B21—5 to 12 inches, yellowish-red (5YR 5/6) fine sandy loam; weak, fine, subangular blocky structure; friable; few fine roots; common small pores; few small rounded pebbles; few pebble-size sandstone fragments; very strongly acid; clear, wavy boundary.
B22—12 to 21 inches, yellowish-red (5YR 5/6) fine sandy loam; weak, fine, subangular blocky structure; friable; few fine roots; common fine pores; common fine flakes of mica; coarse fragments of weathered sandstone, 5 percent by volume; tongues of sandy clay loam; very strongly acid; abrupt, smooth boundary.
C—21 to 35 inches, dark reddish-brown (2.5YR 3/4) weathered sandstone that crushes to fine sandy loam; firm in place; very friable; common fine flakes of mica; few black specks; very strongly acid.
R—35 inches, dark reddish-brown sandstone.

Depth to bedrock is more than 2.5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is reddish brown, and the A1 horizon is dark brown or dark gray. The B horizon is yellowish-red or reddish-yellow fine sandy loam or sandy loam. The C horizon commonly is dark reddish-brown or brown weathered sandstone that crushes to fine sandy loam or sandy loam.

Pinkston fine sandy loam, 2 to 10 percent slopes (PfC).—This well-drained to excessively drained soil is on broad ridges and narrow side slopes on uplands. It has the profile described as representative of the series. Areas are generally elliptical or occur as narrow bands that are roughly rectangular in shape. They range from 2 to 20 acres in size.

Included with this soil in mapping are places where the surface layer is coarse sandy loam. Also included are a few acres of Mayodan and White Store soils.

This Pinkston soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope, erosion resulting from runoff, and the depth to bedrock are the major concerns in management. Capability unit IVe-3; woodland suitability group 4o1.

Pinkston fine sandy loam, 10 to 25 percent slopes (PfE).—This well-drained to excessively drained soil is on side slopes adjacent to the major drainageways on uplands. It has a surface layer of reddish-brown or dark-brown fine sandy loam. Its subsoil is yellowish-red, friable fine sandy loam or sandy loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 4 to 30 acres in size.

Included with this soil in mapping are places where the surface layer is coarse sandy loam and spots where the soil is eroded. Also included are areas of Mayodan and White Store soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forests. Slope, erosion resulting from runoff, and the depth to bedrock are the major concerns in management. Capability unit VIIe-1; woodland suitability group 4r2.

Roanoke Series

The Roanoke series consists of nearly level, poorly drained soils on low stream terraces. These soils formed under forest vegetation, in alluvial deposits.

In a representative profile the surface layer is light brownish-gray silt loam about 7 inches thick. The subsoil is about 44 inches thick. The upper part is mottled light brownish-gray silty clay loam. The lower part is mottled gray, firm clay and silty clay loam. The underlying material to a depth of 60 inches is mottled grayish-brown, stratified sand and silt and thin lenses of sandy clay.

Roanoke soils are flooded frequently for brief periods. They are low in natural fertility and organic-matter content. Permeability is slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is moderate.

The seasonal high water table is at or near the surface late in winter and early in spring.

Most of the acreage is forested with mixed hardwoods. The rest is chiefly in pasture. If properly drained the soils are well suited to hay, small grain, and corn. The major limitations are wetness and flooding.

Representative profile of Roanoke silt loam in a pasture 3.8 miles southeast of Bahama on State Road 1615; 900 feet east of road:

Ap—0 to 7 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, prominent, yellowish-brown mottles; weak, medium, granular structure; friable, slightly sticky, slightly plastic; many fine roots; common medium pores; strongly acid; clear, smooth boundary.

B1g—7 to 10 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, fine, prominent, strong-brown mottles; weak, medium, blocky structure; friable, sticky, plastic; common fine roots; common fine pores; strongly acid; gradual, wavy boundary.

B21tg—10 to 24 inches, gray (2.5Y N6/) clay, estimated 35 percent silt; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; moderate, medium, blocky structure; firm, very sticky, very plastic; few fine roots; few medium pores; few discontinuous clay films on faces of peds; very strongly acid; clear, wavy boundary.

B22tg—24 to 42 inches, gray (2.5Y N5/) clay, estimated 25 percent silt; many, coarse, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/6) mottles; massive parting to weak, medium, blocky structure; firm, very sticky, very plastic; few fine roots; few fine pores; many discontinuous clay films on faces of peds; strongly acid; gradual, wavy boundary.

B3g—42 to 51 inches, gray (2.5Y N5/) silty clay loam and few pockets of sand; few, coarse, prominent, strong-brown (7.5YR 5/6) mottles and common, medium, prominent, yellowish-brown (10YR 5/6) mottles; massive parting to weak, medium, subangular blocky structure; firm, sticky, slightly plastic; few rounded quartz pebbles; strongly acid; gradual, wavy boundary.

IICg—51 to 60 inches, grayish-brown (10YR 5/2) stratified sand and silt and thin lenses of sandy clay; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; massive; friable; strongly acid.

Depth to bedrock is more than 5 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon is light brownish gray or dark grayish brown, and the A1 horizon, if present, is grayish brown or gray. The B1 horizon is light brownish-gray or gray silty clay loam or clay loam. The B2t horizon is gray clay or silty clay. The B3 horizon is gray or light gray. The B horizon has few to many strong-brown and yellowish-brown mottles. The C horizon commonly is grayish-brown or gray and yellowish-brown stratified sand and silt and thin lenses of sandy clay.

Roanoke silt loam (Ro).—This poorly drained soil is on low stream terraces. Areas are generally elliptical in shape and 2 to 100 acres in size. Slopes range from 0 to 2 percent.

Included with this soil in mapping are a few spots where the surface layer is fine sandy loam. Also included are a few areas of Wehadkee and Chewacla soils.

This Roanoke soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is slow.

This soil is suited to pasture. Wetness and flooding are major concerns in management. Capability unit IVw-1; woodland suitability group 2w9.

Tatum Series

The Tatum series consists of moderately steep, well-drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum from fine-grained slate rock.

In a representative profile the surface layer is very dark grayish-brown gravelly silt loam about 2 inches thick. It is underlain by a 4-inch layer of brown gravelly silt loam. The subsoil is about 28 inches thick. The upper part is yellowish-red, friable silty clay loam. The next layer is red, friable and firm silty clay. The lower part is red, friable silty clay loam. The underlying material to a depth of about 50 inches is mottled red and yellowish-red, weathered rock that crushes to friable loam.

Tatum soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is moderately deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with mixed hardwoods and loblolly pine. The soils are well suited to most pasture grasses grown in the county. The major limitations are the erosion hazard resulting from runoff and slope and the gravelly surface layer.

Representative profile of Tatum gravelly silt loam, 15 to 25 percent slopes, in a wooded area 1.2 miles east from Quail Roost on State Road 1614; 100 feet west of Flat River, 100 feet north of road:

O1—2 inches to ½ inch, leaves and twigs.

O2—½ inch to 0, thin layer of decomposed organic matter.

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

A2—2 to 6 inches, brown (7.5YR 5/4) gravelly silt loam; weak, fine, granular structure; very friable; many fine and medium roots; strongly acid; clear, smooth boundary.

B1t—6 to 12 inches, yellowish-red (5YR 4/8) silty clay loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few medium roots; strongly acid; clear, smooth boundary.

B21t—12 to 17 inches, red (2.5YR 4/6) silty clay; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few medium roots; strongly acid; gradual, smooth boundary.

B22t—17 to 28 inches, red (2.5YR 4/8) silty clay; strong, medium, subangular blocky structure; firm, slightly sticky, plastic; few fine roots; strongly acid; gradual, smooth boundary.

B3t—28 to 34 inches, red (2.5YR 5/8) silty clay loam; few, medium, faint, yellowish-red (5YR 5/6) streaks; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; strongly acid; irregular, wavy boundary.

C1—34 to 50 inches, mottled red (2.5YR 5/8) and yellowish-red (5YR 5/6) weathered rock that crushes to loam; friable; strongly acid; irregular boundary.

C2—50 inches, hard slate that can be dug with a spade with difficulty.

Depth to bedrock is more than 3½ feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is brown or yellowish brown, and the A1 horizon is very dark grayish brown or grayish brown. The A2 horizon, if present, is brown or yellowish brown. The B1t horizon, if present, is yellowish-red or red silty clay loam. The B2t horizon is red or light red. The B3t horizon is red or dark reddish-brown silty clay loam or silt loam mottled with yellowish red. The C horizon commonly is mottled red and yellowish-red weathered rock that crushes to loam or silt loam.

Tatum gravelly silt loam, 15 to 25 percent slopes (TaE).—This well-drained soil is on uplands. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are spots where the soil is eroded. Also included are areas of Nason and Wilkes soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 4r2.

Urban Land

Urban land (Ur) has been cut, filled, graded, or otherwise changed to the extent that the original soil characteristics have been altered or destroyed. More than 80 percent of each mapped area is covered by buildings or pavement. The rest is small lawns or shrub gardens near buildings, sidewalks, and parking lots. Capability unit unassigned; woodland suitability group unassigned.

Wahee Series, Alkaline Subsoil Variant

The Wahee series, alkaline subsoil variant, consists of nearly level, somewhat poorly drained soils on low stream terraces. These soils formed under forest vegetation, in alkaline alluvial deposits.

In a representative profile the surface layer is brown loam about 4 inches thick. It is underlain by a 6-inch layer of pale-brown loam. The subsoil is about 46 inches thick. The upper part is mottled light yellowish-brown, friable sandy clay loam. The next layer is mottled yellowish-brown and light-gray, very firm clay. The lower part is mottled strong-brown, friable sandy clay loam. The underlying material is mottled strong-brown, friable sandy clay loam.

Wahee soils are flooded infrequently for very brief periods. They are medium in natural fertility and low in organic-matter content. Permeability is slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is moderate. The seasonal high water table is at a depth of about one-half foot late in winter and early in spring.

Most of the acreage is forested with loblolly pine and mixed hardwoods. The rest is chiefly in pasture. If adequately drained, this soil is fairly well suited to hay and some row crops, including corn. The major limitations are wetness and ponding.

Representative profile of Wahee loam, alkaline subsoil variant, in a pine forest 1 mile north of the Durham-Wake County line on State Road 54; 200 feet west of road:

O1—1 inch to 0, undecomposed forest litter.

A1—0 to 4 inches, brown (10YR 6/3) loam; weak, medium, granular structure; friable; many medium roots; very strongly acid; clear, smooth boundary.

A2—4 to 10 inches, pale-brown (10YR 6/3) loam; weak, medium, granular structure; very friable; common medium roots; extremely acid; clear, smooth boundary.

A&Bt—10 to 16 inches, light yellowish-brown (10YR 6/4) sandy clay loam; many, coarse, distinct light brownish-gray (10YR 6/2) mottles in interiors of peds; weak, fine, subangular blocky structure; tongues and coatings (as much as 1 millimeter thick) of clean very fine sand grains; friable, slightly sticky, slightly plastic; common medium roots; many medium pores; very strongly acid; clear, smooth boundary.

B21t—16 to 30 inches, yellowish-brown (10YR 5/4) clay; few, medium, prominent, gray (10YR 6/1) mottles in the interiors of peds; weak, medium, angular and subangular blocky structure; very firm, very sticky, very plastic; few medium roots; common medium pores; gray (10YR 7/1) very fine sand coatings on faces of a few peds; medium acid; gradual, smooth boundary.

B22t—30 to 48 inches, light-gray (10YR 7/2) clay; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, coarse, angular and subangular blocky structure; very firm, very sticky, very plastic; few medium roots; few fine pores; few, discontinuous clay films; moderately alkaline; gradual, smooth boundary.

B3—48 to 56 inches, strong-brown (7.5YR 5/6) sandy clay loam; few, medium, prominent gray (10YR 6/1) mottles; weak, coarse, angular and subangular blocky structure; friable, slightly sticky, slightly plastic; common medium pores; few discontinuous clay films; moderately alkaline; gradual, smooth boundary.

C—56 to 65 inches, strong-brown (7.5YR 5/6) sandy clay loam; many, coarse, distinct light-gray (10YR 6/1) mottles; massive parting to weak, platy structure; friable, slightly sticky, slightly plastic; moderately alkaline.

Depth to bedrock is more than 5 feet. The B horizon is medium acid to moderately alkaline.

The Ap horizon, where present, is very dark gray or gray, and the A1 horizon and A2 horizon are brown, pale brown, or light brownish gray. The B2t horizon is yellowish-brown, gray, or light-gray sandy clay, clay, or silty clay. The B3 horizon is sandy clay loam to silty clay loam. In places the B horizon has strong-brown and gray mottles. The C horizon commonly is strong-brown or gray sandy clay loam, sandy loam, or sand mottled with light gray or pale olive.

Wahee loam, alkaline subsoil variant (Wh).—This somewhat poorly drained soil is on low stream terraces. Areas are generally elliptical in shape and 2 to 40 acres in size. Slopes range from 0 to 2 percent.

Included with this soil in mapping are a few areas of similar soils where the surface layer is fine sandy loam. Also included are areas of Altavista soils.

This Wahee soil is easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is slow.

This soil is fairly well suited to pasture, hay crops, small grain, or corn. Ponding and wetness are the major concerns in management. Capability unit IIIw-2; woodland suitability group 2w8.

Wedowee Series

The Wedowee series consists of strongly sloping and moderately steep, well-drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum from granite, gneiss, and other acidic rock.

In a representative profile the surface layer is dark-brown sandy loam about 3 inches thick. It is underlain by a 6-inch layer of light yellowish-brown sandy loam. The subsoil is about 27 inches thick. The upper part is reddish-yellow, friable sandy clay loam. The next layer is strong-brown, firm clay. The lower part is mottled strong-brown and very pale brown, firm clay loam. The underlying material to a depth of 60 inches is mottled strong-brown, very pale brown, and white saprolite that crushes to friable silt loam.

Wedowee soils are low in natural fertility and organic-matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep. Shrink-swell potential is low. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture. The soils are well suited to most row crops grown in the county, including tobacco and corn. The major limitation is the erosion hazard resulting from runoff and slope.

Representative profile of Wedowee sandy loam, 10 to 15 percent slopes, in a forest 2.6 miles north of Magnum Store on State Road 1471; 200 feet east of road:

A1—0 to 3 inches, dark-brown (10YR 4/3) sandy loam; moderate, medium, granular structure; very friable; many medium roots; strongly acid; abrupt, smooth boundary.

A2—3 to 9 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, medium, granular structure; very friable; common medium roots; strongly acid; abrupt, wavy boundary.

B1—9 to 12 inches, reddish-yellow (7.5YR 6/6) sandy clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common medium pores; very strongly acid; clear, wavy boundary.

B2t—12 to 30 inches, strong-brown (7.5YR 5/8) clay; moderate, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; common fine pores; few discontinuous clay films on faces of peds; strongly acid; gradual, wavy boundary.

B3—30 to 36 inches, mottled strong-brown (7.5YR 5/6) and very pale brown (10YR 7/4) clay loam; weak, medium, subangular blocky structure; firm, slightly sticky, slightly plastic; few, fine, hard, white silty fragments; strongly acid; gradual, wavy boundary.

C—36 to 60 inches, mottled strong-brown (7.5YR 5/6), very pale brown, (10YR 7/4) and white (10YR 8/2) saprolite that crushes to silt loam; massive; friable; very strongly acid.

Depth to bedrock is more than 4 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon, if present, is yellowish brown, and the A1 horizon is dark brown or dark grayish brown. The A2 horizon is commonly yellow, light yellowish brown, or brown. The B1 horizon, if present, is reddish-yellow or brownish-yellow sandy clay loam or loam. The B2t horizon is strong-brown or brownish-yellow clay or sandy clay. The B3 horizon is strong-brown and very pale brown clay loam, sandy clay loam, or loam. The B horizon commonly has very pale brown mottles. The C horizon is mottled strong-brown, brown, very pale brown, yellow, red, or white saprolite that crushes to silt loam or loam.

Wedowee sandy loam, 10 to 15 percent slopes (WmD).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. It has the profile described as representative of the series. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 8 acres in size.

Included with this soil in mapping are areas where stones are on the surface and spots where the soil is eroded. Also included are areas of Nason soils.

This Wedowee soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit IVe-1; woodland suitability group 3o7.

Wedowee sandy loam, 15 to 25 percent slopes (WmE).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. It has a surface layer of yellowish-brown or dark-brown sandy loam. Its subsoil is reddish-yellow to strong-brown, firm clay loam to sandy clay loam. Areas occur as long, narrow bands that are roughly rectangular in shape and range from 2 to 15 acres in size.

Included with this soil in mapping are places where slopes are more than 25 percent. Also included are areas of Nason soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. Slope and the erosion resulting from runoff are the major concerns in management. Capability unit VIe-1; woodland suitability group 3r8.

Wehadkee Series

The Wehadkee series consists of nearly level, poorly drained soils on flood plains. These soils formed in fine loamy alluvium washed from soils on uplands.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of about 46 inches is mottled light-gray, friable silty clay loam. Below this to a depth of 60 inches is mottled dark-brown and light-gray, friable clay loam.

Wehadkee soils are flooded very frequently for very brief periods. They are low in natural fertility and medium in organic-matter content. Permeability is moderate, and available water capacity is high. The root zone is deep. Shrink-swell potential is low. The seasonal high water table is generally at or near the surface late in winter and early in spring.

Most of the acreage is now forested with mixed hardwoods. If adequately drained, these soils are fairly well suited to some row crops, including corn. The major limitations are wetness and flooding.

Representative profile of Wehadkee silt loam in a hardwood forest 5.7 miles southwest from Durham on U.S. 15-501; 100 feet south of road, and 100 feet west of New Hope Creek:

A1—0 to 7 inches, brown (10YR 5/3) silt loam; weak, coarse, granular structure; friable, slightly sticky, slightly plastic; many fine roots; few brittle concretions; medium acid; abrupt, smooth boundary.

B1—7 to 12 inches, light-gray (10YR 7/2) silty clay loam; many, coarse, distinct, dark-brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common medium pores; common, small, soft, dark-brown concretions; medium acid; clear, wavy boundary.

B2g—12 to 46 inches, light-gray (10YR 7/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark-brown (10YR 4/3) mottles; weak, coarse, subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots to a depth of about 24 inches; common medium pores; common small concretions; medium acid; gradual, irregular boundary.

B3—46 to 60 inches, mottled dark-brown (10YR 4/3) and light-gray (10 YR 7/1) clay loam; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; common, small, soft, dark-brown concretions; medium acid.

Depth to bedrock is more than 5 feet. The B horizon is medium acid or slightly acid.

The Ap horizon, if present, is grayish brown, and the A1 horizon is brown, grayish brown, or gray. The B1 horizon is light-gray or gray silty clay loam or loam. The B2 horizon is light-gray or gray silty clay loam or clay loam mottled with yellowish brown and dark brown. The B3 horizon is mottled dark brown or brown and light gray. The C horizon, if present, is commonly gray or light-gray sandy loam or gray stratified sand and gravel.

Wehadkee silt loam (Wn).—This poorly drained soil is on narrow flood plains. Areas generally occur as narrow bands parallel to small streams and are 3 to 50 acres in size. Slopes range from 0 to 2 percent.

Included with this soil in mapping are areas of Congaree and Chewacla soils.

This Wehadkee soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture. Infiltration is moderate, and runoff is slow.

This soil is fairly well suited to corn and pasture. Flooding and wetness are the major concerns in management. Capability unit IVw-1; woodland suitability group 1w9.

White Store Series

The White Store series consists of nearly level to moderately steep, moderately well drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in material weathered from Triassic Mudstone.

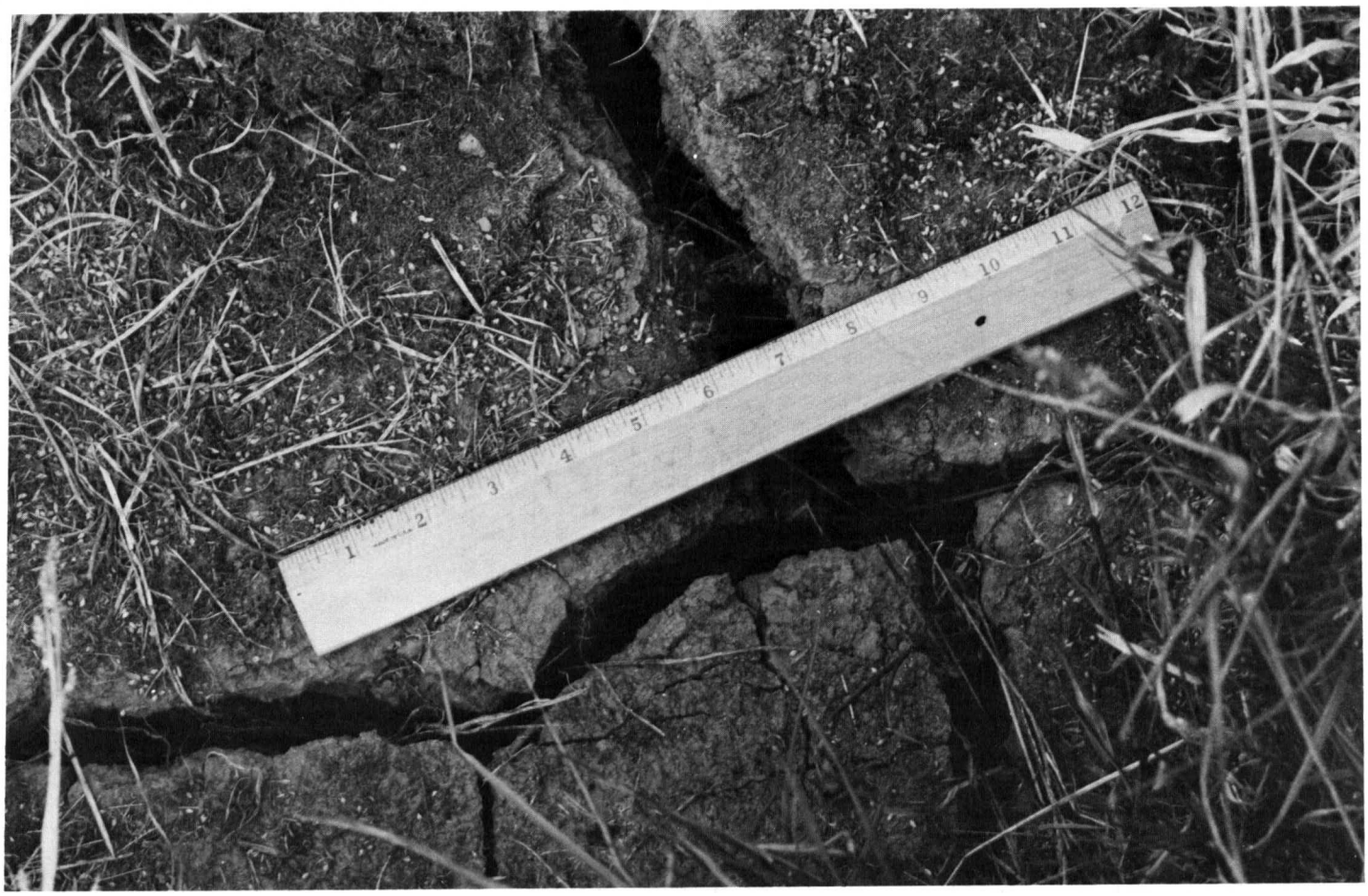

Figure 8.—**Cracks 1¾ inches wide and 10 inches deep in a White Store soil.**

In a representative profile the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 29 inches thick. The upper part is strong-brown, firm clay loam. The lower part is mottled yellowish-red, very firm clay. The underlying material to a depth of 60 inches is dark reddish-brown, highly weathered sandstone and shale and mottled red and pink, partly weathered, fine-grained sandstone that crushes to fine sandy loam.

White Store soils are low in natural fertility and organic-matter content. Permeability is very slow, and available water capacity is medium. The root zone is deep. Shrink-swell potential is high; the soil shrinks when dry and swells when wet (fig. 8). Depth to the seasonal high water table is about 1½ feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture or under cultivation. The soils are well suited to most crops commonly grown in the county, including tobacco, corn, and small grain. The major limitations are the erosion hazard resulting from runoff, the very slow permeability, the steep slopes, the high shrink-swell potential, and a perched water table.

Representative profile of White Store sandy loam, 2 to 6 percent slopes, in a young pine forest 1 mile north of Nelson on State Road 1959 at the intersection with State Road 1969; 25 feet west of road:

Ap—0 to 6 inches, brown (10YR 5/3) sandy loam; weak, medium, granular structure; very friable; common fine roots; few quartz pebbles; medium acid; abrupt, wavy boundary.

B1t—6 to 10 inches, strong-brown (7.5YR 5/6) clay loam; weak, medium, subangular blocky structure; firm, sticky, plastic; few fine roots; few discontinuous clay films; few quartz pebbles; strongly acid; clear, wavy boundary.

B21t—10 to 22 inches, yellowish-red (5YR 5/6) clay; common, medium, distinct, reddish-brown (5YR 4/4) and yellowish-brown (10YR 5/6) mottles; prismatic structure parting to moderate, fine and medium, blocky structure; very firm, very sticky, very plastic; few fine roots; common continuous clay films on faces of peds; very strongly acid; gradual, wavy boundary.

B22t—22 to 28 inches, yellowish-red (5YR 4/6) clay; many, medium, distinct, reddish-brown (5YR 4/4) and light brownish-gray (10YR 6/2) mottles; moderate, medium, blocky structure; very firm, very plastic, very sticky; few discontinuous clay films on faces of peds; very strongly acid; gradual, wavy boundary.

B3t—28 to 35 inches, yellowish-red (5YR 5/6) clay; many, coarse, distinct mottles and streaks of reddish brown (2.5YR 4/4) and gray (10YR 5/1); weak, medium, blocky structure; very firm, sticky, plastic; few discontinuous clay films on faces of peds; few small flakes of mica; common soft shale fragments; very strongly acid; gradual, wavy boundary.

C1—35 to 38 inches, dark reddish-brown (2.5YR 3/4), highly weathered sandstone and shale containing pockets of

clay; many, coarse, distinct, gray (10YR 6/1) and yellowish-brown (10YR 5/4) mottles; massive; friable; few small flakes of mica; strongly acid; clear boundary.
C2—38 to 60 inches, mottled red and pink, partly weathered, fine-grained sandstone that crushes to fine sandy loam; massive; medium acid.

Depth to bedrock is more than 4 feet. The B horizon is very strongly acid or strongly acid.

The Ap horizon is brown or yellowish brown, and the A1 horizon, if present, is grayish brown, brown, or yellowish brown. The A horizon is sandy loam or clay loam. The B1t horizon, if present, is strong-brown or brown clay, clay loam, or sandy clay loam. The B2t horizon is yellowish-red or reddish-brown clay to silty clay. The B3 horizon, if present, is reddish-yellow, yellowish-red, dark reddish-brown, or dusky red clay to silty clay loam. The B horizon has many red, brownish-yellow, or gray mottles. The upper part of the C horizon is commonly dark reddish-brown, weathered sandstone or siltstone that has gray mottles. The lower part of the C horizon is gray, red, and light-red, partly weathered sandstone.

White Store sandy loam, 2 to 6 percent slopes (WsB).—This moderately well drained soil is on broad ridges on uplands. It has the profile described as representative of the series. Areas are generally elliptical in shape and 2 to 10 acres in size.

Included with this soil in mapping are areas of similar soils that have a surface layer of fine sandy loam or silt loam and a few small areas where the soil is eroded. Also included are a few areas of Creedmoor and Mayodan soils.

This White Store soil is easy to keep in good tilth. Because the subsoil is very slowly permeable, however, tillage is restricted after heavy rain. Infiltration is moderate, and runoff is medium.

This soil is well suited to tobacco, corn, small grain, hay, and pasture. Erosion resulting from runoff, high shrink-swell potential, and very slow permeability are the major concerns in management. Capability unit IIe-3; woodland suitability group 4c2.

White Store sandy loam, 6 to 10 percent slopes (WsC).—This moderately well drained soil is on narrow side slopes on uplands. It has a surface layer of brown or yellowish-brown sandy loam. Its subsoil is yellowish-red, very firm clay or silty clay that in most places is mottled with red and gray. Areas occur as narrow bands that are roughly rectangular in shape and range from 3 to 15 acres in size.

Included with this soil in mapping are areas of soils that have a surface layer of fine sandy loam and a few areas where the soil is eroded. Also included are a few acres of Creedmoor and Pinkston soils.

This White Store soil is easy to keep in good tilth, and it can be worked throughout a wide range of moisture content. Infiltration is moderate, and runoff is rapid.

The soil is well suited to pine and hardwood forests and to corn, tobacco, small grain, and pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit IIIe-3; woodland suitability group 4c2.

White Store sandy loam, 10 to 25 percent slopes (WsE).—This moderately well drained soil is on side slopes adjacent to major drainageways in uplands. It has a surface layer of yellowish-brown or grayish-brown sandy loam. Its subsoil is yellowish-red, very firm clay. Areas occur as long, narrow bands that are roughly rectangular in shape and 3 to 20 acres in size.

Included with this soil in mapping are areas of soils that have a surface layer of fine sandy loam or loam and spots where the soil is eroded. Also included are areas of Mayodan and Pinkston soils.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forests and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIe-1; woodland suitability group 4c2.

White Store clay loam, 2 to 10 percent slopes, eroded (WvC2).—This moderately well drained soil is on ridges and narrow side slopes on uplands. It has a surface layer of yellowish-brown clay loam. Its subsoil is reddish-brown, very firm clay that in most places is mottled with red and gray. Areas occur as narrow bands that are roughly rectangular in shape and 2 to 25 acres in size.

Included with this soil in mapping are a few spots where the surface layer is fine sandy loam and a few acres where shallow gullies have formed. Also included are a few acres of Pinkston and Wilkes soils.

This White Store soil is easy to keep in good tilth, but it can be worked within only a narrow range of moisture content because the surface layer has a high content of clay. Infiltration is slow, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIe-2; woodland suitability group 4c2.

White Store clay loam, 10 to 25 percent slopes, eroded (WvE2).—This moderately well drained soil is on side slopes adjacent to major drainageways on uplands. It has a surface layer of yellowish-brown clay loam. Its subsoil is yellowish-red, very firm clay or silty clay. Areas occur as long, narrow bands that are roughly rectangular in shape and 2 to 20 acres in size.

Included with this soil in mapping are a few spots where the surface layer is fine sandy loam and a few places where deep gullies have formed. Also included are areas of Pinkston soils.

Infiltration is slow, and runoff is rapid.

This soil is suited to pine and hardwood forests and to pasture. The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns in management. Capability unit VIIe-2; woodland suitability group 4c2.

White Store-Urban land complex, 0 to 10 percent slopes (WwC).—This complex consists of White Store soil and Urban land, which is mainly White Store soil material. As much as 30 percent of each mapped area is covered by streets, houses, and other structures. About 30 percent is an undisturbed White Store soil. About 25 percent is a White Store soil that in places has been covered with as much as 18 inches of fill material and in other places has had as much as two-thirds of the original soil material removed. The rest is fill, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is commonly a mixture of sandy loam and clay.

Included with this complex in mapping are areas of Creedmoor and Mayodan soils. Capability unit unassigned; woodland suitability group unassigned.

White Store-Urban land complex, 10 to 25 percent slopes (WwE).—This complex consists of White Store soil and Urban land, which is mainly White Store soil material.

About 25 percent of each mapped area is covered by houses, streets, driveways, and sidewalks. About 40 percent is an undisturbed White Store soil. About 30 percent is a White Store soil that has been graded or terraced. In these graded or terraced areas, as much as two-thirds of the original soil material has been cut away or as much as 18 inches of fill material has been added. The rest of each mapped area is fill, 18 inches or more thick, or places where the original soil material has been cut away. The fill material is a mixture of sand and very plastic clay.

Included with this complex in mapping are areas of Mayodan soils. Capability unit unassigned; woodland suitability group unassigned.

Wilkes Series

The Wilkes series consists of strongly sloping and moderately steep, well-drained soils on uplands. The landscape is one of rounded divides and steep side slopes. These soils formed under forest vegetation, in residuum from mixed acidic and basic rock.

In a representative profile the surface layer is grayish-brown sandy loam about 3 inches thick. It is underlain by a 3-inch layer of light brownish-gray sandy loam. The subsoil is yellowish-brown, firm clay and clay loam about 7 inches thick. The underlying material to a depth of about 40 inches is mottled yellowish-brown, green, black, and gray saprolite that crushes to silt loam. Hard bedrock is at a depth of 40 inches.

Wilkes soils are medium in natural fertility and low in organic-matter content. Permeability is moderately slow, and available water capacity is low. The root zone is moderately deep. Shrink-swell potential is moderate. Depth to the seasonal high water table is more than 6 feet.

Most of the acreage is forested with loblolly pine and low-quality hardwoods. The rest is chiefly in pasture. The soils are fairly well suited to most row crops grown in the county, including tobacco and corn. The major limitations are the erosion hazard resulting from runoff, the steep slopes, the depth to bedrock, and the seasonal high water table.

Representative profile of Wilkes sandy loam, 10 to 25 percent slopes, in a wooded area 10.4 miles southeast of Durham on State Road 1901; 100 feet north or road:

O1—3 inches to 1 inch, undecomposed mixed hardwood and pine forest litter.
O2—1 inch to 0, partly decomposed forest litter.
A1—0 to 3 inches, grayish-brown (2.5Y 5/2) sandy loam; moderate, medium, granular structure; very friable; common fine and medium roots; common quartz pebbles ¼ inch to 2 inches in diameter; strongly acid; abrupt, smooth boundary.
A2—3 to 6 inches, light brownish-gray (2.5Y 6/2) sandy loam; moderate, medium and coarse, granular structure; very friable; common fine and medium roots; common small strong-brown fragments of weathered rocks; common quartz pebbles ¼ inch to 2 inches in diameter; strongly acid; abrupt, smooth boundary.
B2t—6 to 10 inches, yellowish-brown (10YR 5/6) clay; common, fine, prominent black and green mottles and common, fine, faint, strong-brown mottles which are assumed to be partly weathered primary materials; massive parting to coarse, angular blocky structure; firm, sticky, plastic; few fine roots; few small pores; few, discontinuous clay films on faces of peds and on walls of cracks; few medium pebbles; material from A horizon in old root channels; slightly acid; clear, wavy boundary.
B3t—10 to 13 inches, yellowish-brown (10YR 5/6) clay loam; weak, coarse, subangular blocky and platy structure; firm, sticky, plastic; common, fine, partly weathered black, gray, and green primary minerals; few fine roots; few discontinuous clay films on faces of peds; common hard schist fragments; slightly acid; abrupt, wavy boundary.
C—13 to 40 inches, mottled yellowish-brown, green, black, and gray saprolite which crushes to silt loam; massive (platy rock structure); friable; few fine roots; thin discontinuous clay films line vertical cracks; common, small and medium, hard schist fragments; neutral; abrupt, wavy boundary.
R—40 inches, hard bedrock.

Depth to bedrock is more than 2 feet. The B horizon is medium acid to neutral.

The Ap horizon, if present, is brown, and the A1 horizon is grayish brown or yellowish brown. The A2 horizon is light brownish gray or yellowish brown. The B horizon is mottled with black, green, and brown. The B2t horizon is yellowish-brown or brown clay or clay loam. The B3t horizon, if present, is yellowish-brown or brown clay loam, loam, or silt loam and in places has partly weathered rock fragments. The C horizon is commonly mottled yellowish-brown, green, black, and gray saprolite that crushes to silt loam or loam.

Wilkes sandy loam, 10 to 25 percent slopes (WxE).—This well-drained soil is on side slopes adjacent to major drainageways in the uplands. Areas occur as narrow bands that are roughly rectangular in shape and range from 2 to 10 acres in size.

Included with this soil in mapping are places where slopes are less than 10 percent and areas where many stones are on the surface.

Infiltration is moderate, and runoff is rapid.

This soil is well suited to pine and hardwood forest and to pasture. The slope, the erosion resulting from runoff, the depth to bedrock, and the seasonal high water table are the major concerns in management. Capability unit VIe-1; woodland suitability group 4r2.

Use and Management of the Soils

This section describes use and management of the soils for crops and pasture, woodland, wildlife, recreation, and engineering. It does not give detailed information about management of individual soils. For specific suggestions, consult a representative of the local office of the Soil Conservation Service, the Extension Service, or the Agricultural Experiment Station.

Crops and Pasture[3]

The pages that follow explain the system of capability grouping and suggest management of the soils of Durham County by capability units. Estimated yields for specific crops under superior management are listed in table 2.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the

[3] J. E. Pollock, conservation agronomist, and R. S. Tennant, district conservationist, Soil Conservation Service, helped prepare this section.

soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

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

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

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

Class I soils have few limitations that restrict their use. (None in the county.)
Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife. (None in the county).
Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture or range, woodland, or wildlife.
Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture, range, woodland, or wildlife.
Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None in the county.)

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

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

CAPABILITY UNITS are 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, IIw-1 or IIIw-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Durham County are described and use and management is suggested for each soil in the county. The capability unit to which each soil in the county is assigned can be found in the Guide to Mapping Units.

CAPABILITY UNIT IIe-1

This unit consists of well-drained, gently sloping soils on uplands and low stream terraces. The surface layer is silt loam, sandy loam, or fine sandy loam. The subsoil is friable or firm sandy clay loam, sandy clay, clay loam, or clay.

These soils are low in natural fertility and organic-matter content. They are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderate. The root zone is deep. The response to lime and fertilizer is good.

These soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is cultivated. The rest is chiefly forested or pastured.

Erosion resulting from runoff is a main concern in management. Runoff can be reduced by returning all crop residue, growing soil-conserving crops at least 25 percent of the time, and using contour tillage along with diversions, terraces, or stripcropping. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type.

CAPABILITY UNIT IIe-2

This unit consists of well-drained, gently sloping soils on uplands. The surface layer is silt loam or clay loam. In places it contains a few pebbles. The subsoil is friable or firm silty clay, silty clay loam, clay loam, or clay.

These soils are low in natural fertility and organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderate. The root zone is deep. The response to lime and fertilizer is good.

These soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is wooded. The rest is chiefly cultivated or pastured.

Erosion resulting from runoff is a hazard. Keeping the soil in good tilth protects it against both runoff and erosion. Tilth can be preserved by returning all crop residue, protecting the surface with soil-conserving crops at least half of the time, and using contour tillage (fig. 9) along with diversions, terraces, or stripcropping. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type.

CAPABILITY UNIT IIe-3

This unit consists of well drained and moderately well drained, gently sloping soils on uplands. The surface layer is sandy loam, loam, or silt loam. The subsoil is friable to extremely firm silty clay loam, silty clay, sandy clay loam, clay loam, or clay.

These soils are low or medium in natural fertility and are low in organic-matter content, but they are easy to keep in good tilth. Because the subsoil is slowly permeable, they remain wet for a long time after a rain. Thus, wetness often

Figure 9.—**Contour farmed soybeans and tobacco on Georgeville silt loam.**

delays tillage. Available water capacity is medium or high, and permeability is slow or very slow.

These soils are fairly well suited or well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is forested with hardwoods or pines. The rest is cultivated or pastured.

Wetness, slow or very slow permeability, high shrink-swell potential, and erosion resulting from runoff are the chief concerns. Runoff and erosion can be reduced and tilth can be improved by returning all crop residue, protecting the surface with soil-conserving crops at least 30 percent of the time, and by using contour tillage along with diversions, terraces, or stripcropping (fig. 10). Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type.

CAPABILITY UNIT IIw-1

The one soil in this unit, Congaree silt loam, is well drained and nearly level. It is on flood plains. It has a surface layer of silt loam that is underlain by friable silt loam.

This soil is medium in natural fertility and low in organic matter. It is easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is high, and permeability is moderate. The root zone is deep. The response to lime and fertilizer is good.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is cultivated or pastured. The rest is chiefly forested with hardwoods or pines.

This soil can be farmed intensively. It can be used for row crops each year if all crop residue is returned. The organic-matter content and tilth can be maintained at a high level if soil-protecting crops, preferably perennial grass, are grown every other year, or 1 year out of 3. Frequent, but brief, flooding is the only limitation.

CAPABILITY UNIT IIw-2

The one soil in the unit, Altavista silt loam, 0 to 2 percent slopes, is moderately well drained. This nearly level soil is on low stream terraces. It has a subsoil of friable silty clay loam to clay loam.

This soil is low in natural fertility and organic-matter content. It is easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderate. The root zone is deep.

This soil is well suited to corn, small grain, soybeans, hay, and pasture. Most of the acreage is in hardwood forest. The rest is cultivated.

Wetness and flooding are the main concerns. Drainage is needed in places. The soil can be used for row crops each year.

Figure 10.—**Strips of corn, lespedeza, and oats on White Store sandy loam.**

Organic-matter content and tilth can be maintained at a high level if all crop residue is returned and soil-conserving crops, preferably perennial grass, are grown every other year, or 1 year out of 3.

CAPABILITY UNIT IIIe-1

This unit consists of well-drained, sloping soils on uplands. The surface layer is sandy loam or fine sandy loam. The subsoil is firm or friable sandy clay loam, sandy clay, clay, or clay loam.

These soils are low in natural fertility and organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderate. The root zone is deep. The response to lime and fertilizer is good.

These soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is cultivated. The rest is pasture and mixed pine and hardwood forest.

Slope and the erosion resulting from runoff are the chief concerns. Soil and water losses can be reduced, tilth can be preserved, and organic-matter content can be maintained by returning all crop residue, protecting the surface with soil-conserving crops at least half of the time, and using contour tillage along with stripcropping, terraces, or diversions. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type (fig. 11).

CAPABILITY UNIT IIIe-2

This unit consists of well-drained, sloping soils on uplands. The surface layer is silt loam or clay loam. The subsoil is firm clay, silty clay, or silty clay loam.

These soils are low in natural fertility and organic-matter content, but they are dominantly easy to keep in good tilth and can be worked throughout a fairly wide range of moisture content. The surface layer of the Davidson soil crusts and clods if the soil is worked when wet. Available water capacity is medium, and permeability is moderate.

These soils are well suited to corn, tobacco, soybeans, small grain, hay, and pasture. Most of the acreage is forested. The rest is cultivated or pastured.

Erosion resulting from runoff and slope are the chief concerns. Soil and water losses can be reduced, tilth can be improved, and organic-matter content can be increased by returning all crop residue, growing soil-protecting crops at least 50 percent of the time, and using contour tillage along with stripcropping, terraces, or diversions. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type.

Figure 11.—Gullied land.

CAPABILITY UNIT IIIe-3

This unit consists of well drained and moderately well drained, sloping soils on uplands. The surface layer is sandy loam or loam. The subsoil is friable to very firm clay, silty clay, sandy clay, sandy clay loam, or clay loam.

These soils are low or medium in natural fertility and low in organic-matter content, but they are easy to keep in good tilth. Because the subsoil is slowly permeable, however, tillage is delayed after heavy rain. Available water capacity is medium to high, and permeability is slow or very slow.

These soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is forested. The rest is cultivated or pastured.

The slope, the erosion resulting from runoff, the wetness, and the slow or very slow permeability are the chief concerns. Soil and water losses can be reduced, tilth can be improved, and organic-matter content can be increased by protecting the surface with soil-conserving crops at least 50 percent of the time; using contour tillage along with stripcropping, terraces, or diversions; and returning all crop residue. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass, preferably a sod-forming type.

CAPABILITY UNIT IIIw-1

This unit consists only of Cartecay and Chewacla soils. These are somewhat poorly drained, nearly level soils on flood plains. The surface layer is silt loam. The subsoil is very friable or friable loamy sand and loam or sandy loam.

These soils are low in natural fertility and organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderately rapid. The root zone is deep.

These soils are well suited to corn, soybeans, and pasture. Most of the acreage is wooded, but a few acres are cultivated or pastured.

Wetness and flooding are the main concerns. Some artificial drainage is needed for most crops. Organic-matter content can be maintained and tilth can be improved by returning all crop residue.

CAPABILITY UNIT IIIw-2

The one soil in this unit, Wahee loam, alkaline subsoil variant, is somewhat poorly drained and nearly level. It is on low stream terraces. The subsoil is friable or very firm clay or sandy clay loam.

This soil is medium in natural fertility and low in organic-matter content, but it is easy to keep in good tilth. Because of ponding, however, tillage is restricted at times during wet periods. Available water capacity is medium, and permeability is slow.

This soil is suited to a limited range of crops. Most of the acreage is forested. The rest is chiefly pastured.

Ponding and wetness are the chief concerns. Organic-matter content can be maintained and structure improved by returning all crop residue.

CAPABILITY UNIT IVe-1

This unit consists of well-drained, strongly sloping soils on uplands. The surface layer is sandy loam. The subsoil is friable or firm clay, clay loam, sandy clay loam, or sandy clay.

These soils are low in natural fertility and organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium, and permeability is moderate. The root zone is deep.

These soils are well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is forested with pine and mixed hardwoods.

Slope and the erosion resulting from runoff are the chief concerns. Soil and water losses can be reduced, tilth can be improved, and organic-matter content can be increased by protecting the surface with soil-conserving crops at least 75 percent of the time, using contour tillage along with field borders, stripcropping, and diversions, and returning all crop residue. Perennial grasses are the best soil-conserving crops. Natural drainageways and other outlets needed for disposal of runoff should be seeded to sod.

CAPABILITY UNIT IVe-2

This unit consists of well-drained, gently sloping and sloping to strongly sloping soils on uplands. The surface layer is silt loam or stony silt loam. The subsoil is friable or firm silty clay loam or silty clay.

These soils are low in natural fertility and organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. In places stones interfere with tillage. Available water capacity is medium, and permeability is moderate. The root zone is deep. The response to lime and fertilizer is good.

These soils are fairly well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is forested with hardwoods or pines. The rest is cultivated or pastured.

Slope and the erosion resulting from runoff are the chief concerns. Soil and water losses can be reduced, tilth can be improved, and organic-matter content can be increased by returning all crop residue, protecting the surface with soil-conserving crops at least 75 percent of the time, and using contour tillage along with stripcropping and diversions. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to perennial grass.

CAPABILITY UNIT IVe-3

The one soil in this unit, Pinkston fine sandy loam, 2 to 10 percent slopes, is well drained and gently sloping and sloping. It is on uplands. The subsoil is friable fine sandy loam.

This soil is low in natural fertility and organic-matter content, but it is easy to keep in good tilth and can be worked throughout a wide range of moisture content. Permeability is moderately rapid, and available water capacity is medium. The root zone is moderately deep. The response to fertilizer is good.

This soil is well suited to tobacco, corn, soybeans, small grain, hay, and pasture. Most of the acreage is forested with loblolly pine or mixed hardwoods. The rest is cultivated or pastured.

The main concerns are slope and erosion resulting from runoff. Soil and water losses can be reduced, tilth can be improved, and organic-matter content can be increased by returning all crop residue, protecting the surface with soil-conserving crops at least 75 percent of the time, and using contour tillage along with stripcropping and diversions. Natural drainageways, field borders, and other outlets needed for disposal of runoff should be seeded to sod-forming grass.

CAPABILITY UNIT IVw-1

This unit consists of somewhat poorly drained and poorly drained, nearly level soils on flood plains and stream terraces. The surface layer is silt loam. The subsoil is friable or firm silt loam, clay loam, silty clay loam, and clay.

These soils are low in natural fertility and low or medium in organic-matter content, but they are easy to keep in good tilth and can be worked throughout a wide range of moisture content. Available water capacity is medium or high, and permeability is moderate or slow. The root zone is deep.

Unless adequately drained, most of these soils are poorly suited to row crops. If drained, they are suited to pasture or hay. Most of the acreage is forested. The rest is chiefly pastured.

Flooding and wetness are the chief concerns. A complete drainage system is needed for crops or pasture.

CAPABILITY UNIT VIe-1

This unit consists of well drained and moderately well drained, strongly sloping and moderately steep soils on uplands. The surface layer is fine sandy loam, sandy loam, silt loam, or loam. In places it contains many pebbles or stones. The subsoil is friable to very firm clay, silty clay, silty clay loam, sandy clay, sandy clay loam, and clay loam.

These soils are low or medium in natural fertility and low in organic-matter content. In places the stones in the surface layer interfere with tillage. Available water capacity is medium or low, and permeability is moderate to very slow.

These soils are well suited to pasture and to pine and hardwood forest. They are not suited to crops, because they are stony and steep. Most of the acreage is wooded. The rest is pastured or cultivated.

Slope and the erosion resulting from runoff are the major concerns in management.

CAPABILITY UNIT VIe-2

The only soil in the unit is moderately well drained White Store clay loam, 2 to 10 percent slopes, eroded. It is on uplands. The subsoil is very firm clay.

This soil is low in natural fertility and organic-matter content, but it is easy to keep in good tilth. It can be worked only in a narrow range of moisture content, however, because the surface layer is high in clay content. Available water capacity is medium, and permeability is very slow.

Most of the acreage is forested with pine and poor-quality hardwoods. The rest is chiefly pastured or cultivated.

The slope, the erosion resulting from runoff, the high shrink-swell potential, and the very slow permeability are the major concerns.

CAPABILITY UNIT VIIe-1

This unit consists of well drained to excessively drained, strongly sloping to steep soils on uplands. The surface layer is fine sandy loam or slaty silt loam. The subsoil is friable or very friable sandy loam, fine sandy loam, or slaty silt loam.

These soils are low in natural fertility and organic-matter content. Available water capacity is low or medium, and permeability is moderately rapid. The root zone is shallow to moderately deep.

These soils are well suited to hardwoods and pines, and most of the acreage is forested. The rest is chiefly pastured or cultivated.

The slope, the erosion resulting from runoff, and the depth to bedrock are the chief concerns.

CAPABILITY UNIT VIIe-2

The only soil in this unit is White Store clay loam, 10 to 25 percent slopes, eroded. The subsoil is very firm clay or silty clay.

This soil is low in natural fertility and organic-matter content. Available moisture is medium, and permeability is very slow.

This soil is not suited to crops because it is steep and the surface layer is firm. It is better suited to woodland, wildlife, and recreation. Most of the acreage is forested with pine or poor-quality hardwoods. The rest is idle or pastured.

Slope and the erosion resulting from runoff are the chief concerns.

CAPABILITY UNIT VIIe-3

Only Gullied land, clayey materials, is in this unit. It is mainly in steeper areas that have been cut by numerous deep and shallow gullies. The surface layer is dominantly clay loam, but erosion has removed almost all of the topsoil and in most places has cut through the subsoil. Only remnants of the original soil are left.

Gullied land, clayey materials, is not suited to crops. All the acreage is in forest or is idle. Areas should be planted to trees, kudzu, or other close-growing plants to prevent further damage to the surrounding areas and to reduce silting of streams below. These areas are the most difficult in the county on which to establish any kind of vegetation. Special management is needed.

Predicted yields

Table 2 lists predicted yields of the principal crops grown in the county. The predictions are based on estimates made by farmers, soil scientists, and others who have knowledge of yields in the county and on information taken from research data. The predicted yields are average yields per acre that can be expected by good farmers at the level of management that tends to produce the highest economic returns.

The yields given apply to both dryland and irrigated soils if the soils are used for both methods of farming. If only one

TABLE 2.—*Predicted average yields per acre of crops under superior management*

[A blank space means the crop is not commonly grown on the soil or no data are available on which to base an estimate. Only arable soils are listed]

Soils	Corn	Oats	Grain sorghum	Tobacco (flue cured)	Soybeans	Hay		Pasture
						Soybeans	Sericea lespedeza	Tall fescue white clover
	Bu	*Bu*	*Bu*	*Lb*	*Bu*	*Tons*	*Tons*	*AUM*[1]
Altavista silt loam, 0 to 2 percent slopes	90	80	55	2,300	30	2.2	3.0	6.0
Altavista silt loam, 2 to 6 percent slopes	85	80	60	2,300	30	2.2	3.0	6.0
Appling sandy loam, 2 to 6 percent slopes	90	85	55	2,300	30	2.0	3.0	6.0
Appling sandy loam, 6 to 10 percent slopes	80	75	50	2,200	25	1.8	2.8	6.0
Cartecay and Chewacla soils [2]	85		65		35			7.0
Cecil fine sandy loam, 2 to 6 percent slopes	90	85	60	2,100	30	1.8	3.2	6.5
Cecil fine sandy loam, 6 to 10 percent slopes	85	80	55	2,000	25	1.6	3.0	6.5
Cecil fine sandy loam, 10 to 25 percent slopes	70	60	45	1,800		1.2	2.6	5.5
Chewacla and Wehadkee soils [3]	90	75			35			7.0
Congaree silt loam	100	90	65	2,600	35	2.4		7.5
Creedmoor sandy loam, 2 to 6 percent slopes	75	75	65	2,200	25	1.8	2.6	6.0
Creedmoor sandy loam, 6 to 10 percent slopes	60	65	55	2,000		1.4	2.4	6.0
Davidson clay loam, 2 to 6 percent slopes	95	90	60		30	1.8	3.0	6.0
Davidson clay loam, 6 to 10 percent slopes	85	80	55		25	1.6	2.8	6.0
Georgeville silt loam, 2 to 6 percent slopes	80	80	55	2,000	30	1.8	3.0	6.0
Georgeville silt loam, 6 to 10 percent slopes	70	70	45	1,800	25	1.6	2.8	5.5
Georgeville silt loam, 10 to 15 percent slopes	60	60	40	1,600		1.2	2.6	5.0
Granville sandy loam, 2 to 6 percent slopes	85	75	50	2,200	30	2.0	3.0	5.5
Granville sandy loam, 6 to 10 percent slopes	75	70	45	2,100	25	1.8	2.8	5.5
Helena sandy loam, 2 to 6 percent slopes	75	65	50	2,100	25	1.8	2.8	6.0
Helena sandy loam, 6 to 10 percent slopes	65	55	45	1,800		1.4	2.2	5.5
Herndon silt loam, 2 to 6 percent slopes	80	80	55	2,100	30	1.8	3.0	6.0
Herndon silt loam, 6 to 10 percent slopes	70	70	45	1,900		1.6	2.8	5.5
Herndon stony silt loam, 2 to 10 percent slopes	60	60						5.0
Iredell loam, 2 to 6 percent slopes	55	60						7.0
Iredell loam, 6 to 10 percent slopes	40	50						5.5
Lignum silt loam, 2 to 6 percent slopes	70	70	50	1,800			2.8	5.5
Mayodan sandy loam, 2 to 6 percent slopes	90	85	55	2,300	30	2.0	3.0	6.0
Mayodan sandy loam, 6 to 10 percent slopes	80	75	50	2,100	25	1.8	2.8	5.5
Mayodan sandy loam, 10 to 15 percent slopes	70	60	45	1,900		1.4	2.6	5.5
Mayodan sandy loam, 15 to 25 percent slopes						1.0	2.2	5.0
Mecklenburg loam, 2 to 6 percent slopes	80	70	55				2.8	6.0
Mecklenburg loam, 6 to 10 percent slopes	75	65	50				2.8	5.5
Nason silt loam, 10 to 15 percent slopes	85	65		1,700	35	1.2		6.0
Nason silt loam, 15 to 25 percent slopes								4.5
Pinkston fine sandy loam, 2 to 10 percent slopes				1,800				4.0
Pinkston fine sandy loam, 10 to 25 percent slopes								2.5
Roanoke silt loam								5.0
Tatum gravelly silt loam, 15 to 25 percent slopes								4.5
Wahee loam, alkaline subsoil variant	80	70			35			6.0
Wedowee sandy loam, 10 to 15 percent slopes							2.4	4.5
Wedowee sandy loam, 15 to 25 percent slopes								4.5
Wehadkee silt loam	60	25						6.5
White Store sandy loam, 2 to 6 percent slopes	70	70	60	1,800		1.2	2.6	6.0
White Store sandy loam, 6 to 10 percent slopes	60	60	50	1,700			2.4	6.0
White Store sandy loam, 10 to 25 percent slopes							2.0	5.0
White Store clay loam, 2 to 10 percent slopes, eroded							1.6	4.5
White Store clay loam, 10 to 25 percent slopes, eroded							1.0	4.0
Wilkes sandy loam, 10 to 25 percent slopes								4.2

[1] Animal-unit-months is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of months the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 1 month of grazing for two cows has a carrying capacity of 2 cow-acre-months. An animal unit is one cow, one steer, or one horse; five hogs or seven sheep or goats.

[2] For Cartecay only. Estimates for Chewacla under Chewacla and Wehadkee soils.

[3] For Chewacla only. Estimates for Wehadkee under Wehadkee silt loam.

Figure 12.—**A 30-year-old stand of loblolly pine on gently sloping Georgeville silt loam.**

method is practical, yields are for only this method of farming. Not included in this table are soils that are used only for range or recreation.

Crops such as vegetables, sweetpotatoes, and sunflowers are grown in the county, but their predicted yields are not included because their acreage is small or because reliable data on yields are not available.

Management to obtain the yields predicted on dryland soils is as follows:

1. Rainfall is effectively conserved.
2. Surface and subsurface drainage systems are installed.
3. Crop residue is managed to maintain soil tilth.
4. Minimum but timely tillage is used.
5. Insects, diseases, and weeds are consistently controlled.
6. Fertilizer is applied according to soil tests and crop needs.
7. Adapted crop varieties are used at recommended seeding rates.

In addition, on irrigated soils—

8. Suitable quality of irrigation water is used.
9. Irrigations are timed to meet the need of the soil and crop.
10. Irrigation systems are properly designed and efficiently used.

Woodland

Originally Durham County was mainly wooded. Now trees cover about 67 percent of the county.

Good stands of commercial trees are produced in the woodlands of the county. Needleleaf trees occur most frequently on the hills, and broadleaf trees generally predominate on the bottoms along the rivers and creeks (fig. 12).

The value of the wood products is substantial, though it is below its potential. Woodland is also valuable for grazing, wildlife, recreation, natural beauty, and conservation of soil and water. This section has been provided to explain how soils affect tree growth and management in the county. In table 3 potential limitations to productivity and management of the soils in Durham County are listed (*6*).

The first column gives the woodland suitability group. Each group is made up of soils that are suited to the same kinds of trees, that need about the same kind of management to produce these trees, and that have about the same potential productivity. It also lists soils by their mapping unit symbols under the series name to which they belong. If a mapping unit contains the name of two series, as in a complex or an association, the component soils are listed and evaluated separately under each series name.

Each woodland suitability group is identified by a three-part symbol. The first part, a number, indicates the relative productivity of the soils: 1 is very high; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the important soil property that imposes a moderate or severe hazard or limitation in managing the soils for wood production. The letter *x* shows that the main limitation is stoniness or rockiness; *w* shows that excessive water in or on the soil is the chief limitation; *r* shows the soils have steep slopes; and *o* shows the soils have no significant restrictions or limitations for woodland use or management. The third element in the symbol, another number, indicates the degree of limitation as evaluated in columns 4, 5, and 6 and the preferred species, as listed in the last two columns of the table.

The second column lists some of the commercially important trees which are adapted to the soil. These are the trees which woodland managers generally favor in intermediate or improvement cuttings. Also given is the potential productivity of these trees in terms of site index. The site index is the average height of dominant trees, in feet, at age 30 for cottonwood; at age 35 for sycamore; at age 25 for planted pines; and at age 50 for all other species or types.

The management limitations evaluated in columns 4, 5, and 6 are erosion hazard, equipment restrictions, and seedling mortality. Erosion hazard measures the risk of soil losses in well-managed woodland. Erosion hazard is *slight* if expected soil loss is small, *moderate* if some measures to control erosion are needed in logging and construction, and *severe* if intensive treatment or special equipment and methods are needed to prevent excessive soil losses.

Equipment restriction ratings reflect the soil conditions that restrict the use of equipment normally used in woodland management or harvesting. A rating of *slight* indicates equipment use is not limited to kind or time of year. A rating of *moderate* means that use of equipment is limited by steep slopes or because soils are wet during some seasons. *Severe* limitations indicate the need for specialized equipment or methods and timing of fieldwork.

Seedling mortality ratings indicate the degree of expected mortality of seedlings when plant competition is not a limiting factor. Normal rainfall, good planting stock, and proper planting are assumed. A *slight* rating indicates expected mortality is less than 25 percent. *Moderate* rating indicates a 25 to 50 percent loss, and *severe* indicates over 50 percent loss of seedlings.

The last two columns are lists of broadleaf and needleleaf trees preferred for planting and for management in existing stands.

Wildlife[4]

Wildlife is related to soils through an indirect relationship with plants. Wildlife species are associated with given types of plant communities which, in turn, are directly related to particular kinds of soils. Proper manipulation of soil, water, and plants to produce suitable habitat is the most effective way to maintain and improve wildlife populations. It is through the three-way relationship of wildlife to plants to soils that interpretations for wildlife are prepared.

The soils of Durham County produce a wide variety of plants which provide food, cover, and protection for many species of wildlife. Upland game species, such as squirrel, rabbit, quail, mourning doves, foxes, and songbirds, are abundant in the county. The population of furbearers, such as raccoon, muskrat, and opossum, is also abundant throughout the county. Several species of waterfowl, such as mallards, black ducks, and wood ducks, are abundant along the Lumber River and its tributaries.

Table 4 rates the potential of each soil mapped in the county for seven wildlife habitat elements and three kinds of wildlife. Criteria applicable to the individual elements are briefly explained as follows.

Grain and seed crops are domestic grains or other seed-producing annuals planted to produce wildlife food. Examples are corn, sorghum, wheat, oats, barley, millet, buckwheat, soybeans, cowpeas, and sunflowers.

Domestic grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for both food and cover. Examples are fescue, lovegrass, switchgrass, clover, trefoil, and crown vetch.

Wild herbaceous plants refer to native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are goldenrod, beggarweed, partridgepea, pokeweed, and fescue.

Hardwood trees include nonconiferous trees and associated woody understory plants that provide food and cover for wildlife species. Examples are oaks, hickory, autumn-olive, dogwoods, and poplar.

Coniferous plants are cone-bearing trees and shrubs that furnish wildlife cover or supply food in the form of seed or fruitlike cones. Examples are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food and cover principally for wetland forms of wildlife. Examples are smartweed, wild millet, rushes, sedges, reeds, wild rice, cutgrass, cordgrass, and cattail.

Shallow-water areas may be naturally wet areas or those created by dams or levees or by water-control devices in

[4] By JOHN P. EDWARDS, biologist, Soil Conservation Service.

TABLE 3.—*Soil groupings according*

Woodland suitability group and soil	Potential productivity		Management limitations
	Tree species	Site index [1]	Erosion hazard
Group 1o7: Well-drained, nearly level soils that have a friable loamy subsoil; on flood plains; subject to frequent flooding; very high potential productivity; suitable for broadleaf and needleleaf trees. Congaree: Cp.	Green ash Loblolly pine Cherrybark oak Sweetgum Sycamore Yellow-poplar	90 90 110 100 90 110	Slight
Group 1w8: Somewhat poorly drained, nearly level soils that have a friable loamy subsoil; on flood plains; subject to very frequent flooding; very high potential productivity; suitable for broadleaf and needleleaf trees. Chewacla: Ch.	Cherrybark oak Cottonwood Water oak Willow oak Loblolly pine Sweetgum Yellow-poplar	100 100 90 90 100 100 100	Slight
Group 1w9: Poorly drained, nearly level soils that have a friable loamy subsoil; on flood plains; subject to very frequent flooding; very high potential productivity; suitable for broadleaf and needleleaf trees. Wehadkee: Wn.	Cottonwood Loblolly pine Water oak Willow oak Sweetgum Yellow-poplar [4]	90 100 90 90 90 100	Slight
Group 2w8: Moderately well drained and somewhat poorly drained, nearly level to gently sloping soils that have a friable or very firm loamy or clayey subsoil; on low stream terraces and flood plains; subject to infrequent or very frequent flooding; high potential productivity; suitable for broadleaf and needleleaf trees. Altavista: AlA, AlB. Cartecay: Cc. Wahee: Wh.	Loblolly pine Shortleaf pine Sweetgum Yellow-poplar	90 80 90 100	Slight
Group 2w9: Poorly drained, nearly level soils that have a friable or firm loamy or clayey subsoil; on low stream terraces; high potential productivity; suitable for water-tolerant broadleaf or needleleaf trees, or both. Roanoke: Ro.	Loblolly pine Sweetgum Water oak	90 90 90	Slight
Group 3o7: Well-drained, nearly level to moderately steep soils that have a friable to firm loamy and clayey subsoil; on uplands; moderately high potential productivity; suitable for broadleaf and needleleaf trees. Appling: ApB, ApC. Cecil: CfB, CfC. Davidson: DaB, DaC. Georgeville: GeB, GeC, GeD. Granville: GrB, GrC. Herndon: HrB, HrC. Mayodan: MfB, MfC, MfD. Nason: NaD. Wedowee: WmD.	Red oak Loblolly pine Shortleaf pine Virginia pine Sweetgum Yellow-poplar	75 80 70 70+ 80 90	Slight
Group 3r8: Well-drained, strongly sloping to moderately steep soils that have a firm loamy and clayey subsoil; on uplands; moderately high potential productivity; suitable for broadleaf and needleleaf trees. Cecil: CfE. Mayodan: MfE. Nason: NaE. Wedowee: WmE.	Red oak Loblolly pine Shortleaf pine Virginia pine Sweetgum Yellow-poplar	75 80 70 70+ 80 90	Slight
Group 3w8: Moderately well drained, gently sloping and sloping soils that have a friable to extremely firm loamy or clayey subsoil; on uplands; moderately high potential productivity; suitable for broadleaf and needleleaf trees, or both. Creedmoor: CrB, CrC. Helena: HeB, HeC. Lignum: LgB.	Loblolly pine Yellow-poplar Red oak Sweetgum White oak Shortleaf pine	80 90 70 80 70 70	Slight to moderate
Group 3x8: Well-drained, gently sloping to strongly sloping soils that have a firm loamy or clayey subsoil; on uplands; moderately high potential productivity; suitable for broadleaf or needleleaf trees, or both. Herndon: HsC. Nason: NoD.	Loblolly pine Shortleaf pine Yellow-poplar Red oak White oak Virginia pine	80 70 90 75 75 70+	Slight

to suitability for woodland

Management limitations—Continued		Preferred tree species for planting and management	
Equipment restrictions	Seedling mortality	Broadleaf	Needleleaf
Slight	Slight	Green ash, white ash, cherrybark oak, northern red oak, Shumard oak, southern red oak, white oak, sycamore, black walnut, yellow-poplar.	Loblolly pine, shortleaf pine.
Moderate	Slight	Cottonwood, green ash, white ash, cherrybark oak, northern red oak, Shumard oak, southern red oak, water oak, white oak, willow oak, sweetgum, sycamore, yellow-poplar.	Loblolly pine, shortleaf pine.
Severe [2]	Severe [2]	Cottonwood, green ash, cherrybark oak, Shumard oak, water oak, white oak, willow oak, sweetgum, sycamore, swamp tupelo, yellow-poplar.[3]	Loblolly pine.[3]
Moderate	Slight to moderate	Cottonwood, green ash, water oak, willow oak, sweetgum, sycamore, yellow-poplar, black walnut.	Loblolly pine, shortleaf pine.
Severe	Moderate	Sweetgum, sycamore, green ash	Loblolly pine.
Slight	Slight	Northern red oak, white oak, yellow-poplar	Loblolly pine, shortleaf pine.
Moderate	Moderate	Northern red oak, white oak, yellow-poplar	Loblolly pine, shortleaf pine, Virginia pine.
Slight to moderate	Slight to moderate	Sycamore, yellow-poplar, sweetgum	Loblolly pine.
Moderate	Slight	Yellow-poplar, northern red oak	Loblolly pine, Virginia pine.

TABLE 3.—*Soil groupings according*

Woodland suitability group and soil	Potential productivity		Management limitations
	Tree species	Site index [1]	Erosion hazard
Group 4o1: Well drained to excessively drained, gently sloping to sloping soils that have a friable to firm clayey or loamy subsoil; on uplands; moderate potential productivity; better suited to needleleaf trees. Mecklenburg: MuB, MuC. Pinkston: PfC.	Loblolly pine Shortleaf pine Virginia pine	70 60 60	Slight
Group 4r2: Well drained to excessively drained, strongly sloping to moderately steep soils that have a friable or firm clayey or loamy subsoil; on uplands; moderate potential productivity; better suited to needleleaf trees. Goldston: GlE, GlF. Pinkston: PfE. Tatum: TaE. Wilkes: WxE.	Loblolly pine Shortleaf pine Virginia pine	70 60 60	Moderate
Group 4c2: Moderately well drained, gently sloping to moderately steep soils that have a very firm clayey subsoil; on uplands; moderate potential productivity; better suited to needleleaf trees. Iredell: IrB, IrC. White Store: WsB, WsC, WsE, WvC2, WvE2.	Loblolly pine Eastern redcedar Shortleaf pine White oak	70 40 60 50	Slight

[1] For some trees, especially broadleaf species, site index is based on the comparative site index of other species on the same soil.
[2] Moderate if drainage is adequate.

TABLE 4.—*Suitability of soils for elements*

Soil series and map symbols	Wildlife habitat elements [1]			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees
Altavista:				
AlA	Good	Good	Good	Good
AlB	Good	Good	Good	Good
Appling:				
ApB	Good	Good	Good	Good
ApC	Fair	Good	Good	Good
Cartecay: Cc	Poor	Fair	Fair	Good
Rating applies to both Cartecay and Chewacla soils.				
Cecil:				
CfB	Good	Good	Good	Good
CfC	Fair	Good	Good	Good
CfE	Poor	Fair	Good	Good
Chewacla: Ch	Very poor	Poor	Poor	Good
For Wehadkee part, see Wehadkee series.				
Congaree: Cp	Poor	Fair	Fair	Good
Creedmoor:				
CrB	Good	Good	Good	Good
CrC	Fair	Good	Good	Good
Davidson:				
DaB	Good	Good	Good	Good
DaC	Fair	Good	Good	Good
Georgeville:				
GeB	Good	Good	Good	Good
GeC	Fair	Good	Good	Good
GeD	Fair	Good	Good	Good
Goldston:				
GlE	Poor	Fair	Good	Fair
GlF	Very poor	Poor	Good	Fair
Granville:				
GrB	Good	Good	Good	Good
GrC	Fair	Good	Good	Good

to suitability for woodland—Continued

Management limitations—Continued		Preferred tree species for planting and management	
Equipment restrictions	Seedling mortality	Broadleaf	Needleleaf
Slight	Slight	No broadleaf species suitable	Loblolly pine, shortleaf pine, Virginia pine.
Moderate	Slight	No broadleaf species suitable	Loblolly pine, Virginia pine.
Moderate	Moderate	No broadleaf species suitable	Loblolly pine, eastern redcedar.

[3] Tree planting is not generally feasible in ponded areas.
[4] Potential productivity is attainable if drainage is adequate.

of wildlife habitat and kinds of wildlife

Wildlife habitat elements [1]—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow-water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Good	Poor	Poor	Good	Good	Poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Fair	Fair	Poor	Fair	Fair.
Good	Poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.

TABLE 4.—*Suitability of soils for elements of*

Soil series and map symbols	Wildlife habitat elements [1]			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood trees
Gullied land: Gu. Too variable to rate.				
Helena:				
HeB	Fair	Good	Good	Good
HeC	Fair	Good	Good	Good
Herndon:				
HrB	Good	Good	Good	Good
HrC	Fair	Good	Good	Good
HsC	Poor	Fair	Very poor	Good
Iredell:				
IrB	Fair	Good	Good	Good
IrC	Fair	Good	Good	Good
IuB, IuC. Too variable to rate.				
Lignum: LgB	Fair	Good	Good	Good
Mayodan:				
MfB	Fair	Good	Good	Good
MfC	Fair	Good	Good	Good
MfD	Fair	Good	Good	Good
MfE	Poor	Fair	Good	Good
MrC, MrD. Too variable to rate.				
Mecklenburg:				
MuB	Fair	Good	Good	Good
MuC	Fair	Good	Good	Good
Nason:				
NaD	Fair	Good	Good	Good
NaE	Poor	Fair	Good	Good
NoD	Poor	Fair	Very poor	Good
Pinkston:				
PfC	Poor	Poor	Fair	Fair
PfE	Poor	Poor	Fair	Fair
Roanoke: Ro	Poor	Fair	Fair	Fair
Tatum: TaE	Poor	Fair	Good	Good
Urban land: Ur. Too variable to rate.				
Wahee: Wh	Poor	Fair	Fair	Good
Wedowee:				
WmD	Fair	Good	Good	Good
WmE	Poor	Fair	Good	Good
Wehadkee: Wn	Very poor	Poor	Poor	Fair
White Store:				
WsB	Fair	Good	Good	Fair
WsC	Fair	Good	Good	Fair
WsE	Poor	Fair	Good	Fair
WvC2	Poor	Fair	Fair	Poor
WvE2	Very poor	Poor	Fair	Poor
WwC, WwE. Too variable to rate.				
Wilkes: WxE	Poor	Poor	Fair	Fair

[1] All soils rated for natural conditions.

marshes or streams. Surface waters generally have an average depth of less than 5 feet. Examples of such areas are muskrat marshes, beaver ponds, waterfowl feeding areas, and wildlife ponds.

Birds and mammals that are generally associated with edges of open areas are classified as openland wildlife. They are found in cropland areas, pastures, lawns, and idle areas overgrown with grasses, herbs, shrubs, and vines. Mourning doves, quail, red foxes, cottontail rabbits, and many species of songbirds are typical examples of wildlife one might expect to find in this group.

Birds and mammals in wooded areas of hardwoods and coniferous trees and shrubs are classified as woodland wildlife. Examples are squirrels, woodpeckers, and gray foxes.

Birds and mammals in swamps, marshes, or ponds are classified as wetland wildlife. Examples are muskrat, raccoon, redwing blackbirds, and various species of ducks.

The four levels of suitability for the three kinds of wildlife are expressed as *good*, *fair*, *poor*, and *very poor*.

Good.—Habitat is easily improved, maintained, or created. There are few or no soil limitations to habitat management, and satisfactory results can be expected.

Fair.—Habitat can be improved, maintained, or created on these soils, but moderate soil limitations affect habitat

wildlife habitat and kinds of wildlife—Continued

Wildlife habitat elements [1]—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow-water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Poor	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Fair	Very poor.
Good	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Good	Good	Fair	Fair	Good.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Fair	Fair	Fair	Good	Fair.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Good	Fair	Poor	Fair	Fair.
Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Poor	Very poor	Very poor	Fair	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.

management or development. A moderate intensity of management and fairly frequent attention may be required to insure satisfactory results.

Poor.—Habitat can be improved, maintained, or created on these soils, but the limitations are severe. Habitat management may be difficult and expensive and require intensive effort. Results are questionable.

Very poor.—Under the prevailing soil conditions, it is impractical to attempt to improve, maintain, or create habitat. Unsatisfactory results are probable.

Soil properties such as thickness of the surface layer and subsoil, flood hazard, drainage, available water capacity, and slopes are considered in rating.

When rating soil suitability for wildlife, a two-step procedure is followed. First, the soils are rated for their suitability for producing the seven habitat elements. Then, combinations of habitat elements are selected and weighed for their contribution to producing a given kind of wildlife habitat.

It should be noted that the ratings given in table 4 are to be used as guidelines and do not provide specific analysis. Further onsite information and analysis will be required when developing individually managed plants.

Recreation

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In table 5 the soils of

TABLE 5.—*Soils and recreation*

Soil series and map symbols	Degree and kind of limitation for—			
	Camp areas	Picnic areas	Playgrounds	Paths and trails
Altavista:				
AlA	Moderate: wet	Moderate: wet	Moderate: wet	Slight.
AlB	Moderate: wet	Moderate: wet	Moderate: slope	Slight.
Appling:				
ApB	Slight	Slight	Moderate: slope	Slight.
ApC	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Cartecay: Cc	Severe: floods; wet	Moderate: floods; wet	Severe: floods; wet	Moderate: floods; wet.
For Chewacla part, see Chewacla series.				
Cecil:				
CfB	Slight	Slight	Moderate: slope	Slight.
CfC	Moderate: slope	Moderate: slope	Severe: slope	Slight.
CfE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Chewacla: Ch	Severe: floods; wet	Moderate: floods; wet	Severe: floods; wet	Moderate: floods; wet.
For Wehadkee part, see Wehadkee series.				
Congaree: Cp	Severe: floods	Moderate: floods	Moderate: floods	Moderate: floods.
Creedmoor: CrB, CrC	Moderate: percs slowly	Slight	Severe: percs slowly	Slight.
Davidson:				
DaB	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
DaC	Moderate: too clayey	Moderate: too clayey	Severe: slope	Moderate: too clayey.
Georgeville:				
GeB	Slight	Slight	Moderate: slope	Slight.
GeC	Slight	Slight	Severe: slope	Slight.
GeD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Goldston:				
GlE	Severe: large stones	Severe: large stones	Severe: large stones	Severe: large stones.
GlF	Severe: large stones; slope.	Severe: large stones; slope.	Severe: large stones; slope.	Severe: large stones; slope.
Granville:				
GrB	Slight	Slight	Moderate: slope	Slight.
GrC	Slight	Slight	Severe: slope	Slight.
Gullied land, clayey materials:				
Gu	Severe: too clayey	Severe: too clayey	Severe: too clayey	Severe: too clayey.
Helena:				
HeB	Moderate: percs slowly	Slight	Moderate: percs slowly	Slight.
HeC	Moderate: percs slowly	Slight	Severe: slope	Slight.
Herndon:				
HrB	Slight	Slight	Moderate: slope	Slight.
HrC	Slight	Slight	Severe: slope	Slight.
HsC	Slight	Slight	Moderate: large stones	Slight.
Iredell: IrB, IrC, IuB, IuC	Moderate: percs slowly; wet.	Moderate: percs slowly	Moderate: percs slowly; wet.	Moderate: wet.
Not applicable for Urban land part of IuB and IuC.				
Lignum: LgB	Moderate: wet	Moderate: wet	Moderate: percs slowly; wet.	Moderate: wet.
Mayodan:				
MfB	Slight	Slight	Moderate: slope	Slight.
MfC, MrC	Slight	Slight	Severe: slope	Slight.
Not applicable for Urban land part of MrC.				
MfD, MrD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Not applicable for Urban land part of MrD.				
MfE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Mecklenburg:				
MuB	Moderate: percs slowly	Slight	Moderate: percs slowly; slope.	Slight.
MuC	Moderate: percs slowly	Slight	Severe: slope	Slight.
Nason:				
NaD, NoD	Moderate: slope	Moderate: slope	Severe: slope	Slight: slope.
NaE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Pinkston:				
PfC	Slight	Slight	Moderate: slope	Slight.
PfE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Roanoke: Ro	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet.
Tatum: TaE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Urban land: Ur.				
Too variable to rate.				
Wahee: Wh	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet.

TABLE 5.—*Soils and recreation*—Continued

Soil series and map symbols	Degree and kind of limitation for—			
	Camp areas	Picnic areas	Playgrounds	Paths and trails
Wedowee:				
WmD	Moderate: slope	Moderate: slope	Severe: slope	Slight: slope.
WmE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Wehadkee: Wn	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet	Severe: floods; wet.
White Store:				
WsB, WsC, WvC2	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
WsE, WwC, WwE, WvE2	Severe: percs slowly; slope.	Severe: slope	Severe: percs slowly; slope.	Moderate: slope.
Not applicable to Urban land part of WwC and WwE.				
Wilkes: WxE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.

Durham County are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

In table 5 the soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these, is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used chiefly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; and do not have slopes or stoniness that greatly increase cost of leveling sites or of building access roads.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have good drainage, freedom from flooding during periods of heavy use, and a nearly level surface that is free of coarse fragments and rock outcrops and firm after rain, but not dusty when dry (fig. 13). If grading and leveling are required, depth to rock is important.

Paths and trails are used for local and cross-country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded no more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Engineering Uses of the Soils

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, shear strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 6, 7, and 8 which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 6 and 7, and it also can be used to make other useful maps.

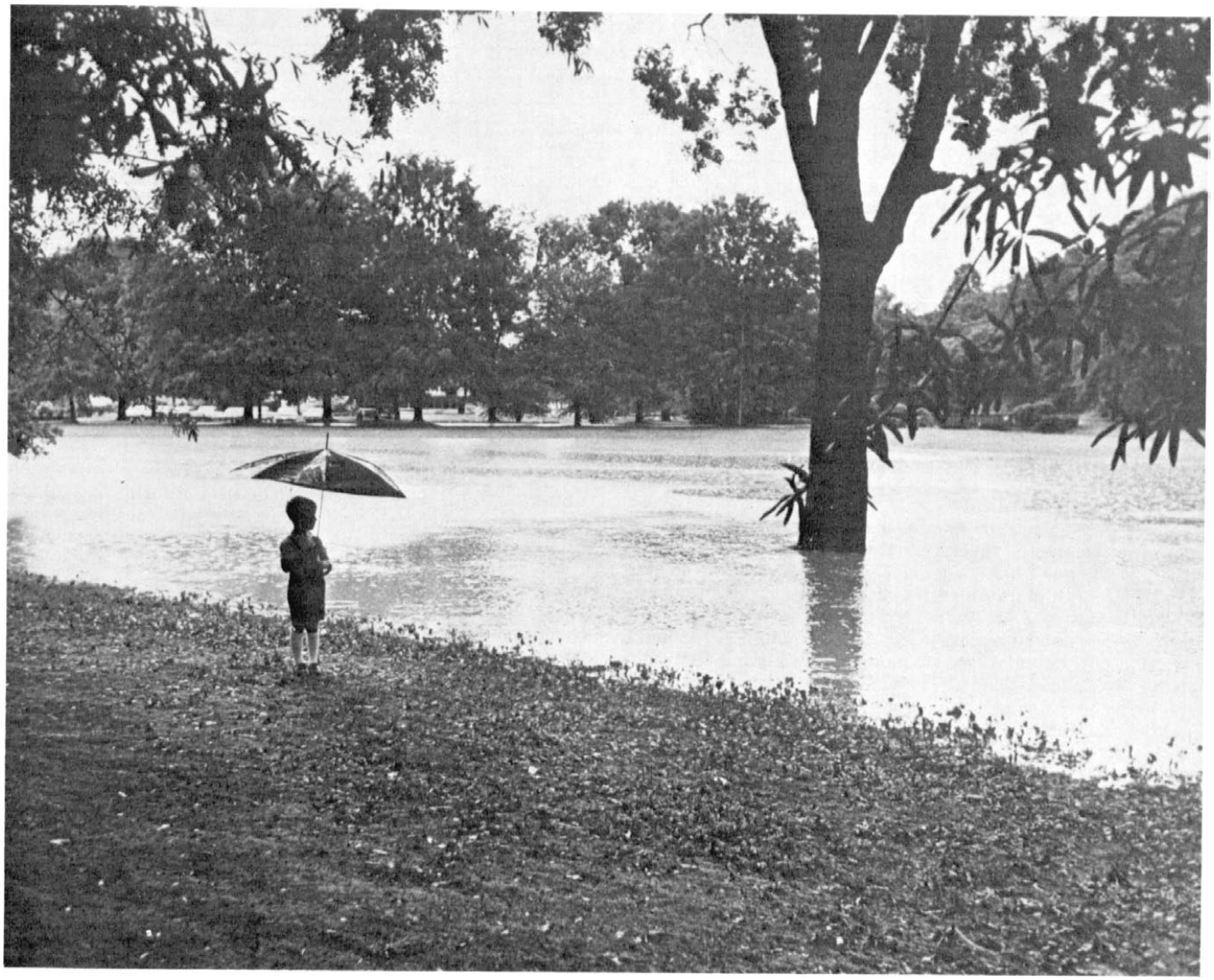

Figure 13.—**Durham city playground after a summer rainstorm. The soil is Congaree silt loam.**

This information, however, does not eliminate need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths of more than 6 feet. Also, inspection of sites, especially small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meanings in soil science that may not be familiar to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system used by the SCS engineers (*7*), Department of Defense, and others, and the AASHO (*1*) system adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL-ML.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 to A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils, which have high bearing strength and

are the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils, which have low strength when wet and are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A-1, A-2, and A-7 groups are divided as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is shown in table 8; the estimated classification, without group index numbers, is given in table 6 for all soils mapped in the survey area.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are given in table 6. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observation made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 6.

Flood hazard is described in terms of the frequency of occurrence and the duration of flooding.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Soil texture is described in table 6 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added; for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semisolid to plastic state; and the liquid limit 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 context within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 6, but in table 8 the data on liquid limit and plasticity index are based on tests of soil samples.

Permeability is the quality that enables a soil to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 6 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such as drainage, texture, total acidity, and electrical conductivity of the soil material. Corrosivity for concrete is influenced mainly by the content of sodium or magnesium sulfate, but also by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage; therefore, protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations

The estimated interpretations in table 7 are based on the engineering properties of soils shown in table 6, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Durham County. In table 7, ratings are used to summarize limitation or suitability of the soils for all purposes listed.

Soil limitations are indicated by the ratings slight, moderate, and severe. *Slight* means that soil properties are generally favorable for the rated use, or limitations are minor and easily overcome or modified by special planning and design. *Moderate* means that soils have one or more properties unfavorable for a particular use, but limitations can be overcome with correct planning, careful design, and good management. *Severe* means that soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance is required.

Soil suitability as a source of road fill or topsoil is rated by the terms *good*, *fair*, and *poor*, which have, respectively, meanings approximately parallel to the terms slight, moderate, and severe.

Following are explanations of some of the columns in table 7.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope is a soil property that affects

TABLE 6.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have in the first column. The symbol >

Soil name and map symbols	Flood hazard	Depth to seasonal high water table	Depth to bedrock	Depth from surface of representative profile	USDA texture	Classification	
						Unified	AASHO
		Feet	*Feet*	*Inches*			
Altavista: AlA, AlB	Infrequent; brief.	2½	>5	0–11	Silt loam	ML, CL–ML	A–4
				11–41	Silty clay loam, clay loam.	CL	A–4, A–6
				41–60	Fine sandy loam	SM, ML, CL–ML SM–SC	A–4
Appling: ApB, ApC	None	>6	>5	0–8	Sandy loam	SM, SM–SC	A–2, A–4
				8–58	Clay, clay loam	CH, CL	A–7, A–6
				58–84	Silty clay loam	CL	A–6, A–4, A–7
*Cartecay: Cc For Chewacla part, see Chewacla series.	Very frequent; very brief.	1½	>5	0–10	Silt loam	CL–ML, ML	A–4
				10–18	Loam	ML	A–4
				18–50	Loamy sand, sandy loam.	ML, SM, SM–SC	A–2
				50–80	Fine sandy clay loam	ML, SM, CL–ML, SM–SC	A–4
Cecil: CfB, CfC, CfE	None	>6	>5	0–5	Fine sandy loam	SM–SC, SM, ML, CL–ML	A–4
				5–51	Clay, clay loam	CL, CH	A–6, A–7
				51–60	Silt loam	ML, CL–ML	A–4
*Chewacla: Ch For Wehadkee part, see Wehadkee series.	Very frequent; very brief.	1½	5	0–17	Silt loam	ML, CL–ML	A–4
				17–60	Silty clay loam	CL	A–6, A–4, A–7
Congaree: Cp	Frequent; very brief.	2½	5	0–52	Silt loam	ML, CL–ML	A–4
				52–65	Silty clay loam	CL	A–4, A–6, A–7
Creedmore: CrB, CrC	None	1½	5	0–8	Sandy loam	SM, SM–SC	A–2, A–4
				8–19	Sandy clay loam	SC, CL	A–4, A–6
				19–56	Clay, silty clay	CL–ML, MH–CH	A–7
				56–77	Very fine sandy loam	CL–ML, CL, ML	A–4, A–6
Davidson: DaB, DaC	None	>6	>5	0–6	Clay loam	CL	A–6
				6–57	Clay	CL, CH	A–7
				57–91	Silty clay loam	CL	A–7, A–4
Georgeville: GeB, GeC, GeD.	None	>6	>5	0–6	Silt loam	ML, CL–ML	A–4
				6–34	Silty clay	MH	A–7
				34–44	Silty clay loam	CL	A–4, A–6, A–7
				44–60	Silt loam	ML, CL–ML	A–4
Goldston:[3] GlE, GlF	None	>6	>2	0–25	Slaty silt loam	GM, ML, CL–ML	A–4
				25	Slate.		
Granville: GrB, GrC	None	>6	>5	0–16	Sandy loam	SM, SM–SC	A–2, A–4
				16–60	Sandy clay loam	CL, SC	A–4, A–6
Gullied land: Gu. No valid estimates. Properties too variable.							
Helena: HeB, HeC	None	>1½	>5	0–12	Sandy loam	SM	A–2, A–4
				12–19	Sandy clay loam	CL	A–4, A–6
				19–46	Clay	CH, CL	A–7
				46–60	Coarse sandy loam	SC, CL	A–4, A–6

significant in engineering

different properties and limitations. For this reason it is necessary to follow carefully the instructions for refering to other series that appear means more than; < means less than]

Percentage less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Probability of corrosion on—[1]	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*			
95–100	95–100	85–100	70–90	<25	[2] NP–7	2.0–6.0	0.10–0.13	5.1–6.5	Low	High: drainage and texture.	Moderate: texture and reaction.
95–100	95–100	90–100	70–95	20–40	5–28	0.6–2.0	0.10–0.15	5.1–6.0	Low		
95–100	90–100	70–90	40–55	<25	NP–4	2.0–6.0	0.11–0.15	5.1–6.0	Low		
95–100	90–100	60–85	30–50	<25	NP–4	2.0–6.0	0.11–0.13	4.5–6.0	Low	High: texture.	High: texture and reaction.
95–100	90–100	75–100	70–95	35–55	20–35	0.6–2.0	0.12–0.14	4.5–5.5	Low		
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.12–0.14	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.10–0.13	5.1–6.5	Low	Moderate: drainage and texture.	Moderate: texture and reaction.
98–100	95–100	85–95	55–70	----	NP	2.0–6.0	0.10–0.13	5.6–6.5	Low		
98–100	95–100	50–85	15–35	<25	NP–4	>6.0	0.10–0.13	5.6–6.5	Low		
98–100	95–100	80–95	40–55	<25	NP–7						
95–100	90–100	70–90	40–55	<25	NP–4	2.0–6.0	0.12–0.14	4.5–6.5	Low	High: texture.	High: texture and reaction.
95–100	90–100	75–100	70–95	35–55	20–35	0.6–2.0	0.13–0.15	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	0.6–2.0	0.13–0.15	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.10–0.13	5.1–6.0	Low	High: drainage and texture.	Moderate: texture and reaction.
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.17–0.19	5.1–6.0	Low		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.10–0.13	6.1–6.5	Low	Moderate: texture.	Low.
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.15–0.20	6.5–6.5	Low		
95–100	90–100	60–90	30–50	<25	NP–4	2.0–6.0	0.10–0.12	4.5–5.0	Low	High: drainage and texture.	High: texture and reaction.
95–100	95–100	85–100	36–60	20–40	8–20	0.2–0.6	0.13–0.15	4.0–5.0	Moderate		
95–100	95–100	85–100	70–95	45–70	20–40	<0.06	0.13–0.15	4.0–5.0	Moderate		
95–100	95–100	85–95	51–70	<40	NP–17	0.2–0.6	0.13–0.15	4.0–5.0			
95–100	95–100	85–100	65–90	30–40	12–22	0.6–2.0	0.12–0.14	5.6–7.3	Low	High: texture.	Low.
95–100	95–100	90–100	75–95	45–70	21–41	0.6–2.0	0.12–0.14	5.6–7.3	Low		
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.12–0.14	5.6–7.3	Low		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.10–0.13	5.1–6.0	Low	Moderate: texture.	Moderate: texture and reaction.
95–100	95–100	90–100	85–100	55–75	17–35	0.6–2.0	0.13–0.15	5.1–5.5	Low		
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.13–0.15	5.1–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	0.6–2.0	0.13–0.15	4.5–5.5	Low		
65–85	65–85	55–70	40–65	<25	NP–7	2.0–6.0	0.08–0.10	4.5–6.0	Low	Low	Moderate: texture and reaction.
95–100	90–100	60–90	30–50	<25	NP–4	>6.0	0.10–0.12	4.5–5.5	Low	Moderate: texture.	High: texture and reaction.
95–100	95–100	85–100	36–60	20–40	8–20	0.6–2.0	0.12–0.14	4.5–5.5	Low		
95–100	90–100	60–90	30–50	<25	NP–2	2.0–6.0	0.10–0.12	4.5–6.0	Low	High: drainage and texture.	High: texture and reaction.
95–100	95–100	85–100	55–70	20–40	8–20	0.2–0.6	0.13–0.15	4.5–5.0	Moderate		
95–100	95–100	85–100	65–85	49–75	25–43	<0.06–2.0	0.13–0.15	4.5–5.0	Moderate		
95–100	95–100	75–90	45–55	20–35	8–20	0.2–0.6	0.11–0.13	4.5–5.0	Moderate		

TABLE 6.—*Estimates of soil properties*

Soil name and map symbols	Flood hazard	Depth to seasonal high water table	Depth to bedrock	Depth from surface of representative profile	USDA texture	Classification	
						Unified	AASHO
		Feet	*Feet*	*Inches*			
Herndon: HrB, HrC, HsC	None	>6	>5	0–8	Silt loam	ML, CL–ML	A–4
				8–12	Silty clay loam	CL	A–4, A–6, A–7
				12–34	Silty clay	MH	A–7
				34–44	Silty clay loam	CL	A–4, A–6, A–7
				44–60	Silt loam	ML, CL–ML	A–4
Iredell: IrB, IrC, IuB, IuC. No valid estimates of Urban land part of IuB and IuC.	None	>1½	>3½	0–7	Loam	ML	A–4
				7–36	Clay	CH	A–7
				36–60	Sandy loam	SM	A–4, A–6
Lignum: LgB	None	>1½	>5	0–9	Silt loam	ML, CL–ML	A–4
				9–17	Silty clay loam	CL	A–4, A–6, A–7
				17–34	Clay, silty clay	CL, ML, MH, CH	A–7
				34–46	Saprolite.		
				46	Slate.		
Mayodan: MfB, MfC, MfD, MfE, MrC, MrD. No valid estimates of Urban land part of MrC and MrD.	None	>6	>5	0–12	Sandy loam	SM, SM–SC	A–2, A–4
				12–47	Sandy clay loam, sandy clay.	SC, CL	A–4, A–7, A–6
				47–60	Sandstone.		
Mecklenburg: MuB, MuC	None	>6	>4	0–5	Loam	ML	A–4
				5–24	Clay	CH, CL	A–7
				24–60	Clay loam, loam	CL	A–4, A–7, A–6
Nason: NaD, NaE, NoD	None	>6	>3½	0–8	Silt loam	ML, CL–ML	A–4
				8–33	Silty clay loam, silty clay.	ML, MH	A–7
				33–47	Silt loam	ML, CL–ML	A–4
				47	Schist.		
Pinkston: PfC, PfE	None	>6	>2½	0–21	Fine sandy loam	SM–SC, SM, ML, CL–ML	A–4
				21–35	Weathered sandstone.		
				35	Sandstone.		
Roanoke: Ro	Frequent; brief.	(4)	>5	0–7	Silt loam	ML, CL–ML	A–4
				7–42	Clay	CL, CH	A–7
				42–51	Silty clay loam	CL	A–7, A–6
				51–60	Sand and silt.		
Tatum:[5] TaE	None	>6	>3½	0–6	Gravelly silt loam	SM, SM–SC	A–2, A–4
				6–34	Silty clay loam, silty clay.	MH, ML	A–7
				34–50	Weathered rock.		
				50	Slate.		
Urban land: Ur. No valid estimates. Properties too variable.							
Wahee, alkaline subsoil variant: Wh.	Infrequent; very brief.	>1½	>5	0–10	Loam	ML	A–4
				10–16	Sandy clay loam	SC, CL	A–4, A–6
				16–48	Clay	CL, CH	A–7
				48–65	Sandy clay loam	SC, CL	A–4, A–6
Wedowee: WmD, WmE	None	>6	>4	0–9	Sandy loam	SM	A–2, A–4
				9–36	Clay, clay loam	CL, CH	A–6, A–7
				36–60	Silt loam	ML, CL–ML	A–4
Wehadkee: Wn	Very frequent; brief.	(4)	>5	0–7	Silt loam	ML, CL–ML	A–4
				7–46	Silty clay loam	CL	A–4, A–6, A–7
				46–60	Clay loam	CL	A–7, A–6

significant in engineering—Continued

Percentage less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Probability of corrosion on—[1]	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*			
95–100	95–100	85–100	70–90	<35	NP–7	2.0–6.0	0.10–0.13	5.1–6.5	Low	Moderate: texture.	Moderate: texture and reaction.
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.10–0.15	5.1–6.0	Low		
95–100	95–100	90–100	85–100	55–75	17–35	0.6–2.0	0.10–0.15	5.1–6.0	Low		
95–100	95–100	90–100	80–95	20–42	8–20	0.6–2.0	0.10–0.15	5.1–6.0	Low		
95–100	95–100	85–100	70–90	<25	NP–7	0.6–2.0	0.10–0.15	4.5–6.0	Low		
95–100	95–100	85–95	50–70		NP	2.0–6.0	0.10–0.13	6.1–7.3	Moderate	High: drainage and texture.	Low.
95–100	95–100	90–100	75–95	60–90	35–65	0.06–0.2	0.15–0.20	6.1–7.3	High		
85–100	75–100	50–75	36–49	35–48	15–26	0.06–0.2	0.15–0.20	6.1–7.3	High		
95–100	95–100	80–100	60–90	<25	NP–7	2.0–6.0	0.12–0.14	4.5–5.5	Low	High: drainage and texture.	High: texture and reaction.
95–100	95–100	90–100	80–95	25–42	8–20	0.6–2.0	0.14–0.16	4.5–5.5	Moderate		
95–100	95–100	85–100	70–95	45–70	20–40	0.06–0.2	0.15–0.20	4.5–5.5	Moderate		
95–100	90–100	60–80	30–50	<25	NP–4	2.0–6.0	0.11–0.13	5.1–5.5	Low	High: texture.	Moderate: texture and reaction.
95–100	95–100	80–95	36–60	20–45	8–27	0.6–2.0	0.12–0.14	5.1–5.5	Low		
98–100	95–100	85–95	50–70		NP	0.6–2.0	0.11–0.13	5.6–6.5	Low	High: texture.	Low.
95–100	95–100	90–100	75–95	45–70	22–41	0.06–0.20	0.12–0.14	5.6–6.5	Moderate		
95–100	95–100	85–100	60–80	25–50	8–25	0.2–0.6	0.12–0.14	5.6–6.5	Moderate		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.10–0.13	4.5–5.5	Low	Moderate: texture.	Moderate: texture and reaction.
95–100	95–100	95–100	85–95	41–65	11–30	0.6–2.0	0.10–0.15	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	0.6–2.0	0.10–0.15	4.5–5.5	Low		
95–100	90–100	70–90	40–55	<25	NP–4	2.0–6.0	0.12–0.15	4.5–5.5	Low	Low	High: texture and reaction.
95–100	95–100	85–100	70–90	<25	NP–7	0.2–0.6	0.10–0.13	4.5–5.5	Low	Very high: drainage and texture.	Moderate: texture and reaction.
95–100	95–100	90–100	75–95	45–70	25–41	0.06–0.2	0.10–0.15	4.5–5.5	Moderate		
95–100	95–100	90–100	80–95	25–42	8–20	0.2–0.6	0.10–0.15	4.5–5.5	Moderate		
75–100	75–100	50–70	30–50	<25	NP–7	2.0–6.0	0.10–0.13	4.5–5.5	Low	Moderate: texture.	Moderate: texture and reaction.
95–100	95–100	95–100	85–95	41–60	11–30	0.6–2.0	0.10–0.15	4.5–5.5	Low		
98–100	95–100	85–95	50–70		NP	2.0–6.0	0.11–0.13	<4.5–8.4	Low	High: drainage and texture.	Low.
95–100	95–100	85–100	36–60	20–40	8–20	0.2–0.6	0.12–0.14	5.6–8.4	Moderate		
95–100	95–100	90–100	75–95	45–70	25–41	0.06–0.2	0.12–0.15	5.6–8.4	Moderate		
95–100	95–100	85–100	36–60	20–40	8–20	0.2–0.6	0.12–0.14	5.6–8.4	Moderate		
95–100	90–100	60–90	30–50	<25	NP–4	2.0–6.0	0.10–0.12	4.5–5.5	Low	High: texture.	Moderate: texture and reaction.
95–100	90–100	75–100	70–95	35–55	20–35	0.6–2.0	0.10–0.14	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	0.6–2.0	0.13–0.15	4.5–5.5	Low		
95–100	95–100	85–100	70–90	<25	NP–7	2.0–6.0	0.14–0.15	5.6–6.5	Low	High: drainage and texture.	Moderate: texture and reaction.
95–100	95–100	90–100	80–85	25–42	8–20	0.6–2.0	0.16–0.20	5.6–6.5	Low		
95–100	95–100	85–100	65–90	35–48	15–26	0.6–2.0	0.16–0.20	5.6–6.5	Low		

TABLE 6.—*Estimates of soil properties*

Soil name and map symbols	Flood hazard	Depth to seasonal high water table	Depth to bedrock	Depth from surface of representative profile	USDA texture	Classification	
						Unified	AASHO
		Feet	*Feet*	*Inches*			
White Store: WsB, WsC, WsE, WvC2, WvE2, WwC, WwE. Urban land part of WwC and WwE too variable to estimate.	None	>1½	>4	0–6 6–35 35–60	Sandy loam Clay loam Weathered sandstone and shale.	SM, SM-SC CH, CL	A–4, A–2 A–7
Wilkes: WxE	None	>6	>2	0–6 6–13 13–40 40	Sandy loam Clay, clay loam Silt loam Bedrock.	SM, SM-SC CH, CL ML, CL-ML	A–2, A–4 A–7 A–4

[1] Rating applies to all layers of soil.
[2] NP is nonplastic.
[3] Coarse fraction more than 3 inches in diameter is 30 percent.

difficulty of layout and construction and also the hazard of erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic-matter content, and slope; and if the floor needs to be leveled, depth to bedrock becomes important. The soil properties that affect embankments are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the amounts of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet, as for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table.

Dwellings, as rated in table 7, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfills are areas of dug trenches for disposing of refuse. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 7 apply only to a depth of about 6 feet, and therefore limitation ratings of *slight* or *moderate* may not be valid if trenches are much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet, but every site should be investigated before it is selected.

Local roads and streets, as rated in table 7, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep. Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade and the workability and quantity of cut and fill material available. The AASHO and Unified classifications of the soil material and also the shrink-swell potential indicate load-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Ratings for light industry are for the undisturbed soils that are used to support building foundations. Emphasis is on foundations, ease of excavation for underground utilities, and corrosion potential of uncoated steel pipe. The undisturbed soil is rated for spread footing foundations for buildings less than three stories high or foundation loads not in excess of that weight. Properties affecting load-supporting capacity and settlement under load are wetness, flooding, texture, plasticity, density, and shrink-swell behavior. Properties affecting excavation are wetness, flooding, slope,

significant in engineering—Continued

Percentage less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Probability of corrosion on—[1]	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Percent		*Inches per hour*	*Inches per inch of soil*	*pH*			
95–100	90–100	60–95	30–50	<25	NP–5	2.0–6.0	0.11–0.13	4.5–6.0	Low	High: drainage and texture.	Moderate: texture and reaction.
95–100	90–100	75–100	70–95	45–90	25–65	<0.06	0.10–0.15	4.5–6.0	High		
95–100	90–100	60–80	30–50	<25	NP–4	2.0–6.0	0.11–0.13	5.1–7.3	Low	High: texture.	Low.
95–100	90–100	75–100	70–90	45–90	25–65	0.2–0.6	0.05–0.10	5.6–7.3	Moderate		
95–100	95–100	80–100	60–90	<25	NP–7	0.6–2.0	0.11–0.13	5.6–7.3	Moderate		

[4] Water table is at or near the surface.
[5] Coarse fraction more than 3 inches in diameter is 15 to 25 percent.

and depth to bedrock. Properties affecting corrosion of buried uncoated steel pipe are wetness, texture, total acidity, and electrical resistivity.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material (fig. 14).

Pond embankments are raised structures of soil material constructed across drainageways in order to impound water. These embankments are generally less than 20 feet high, are constructed of homogeneous soil material, and are compacted to medium density. Embankments of core and shell type construction are not rated in this table. Embankment foundation, reservoir area, and slope are assumed to be suitable for pond construction. Soil properties are considered that affect the embankment and the availability of borrow material. The best soils have good slope stability, low permeability, slight compressibility under load, and good resistance to piping and erosion. The best borrow material is free of stones or rocks and thick enough for easy excavation.

Aquifer-fed excavated ponds are bodies of water created by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds fed by runoff and also embankment-type ponds where the depth of water impounded against the embankment exceeds three feet. The assumption is that the pond is properly designed, located, and constructed and that the water is of good quality. Soil properties affecting aquifer-fed ponds are the existence of a permanent water table, permeability of the aquifer, and properties that interfere with excavation (stoniness and rockiness).

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Topsoil is used for topdressing an area where vegetation is is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as in preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

Agricultural drainage is affected by such soil properties as permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and fragipans or other layers that restrict movement of water; available water capacity; and need for drainage or depth to water table or bedrock.

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Soil test data

Table 8 contains engineering test data for some of the major soil series in Durham County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

TABLE 7.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have

Soil series and map symbols	Degree of limitation for—						
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfills [1] (trench type)	Local roads and streets	Light industry
Altavista: AlA, AlB	Severe: wet	Severe: wet	Severe: wet	Severe: floods.	Severe: wet; floods.	Severe: floods.	Severe: floods.
Appling:							
ApB	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Moderate: low strength.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
ApC	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope; low strength.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
*Cartecay: Cc. For Chewacla part, see Chewacla series.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods; wet.	Severe: floods.	Severe: floods.
Cecil:							
CfB	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Moderate: low strength.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
CfC	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope; low strength.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
CfE	Severe: slope more than 15 percent.	Severe: slope.	Moderate: too clayey.	Severe: slope more than 15 percent.	Severe: too clayey.	Severe: slope.	Severe: slope.
*Chewacla: Ch. For Wehadkee part, see Wehadkee series.	Severe: floods; wet.	Severe: wet	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.
Congaree: Cp	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Creedmoor:							
CrB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey; wet.	Severe: low strength; shrink-swell.	Severe: wet	Severe: low strength; shrink-swell.	Severe: low strength; shrink-swell.
CrC	Severe: percs slowly.	Severe: slope.	Severe: too clayey; wet.	Severe: low strength; shrink-swell.	Severe: wet	Severe: low strength; shrink-swell.	Severe: low strength; shrink-swell.
Davidson:							
DaB	Moderate: percs slowly.	Moderate: seepage	Moderate: too clayey.	Moderate: shrink-swell.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
DaC	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: shrink-swell.	Severe: too clayey.	Moderate: low strength.	Moderate: low strength.
Georgeville:							
GeB	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Moderate: shrink-swell; low strength.	Moderate: too clayey.	Severe: low strength.	Moderate: low strength.
GeC	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: shrink-swell; low strength.	Moderate: too clayey.	Severe: low strength.	Moderate: low strength.
GeD	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: shrink-swell; low strength.	Severe: slope.	Severe: low strength.	Severe: slope.
Goldston: GlE, GlF	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: dominant slope.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Granville:							
GrB	Slight	Moderate: seepage.	Slight	Slight	Slight	Slight	Moderate: slope.
GrC	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Slight	Moderate: slope.	Severe: slope.
Gullied land: Gu. Too variable. No interpretations.							

interpretations of soils

different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series in the first column]

Degree of limitation for—Continued			Suitability as a source of—		Characteristics affecting—		
Pond reservoir areas	Pond embankments	Aquifer-fed excavated ponds	Road fill	Topsoil	Agricultural drainage	Irrigation	Terraces and diversions
Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Fair: wet	Fair: wet	Wet; floods	Wet; floods	Not needed.
Moderate: seepage.	Moderate: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Complex slope; slow intake.	Complex slope; erodes easily.
Moderate: seepage.	Moderate: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Complex slope; slow intake.	Complex slope; erodes easily.
Severe: seepage.	Moderate: piping.	Moderate: deep to water.	Fair: wet	Good	Wet; floods	Wet; floods	Not needed.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Complex slope; slow intake.	Complex slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Complex slope; slow intake.	Complex slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Complex slope; slow intake.	Complex slope; erodes easily.
Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Fair: wet	Good	Wet; floods	Wet; floods	Not needed.
Moderate: seepage.	Moderate: piping.	Severe: deep to water.	Fair: low strength.	Good	Favorable	Favorable	Not needed.
Slight	Severe: low strength; compressible.	Severe: no water.	Poor: shrink-swell; low strength.	Fair: thin layer.	Percs slowly; wet.	Slow intake; wet.	Plastic subsoil; very erodible where exposed.
Slight	Severe: low strength; compressible.	Severe: no water.	Poor: shrink-swell; low strength.	Fair: thin layer.	Percs slowly; wet.	Slow intake; wet.	Erodes easily; percs slowly.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily.	Slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily.	Slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Poor: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily.	Favorable; slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Poor: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily.	Favorable; slope; erodes easily.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Poor: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily.	Favorable; slope; erodes easily.
Severe: depth to rock.	Severe: thin layer.	Severe: no water.	Poor: thin layer.	Poor: small stones.	Not needed	Slope	Slope; depth to rock.
Moderate: seepage.	Moderate: piping.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Fast intake rate; slope.	Complex slope.
Moderate: seepage.	Moderate: piping.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Fast intake; slope.	Complex slope.

TABLE 7.—*Engineering*

Soil series and map symbols	Degree of limitation for—						
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfills [1] (trench type)	Local roads and streets	Light industry
Helena:							
HeB	Severe: percs slowly; wet.	Moderate: slope.	Severe: too clayey; wet.	Severe: shrink-swell.	Severe: wet.	Severe: low strength.	Severe: shrink-swell; low strength.
HeC	Severe: percs slowly; wet.	Severe: slope.	Severe: too clayey; wet.	Severe: shrink-swell.	Severe: wet.	Severe: low strength.	Severe: shrink-swell; low strength.
Herndon:							
HrB	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Moderate: low strength.	Severe: too clayey.	Severe: low strength.	Moderate: low strength.
HrC	Moderate: percs slowly.	Severe: slope.	Slight	Moderate: low strength.	Severe: too clayey.	Severe: low strength.	Moderate: low strength.
HsC	Moderate: percs slowly.	Severe: slope; large stones.	Severe: large stones.	Moderate: low strength.	Severe: large stones.	Severe- low strength.	Moderate: low strength.
Iredell:							
IrB, IuB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
IrC, IuC Urban land part of IuB and IuC is too variable to rate.	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
Lignum: LgB	Severe: percs slowly.	Moderate: depth to rock.	Severe: too clayey.	Severe: shrink-swell.	Severe: too clayey.	Severe: shrink-swell; low strength.	Severe: shrink-swell; low strength.
Mayodan:							
MfB	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Moderate: too clayey.	Slight	Moderate: slope.
MfC	Moderate: percs slowly.	Moderate: seepage.	Slight	Moderate: slope.	Moderate: too clayey.	Slight	Moderate: slope.
MfD	Moderate: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Moderate: too clayey.	Moderate: slope.	Severe: slope.
MfE Urban land part of MrC and MrD is too variable to rate.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Severe: slope.
Mecklenburg:							
MuB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: shrink-swell; low strength.	Severe: too clayey.	Severe: low strength.	Moderate: shrink-swell; low strength.
MuC	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: shrink-swell; low strength.	Severe: too clayey.	Severe: low strength.	Moderate: shrink-swell; low strength.
Nason:							
NaD	Moderate: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Severe: depth to rock.	Severe: slope; depth to rock.	Severe: slope.
NaE	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope; depth to rock.	Severe: slope.
NoD	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope; large stones.	Severe: depth to rock.	Severe: slope; depth to rock.	Severe: slope.
Pinkston: PfC, PfE	Severe: depth to rock.	Severe: depth to rock; slope.	Severe: depth to rock.	Severe: depth to rock; slope.	Severe: depth to rock; slope.	Severe: depth to rock; slope.	Severe: depth to rock; slope.

interpretations of soils—Continued

Degree of limitation for—Continued			Suitability as a source of—		Characteristics affecting—		
Pond reservoir areas	Pond embankments	Aquifer-fed excavated ponds	Road fill	Topsoil	Agricultural drainage	Irrigation	Terraces and diversions
Slight	Moderate: compressible; low strength.	Severe: no water.	Poor: shrink-swell; low strength.	Fair: thin layer.	Percs slowly; wet.	Slow intake; wet.	Erodes easily; percs slowly.
Slight	Moderate: compressible; low strength.	Severe: no water.	Poor: shrink-swell; low strength.	Fair: thin layer.	Percs slowly; wet.	Slow intake; wet.	Erodes easily; percs slowly.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Poor: low strength.	Fair: thin layer.	Not needed	Slow intake	Slope; erodes easily; percs slowly.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Poor: low strength.	Fair: thin layer.	Not needed	Slow intake	Slope; erodes easily; percs slowly.
Severe: slope.	Severe: compressible.	Severe: no water.	Poor: low strength.	Fair: thin layer.	Not needed	Slow intake	Slope; erodes easily; percs slowly.
Slight	Moderate: compressible; unstable fill.	Severe: no water.	Poor: shrink-swell; low strength.	Poor: thin layer.	Percs slowly; slope.	Slow intake	Percs slowly; slope.
Slight	Moderate: compressible; unstable fill.	Severe: no water.	Poor: shrink-swell; low strength.	Poor: thin layer.	Percs slowly; slope.	Slow intake	Percs slowly; slope.
Slight	Moderate: thin layer.	Severe: no water.	Poor: low strength.	Fair: thin layer.	Percs slowly; wet.	Slow intake; wet.	Not needed.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Slow intake; complex slope.	Percs slowly; complex slope.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Slow intake; complex slope.	Percs slowly; complex slope.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Slow intake; complex slope.	Percs slowly; complex slope.
Moderate: seepage.	Severe: compressible.	Severe: no water.	Fair: low strength.	Fair: thin layer.	Not needed	Slow intake; complex slope.	Percs slowly; complex slope.
Slight	Severe: compressible.	Severe: no water.	Poor: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily; complex slope.	Erodes easily; slope.
Slight	Severe: compressible.	Severe: no water.	Poor: low strength.	Poor: thin layer.	Not needed	Slow intake; erodes easily; complex slope.	Erodes easily; slope.
Moderate: depth to rock; seepage.	Moderate: thin layer; unstable fill.	Severe: no water.	Poor: thin layer.	Poor: thin layer.	Not needed	Slow intake; slope.	Slope; depth to rock.
Moderate: depth to rock; seepage.	Moderate: thin layer; unstable fill.	Severe: no water.	Poor: thin layer.	Poor: thin layer.	Not needed	Slow intake; slope.	Slope; depth to rock.
Moderate: depth to rock; seepage.	Moderate: thin layer; unstable fill.	Severe: no water.	Poor: thin layer.	Poor: thin layer.	Not needed	Slow intake; slope.	Slope; depth to rock.
Severe: depth to rock.	Severe: depth to rock.	Severe: no water.	Poor: thin layer.	Poor: thin layer.	Not needed	Fast intake; droughty.	Depth to rock; rooting depth.

TABLE 7.—*Engineering*

Soil series and map symbols	Degree of limitation for—						
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings	Sanitary landfills [1] (Trench type)	Local roads and streets	Light industry
Roanoke: Ro	Severe: floods.	Severe: floods.	Severe: floods; wet.	Severe: floods.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods.
Tatum: TaE	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope; depth to rock.	Severe: slope.	Severe: slope.
Urban land: Ur. Too variable. No interpretations.							
Wahee: Wh	Severe: floods.	Severe: floods.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods.	Severe: floods; wet.
Wedowee:							
WmD	Severe: slope.	Severe: slope.	Severe: depth to rock; slope.	Moderate: slope.	Severe: depth to rock.	Moderate: slope; depth to rock.	Severe: slope.
WmE	Severe: slope.	Severe: slope.	Severe: depth to rock; slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
Wehadkee: Wn	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods.	Severe: floods; wet.	Severe: floods; wet.	Severe: floods; wet.
*White Store:							
WsB	Severe: percs slowly.	Moderate: depth to rock; slope.	Severe: too clayey.	Severe: shrink-swell.	Severe: too clayey.	Severe: low strength; shrink-swell.	Severe: shrink-swell.
WsC, WvC2, WwC	Severe: percs slowly.	Moderate: depth to rock; slope.	Severe: too clayey.	Severe: shrink-swell.	Severe: too clayey.	Severe: low strength; shrink-swell.	Severe: shrink-swell.
WsE, WvE2, WwE Urban land part of WwC and WwE is too variable to rate.	Severe: percs slowly.	Severe: slope.	Severe: slope.	Severe: shrink-swell.	Severe: too clayey.	Severe: slope.	Severe: shrink-swell.
Wilkes: WxE	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: slope; depth to rock.	Severe: dominant slope; shrink-swell; low strength.	Severe: depth to rock; too clayey.	Severe: depth to rock; low strength; slope.	Severe: slope.

[1] Onsite study is needed of the underlying strata, the water table, and the hazards of aquifer pollution and drainage into ground water in landfill deeper than 5 or 6 feet.

Moisture-density or compaction data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed maximum dry density. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material, as has been explained for table 6.

Formation and Classification of the Soils

This section describes the factors of soil formation and explains how these factors have affected the soils in Durham County. It also defines the system of soil classification currently used and classifies each soil series recognized in the county according to that system.

Factors of Soil Formation

Soils are the products of soil-forming processes acting upon materials altered or deposited by geologic forces. The factors that contribute to the differences among soils are parent material, climate, plant and animal life, topography, and time. Climate and plant and animal life, particularly vegetation, are the active forces in soil formation. Their effect on parent material is modified by topography and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. In some places one factor dominates in the formation of a soil and determines most of its properties, but normally the interaction of all factors determines the kind of soil that forms in any given place.

Parent material

Parent material is the unconsolidated rock from which a soil is formed. It is the soil-forming factor that is primarily

interpretations of soils—Continued

Degree of limitation for—Continued			Suitability as a source of—		Characteristics affecting—		
Pond reservoir areas	Pond embankments	Aquifer-fed excavated ponds	Road fill	Topsoil	Agricultural drainage	Irrigation	Terraces and diversions
Moderate: percs slowly.	Severe: low strength.	Slight	Poor: wet	Poor: wet	Slow intake; poor outlets.	Floods; wet	Not needed.
Moderate: depth to rock.	Moderate: thin layer; unstable fill.	Severe: depth to water.	Fair: thin layer.	Poor: thin layer.	Not needed	Complex slope; rooting depth.	Slope; depth to rock.
Slight	Moderate: compressible.	Severe: depth to water.	Fair: low strength; wet.	Good	Percs slowly	Slow intake; floods; wet.	Not needed.
Moderate: seepage.	Moderate: low strength; thin layer.	Severe: no water.	Fair: thin layer; low strength.	Good	Not needed	Complex slope	Complex slope.
Moderate: seepage.	Moderate: low strength; thin layer.	Severe: no water.	Fair: thin layer; low strength.	Good	Not needed	Complex slope	Slope.
Moderate: percs slowly.	Moderate: piping.	Slight	Poor: wet	Poor: wet	Floods; wet; poor outlets.	Floods; wet	Not needed.
Slight	Moderate: compressible.	Severe: depth to water.	Poor: low strength.	Fair: thin layer.	Percs slowly	Slow intake; slope.	Plastic clay; difficult to work; slope.
Slight	Moderate: compressible.	Severe: depth to water.	Poor: low strength.	Fair: thin layer.	Percs slowly	Slow intake; slope.	Plastic clay; difficult to work; slope.
Slight	Moderate: compressible.	Severe: depth to water.	Poor: low strength.	Fair: thin layer.	Slope; percs slowly.	Slope	Plastic clay; slope.
Moderate: slope; depth to rock.	Moderate: compressible; thin layer.	Severe: no water.	Poor: thin layer; low strength.	Fair: thin layer.	Not needed	Complex slope; droughty.	Complex slope; depth to rock.

responsible for the chemical and mineralogical composition of the soil. It is also the most important factor that has caused differences among the soils of Durham County. Some of the differences, such as texture, color, or depth, are easily determined in the field. Minor differences in mineralogical composition are determined by laboratory analysis.

Most of the soils of Durham County formed in residual materials, that is, the material weathered from the underlying rocks. The soils formed in parent material that ranges from Precambrian to Mesozoic in geological age. According to the geology map of North Carolina (*3*), Triassic sandstone, siltstone, and shales with injected intrusions of diabasic rocks underlay the southern and central parts of the county. Soils formed in these Triassic parent materials are of the Creedmoor, Granville, Mayodan, Pinkston, and White Store series.

Soils formed in the residuum from diabasic intrusions are of the Iredell, Mecklenburg, and Wilkes series. Most of the northern third of the county is underlain by metavolcanic rocks. Soils formed in parent material derived from felsic volcanic slates and mafic volcanic slates are of the Davidson, Georgeville, Goldston, Herndon, Lignum, Nason, and Tatum series.

In several widely scattered areas in the northern and western parts of the county and southeast of the Triassic Basin, the parent material is derived from felsic crystalline rocks that are mostly granite, schist, and gneiss. These areas also include some mafic rocks, such as diorite and granodiorite. Soils formed in these parent materials are of the Appling, Cecil, and Helena series.

Soils formed in old alluvium on stream terraces are of the Altavista, Wahee, and Roanoke series.

Soils formed in recent alluvium are of the Cartecay, Chewacla, Congaree, and Wehadkee series.

Climate

Climate is important in the formation of soils because it influences the weathering of minerals. Weathering is more rapid in a warm, humid climate than it is in a cold or a dry climate. The type and abundance of vegetation are influenced by the amount of precipitation and the length of the growing season. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains and frequent showers may cause excessive erosion.

Durham County is warm and humid, as is typical of the southeastern United States. Facts about the temperature

TABLE 8.—*Engineering*

[Tests performed by North Carolina State Highway Commission,

Soil name and location	Parent material	Report number	Depth	Moisture density [1]	
				Maximum dry density	Optimum moisture
			Inches	*Lb per cu ft*	*Percent*
Creedmoor sandy loam:		S68NC-32			
12 miles southeast of Durham.	Sandstone.	23-1,2	0-8	114	11
		23-5	19-29	98	22
		23-9,10	56-77	109	17
Davidson clay loam:					
0.3 mile east of Quail Roost.	Hornblende gneiss.	21-1	0-6	102	21
		21-2	8-24	101	22
Georgeville silt loam:					
15 miles northeast of Durham.	Felsic volcanic slate.	19-1,2	0-6	92	23
		19-4,5	11-28	89	30
		19-8	44-55	94	25
Helena sandy loam:					
15 miles northeast of Durham.	Granodiorite.	20-1,2	0-12	116	10
		20-4,5	19-39	95	24
		20-8	46-60	113	15
Iredell loam:					
From Eno River, 0.5 mile north on U.S. Highway 501, 1.6 mile east on State Highway 1639, in woods 20 yards north of road. (Modal)	Diorite.	13-2	2-7	116	17
		13-3	16-20	81	34
		13-5	30-50	117	15
Lignum silt loam:		S67NC-32			
From Rougemont, 0.9 mile southwest on State Highway 1472, 800 feet north on State Highway 1473, in woods 30 feet west of road.	Volcanic slate.	15-1	0-5	111	14
		15-2	20-27	102	21
Mecklenburg loam:					
0.5 mile north of Eno river on U.S. Highway 501, in woods 20 yards east of road. (Modal)	Diorite.	16-1	0-5		
		16-2	5-15	99	24
		16-3	35-45	95	27
White Store sandy loam:					
From Nelson, 1 mile north on old U.S. Highway 70 (State Highway 1959), in woods 50 feet west of road.	Triassic siltstone.	14-1	3-5	109	13
		14-2	10-21	92	26
		14-3	50-60	110	17

[1] Based on AASHO Designation T 99-57, Methods A and C (*1*).

[2] Mechanical analyses according to AASHO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been 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

and precipitation are given in tables 14 and 15 in the section "General Nature of the County."

The climate is nearly the same throughout the county, and precipitation is rather uniformly distributed during the year. In winter the precipitation is generally in the form of light snows and showers, and in other seasons it is light, prolonged rains or quick, hard showers. Winter is moderately cold and sometimes wet; summer is usually hot and humid.

This warm, humid climate has caused most of the soils of the county to be strongly weathered, leached and acid in their upper parts, and comparatively low in the supply of plant nutrients.

Plant and animal life

Before the county was settled, the native vegetation consisted mainly of hardwoods and some coniferous trees. These plants had a major influence on the formation of the soils. In addition, the activities of micro-organisms, earthworms, larvae, and other forms of animal life were important in the cycle of decay and regeneration of plants.

Hardwood trees and other plants take up minerals from the soil and store them in their roots, stems, and leaves. When these plants or parts of them decay, the minerals re-

test data

Department of Materials and Tests, Raleigh, N. C.]

Mechanical analyses [2]											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—							
1 in	¾ in	⅜ 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			AASHO [3]	Unified
											Percent			
------	--------	--------	--------	100	85	37	29	14	7	4	18	[4] NP	A-4(0)	SM
------	--------	--------	--------	100	94	75	71	63	52	45	61	32	A-7-6(20)	CH
------	--------	--------	--------	100	93	54	48	31	17	10	29	6	A-4(4)	ML
------	--------	100	99	96	92	85	83	76	51	39	42	18	A-7-6(12)	CL
------	--------	100	99	99	95	90	88	81	59	49	51	28	A-7-6(17)	CH
------	100	97	93	90	88	75	72	54	24	14	38	5	A-4(8)	ML
------	--------	--------	100	99	98	95	92	86	70	58	70	25	A-7-5(18)	MH
------	--------	--------	--------	100	99	92	86	70	45	31	50	15	A-7-5(12)	MH
------	--------	100	100	98	86	46	39	24	11	7	16	NP	A-4(2)	SM
------	--------	100	99	98	93	76	74	66	56	48	69	40	A-7-6(20)	CH
------	--------	--------	--------	100	82	49	45	36	24	17	30	10	A-4(3)	SC
100	98	95	91	86	33	24	21	15	7	3	36	8	A-2-4(0)	SM
------	--------	100	100	99	94	88	86	82	72	67	101	64	A-7-5(20)	CH
100	98	94	86	78	53	38	33	20	11	7	40	15	A-6(2)	SM
------	--------	--------	--------	100	81	65	63	57	27	12	21	NP	A-4(6)	ML
------	--------	--------	--------	100	97	92	91	88	69	50	49	28	A-7-6(17)	CL
[5] 85	78	48	34	30	25	20	19	18	10	6	44	11	A-2-7(0)	GM
------	--------	--------	100	96	92	81	80	77	59	44	52	23	A-7-6(16)	MH
------	--------	--------	100	96	87	74	72	67	46	28	50	20	A-7-5(14)	MH
100	98	--------	97	95	91	76	72	64	25	15	25	5	A-4(8)	CL–ML
------	--------	--------	--------	100	98	94	92	87	71	63	78	8	A-7-5(20)	CH
------	100	97	94	90	89	80	73	48	19	11	36	10	A-4(8)	ML

millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

[3] Based on AASHO Designation M 145-49.

[4] Nonplastic.

[5] 100 percent passes the 3-inch sieve, 97 percent the 2-inch sieve, and 93 percent the 1½-inch sieve.

enter the soil and are again used by the plants. Unless disturbed, this cycle continues through the years.

Soil formation also is affected by plant roots, which penetrate soil material to various depths, generally increase its porosity, and may break or split coarse fragments and particles. Organic acids produced by plants and their decay react on basic minerals in the parent material. Minerals taken into solution or suspension may be leached from a soil or translocated within it.

As farming developed in Durham County, the activity of man influenced soil formation. Forests were cleared, and new kinds of plants were introduced. Cultivation and artificial drainage changed some characteristics of soils in the county.

Man's activity has caused an accelerated loss of soil through erosion. Because of this loss, the soil in some areas is now thin and has been changed in other ways. Some of the material washed from sloping areas has been deposited in depressions and on flood plains. Young, or immature, soils formed in such material.

Topography

Topography, or relief, controls surface drainage and affects the percolation of water through the soil and into the

Figure 14.—**Fish pond in Mayodan sandy loam.**

underlying material. It affects the depth of soil and its formation and has some effect on the dominant kinds of vegetation.

Soils that formed where slopes are steep normally have weakly expressed horizons, and their solum commonly is thin because much of it is eroded away almost as rapidly as it forms. Soils in low depressions and on flood plains generally have drainage impeded to some degree. Root distribution, a factor in soil formation, is limited in shallow, steep, and imperfectly drained soils.

The topography of Durham County ranges from gently rolling to very steeply sloping.

The steepest areas are those adjacent to the major drainageways. In many places broad, nearly level flood plains parallel the major streams and rivers of the county.

Differences in topography can account for some differences between soils formed in the same or similar material. This is illustrated by the Georgeville and the Tatum soils, both of which formed in smooth, fine-grained material. The gently sloping to sloping Georgeville soils have a thick solum and a strongly expressed argillic horizon. In contrast, the strongly sloping to steep Tatum soils have a much thinner solum and a definite, but somewhat weaker argillic horizon. The differences between soils of these two series are caused mainly by topography and its effect on the rate of natural and accelerated erosion.

Time

Time is important in the formation of soils. A soil is considered mature if the factors of soil formation have operated long enough to form well-defined, genetically related horizons and the soil is in equilibrium with its environment. A soil is considered immature, however, if the soil shows little or no horizonation and if the soil-forming processes are still active. Many soils range in maturity between these extremes.

Soils that formed in the same kind of parent material but in areas of different topography do not necessarily mature in

TABLE 9.—*Soil series classified according to current system of classification*

[Updated to January 1971]

Soil series	Family	Subgroup	Order
Altavista	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols.
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Cartecay	Coarse-loamy, mixed, nonacid, thermic	Aquic Udifluvents	Entisols.
Cecil	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Chewacla	Fine-loamy, mixed, thermic	Fluvaquentic Dystrochrepts	Inceptisols.
Congaree	Fine-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Creedmoor	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Davidson	Clayey, kaolinitic, thermic	Rhodic Paleudults	Ultisols.
Georgeville	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Goldston	Loamy-skeletal, siliceous, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Granville	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Helena	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Herndon	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Iredell	Fine, montmorillonitic, thermic	Typic Hapludalfs	Alfisols.
Lignum	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Mayodan	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Mecklenburg	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Nason	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Pinkston	Coarse-loamy, mixed, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Roanoke	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.
Tatum	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Wahee, alkaline subsoil variant	Fine, kaolinitic, thermic	Aquic Glossudalfs	Alfisols.
Wedowee	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Wehadkee	Fine-loamy, mixed, nonacid, thermic	Typic Fluvaquents	Entisols.
White Store	Fine, mixed, thermic	Vertic Hapludalfs	Alfisols.
Wilkes	Loamy, mixed, thermic, shallow	Typic Hapludalfs	Alfisols.

the same length of time. In steep areas, for example, no definite horizons have had time to develop because the soil material has been removed by erosion almost as rapidly as it has formed. In less strongly sloping areas, there is time for some soil formation.

Soils formed in material that is resistant to weathering require more time to reach maturity than soils formed in easily weathered material. On flood plains the development of genetically related horizons may be slowed or prevented if alluvium is still being deposited frequently.

The Appling soils are mature soils; the horizons are well defined and genetically related, the rate of weathering has exceeded that of geologic erosion, and the soils generally are in equilibrium with their environment. The Goldston soils are only partly mature because they are sloping and the rate of erosion is nearly that of weathering. The Congaree soils are immature because the material in which they formed is recently deposited and is constantly being renewed.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, see their relationship to one another and to the whole environment, and develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are classified in broad classes to facilitate study and comparison of large areas, such as countries and continents.

The system of soil classification currently used, called the Soil Taxonomy,[5] was adopted by the National Cooperative Soil Survey in 1965.

The Soil Taxonomy has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 9, the soil series of Durham County are classified according to the Soil Taxonomy. The categories are briefly defined as follows.

ORDER.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The three exceptions to this are the Entisols, Inceptisols, and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol*.

SUBORDER.—Each order is divided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order.

[5] See unpublished Soil Taxonomy, preliminary Abridged Text. Soil Survey Staff, Soil Conservation Service, USDA. Available in SCS office, Raleigh, N. C.

TABLE 10.—*Physical*

[Analyses made at the U.S. Department of Agriculture Soil Survey Laboratory, Beltsville, Maryland, according to

Soil and sample number	Depth from surface	Horizon	Percentage of material less than 2 millimeters in diameter [1]					
			Total			Sand		
			Sand (2 to 0.05 mm)	Silt (0.05 to 0.002 mm)	Clay (<0.002 mm)	Very coarse (2 to 1 mm)	Coarse (1 to 0.5 mm)	Medium (0.5 to 0.25 mm)
	Cm							
Creedmoor sandy loam: S69NC32–2	[4] 3–13	A–21	71.0	24.3	4.7	3.2	11.8	12.3
	13–24	A–22	67.2	26.6	6.2	3.6	12.7	11.8
	24–43	B1	56.2	28.2	15.6	3.4	10.4	9.7
	43–76	B21t	30.0	24.8	45.2	1.5	5.6	5.7
	76–101	B22t	27.8	29.4	42.8	.8	4.4	5.1
	101–132	B23t	21.9	42.5	35.6	.5	3.2	3.3
	132–142	B31	8.0	33.7	48.3	.3	1.0	1.0
	142–170	B32	15.3	37.2	47.5	.3	1.8	2.3
	142–170	([6])	4.0	50.0	46.0	.5	.4	.4
	170–175	[7] IIC1	54.4	33.9	11.7	2.4	11.2	11.4
	175–200	IIC2	60.6	24.4	15.0	3.4	15.0	13.0
	200–208	IIC3	76.5	18.8	4.7	6.7	22.1	16.1
White Store loam: S69NC32–1	0–10	A1	39.3	49.4	11.3	.7	2.1	3.8
	10–16	A2	34.4	49.0	16.6	.4	1.6	3.1
	16–33	B1	27.6	45.0	27.4	.2	1.0	2.5
	33–50	B21t	11.5	28.0	60.5	.2	.3	.9
	50–68	B22t	4.9	25.9	69.2	.1	.2	.4
	68–79	B23t	4.9	27.7	67.4	.0	.1	.4
	79–98	B24t	5.7	30.1	64.2	.0	.2	.5
	98–113	B25t	5.3	33.5	61.2	.0	.3	.6
	113–122	B26t	8.8	59.7	31.5	.0	.4	.8
	122–138	B31t	13.5	64.2	22.3	.1	.6	.8
	138–168	B32t	18.3	61.5	20.2	.1	.5	.9
	168–183	C	37.9	52.7	9.4	.2	.2	.6

[1] Based on Investigations method 3A1.
[2] Based on Investigations method 3B2.
[3] Based on Investigations method 3B1.
[4] The 0 to 3 cm horizon is not sampled.

GREAT GROUP.—Each suborder is divided into great groups on the basis of similarity in the kind and sequence of major soil horizons and features. The horizons considered are those in which clay, iron, or humus have accumulated; those that have pans that interfere with the growth of roots, movement of water, or both; and those that have a thick, dark-colored surface layer. Some features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and dark-red and dark brown colors associated with basic rocks. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder.

SUBGROUP.—Each great group is divided into subgroups, one that represents the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group.

FAMILY.—Families are established within each subgroup, primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae, as shown in table 9.

Chemical and Mineralogical Analyses of Soils

The soil analyses in tables 10, 11, 12, and 13 were made of selected soils in Durham County. Samples were collected at one site each of Creedmoor and White Store soils as indicated by the symbol *s* on the detailed soil map. The sample area was judged to be typical for these soil series by the soil scientists who made the soil map. Methods of analysis are

analyses of selected soils

methods of Soil Survey Investigations Report No. 1 (*5*). The symbol > means more than; < means less than]

Percentage of material less than 2 millimeters in diameter [1]—Continued							Fraction more than 2 millimeters in diameter			
Sand—Continued		Silt		Int. II: (0.2 to 0.02 mm)	2 to 0.1 mm material	Material <0.074 mm	Estimated volume[2]	Weight of coarse fragments [3]		
Fine (0.25 to 1 mm)	Very fine (0.1 to 0.05 mm)	0.05 to 0.02 mm size	Int. III (0.02 to 0.002 mm)					In whole core	In fraction >76 mm	
									2 to 19 mm	19 to 76 mm
							Cm	*Percent*	*Percent*	*Percent*
26.4	17.3	13.4	10.9	46.7	53.7	39.1	1.00	[5] T	T	0
23.5	15.6	13.1	13.5	43.0	51.6	41.8	1.00	T	T	0
19.5	13.2	12.4	15.8	37.4	43.0	51.8	1.00	1	1	0
10.8	6.4	6.4	18.4	19.2	23.6	73.9	1.00	1	T	0
10.8	6.7	6.8	22.6	20.0	21.1	76.2	1.00			0
7.1	7.8	12.3	30.2	24.6	14.1	83.5	1.00	T	T	0
2.5	3.2		38.2	.3	4.8	94.2	1.00	T	T	0
6.4	4.5	3.9	33.3	12.5	10.8	87.3	1.00	T	T	0
1.4	1.3	2.8	47.2	5.1	2.7	96.8	1.00	0	0	0
18.9	10.5	9.8	24.1	31.0	43.9	51.6	1.00	T	T	0
19.0	10.1	8.3	16.1	28.9	50.5	45.3	1.00	T	T	0
21.7	9.9	7.8	19.4	29.5	66.6	29.1	1.00	T	T	0
16.6	16.1	22.0	27.4	49.3	23.2	70.7	1.00	T	T	0
14.6	14.7	21.2	27.8	45.7	19.5	74.7	1.00	T	T	0
11.6	12.3	16.7	28.3	37.1	15.3	80.1	1.00	T	T	0
4.9	5.2	7.0	21.0	15.6	6.3	91.7	1.00			
2.0	2.1	3.4	22.5	7.0	2.7	96.4	1.00	T	T	0
2.1	2.3	3.8	23.9	7.5	2.6	96.5	1.00	0	0	0
2.4	2.6	4.2	25.9	8.4	3.1	95.9	1.00	0	0	0
2.1	2.3	4.2	29.5	7.9	3.0	96.1	1.00	0	0	0
2.6	5.0	17.8	41.9	24.5	3.8	94.9	1.00	0	0	0
3.3	8.7	22.8	41.4	33.6	4.8	93.0	1.00	0	0	0
6.2	10.6	18.5	43.0	33.8	7.7	88.5	1.00	0	0	0
15.7	21.2	16.8	35.9	51.8	16.7	73.6	1.00	0	0	0

[5] T = Trace.
[6] Red material from B32 horizon.
[7] Laboratory sample is redder than indicated in description.

those employed by the Soil Survey laboratory (*5*). The exact method is indicated in the footnotes; for example, organic carbon was determined by method 6A1a.

Such detailed studies are useful to test ideas gained about the soils as they are observed in their natural landscapes. Creedmoor and White Store soils formed in Triassic rocks (*3*), which are extensive in Durham County. Both contain substantial amounts of clay in the B horizon, yet the physical qualities of the two soils are rather contrasting. The White Store soil contains clay which is quite sticky and plastic when wet. When this soil dries, it loses volume and shrinks to the extent that cracks are observed in it during dry periods of the year. Creedmoor soil, although it contains much clay, is not so plastic when wet nor does it lose enough volume upon drying to result in cracks of such size. For reasons such as these, the studies were undertaken.

Both soils had been described by soil scientists as having clay texture in the major parts of the B horizon. These studies confirm that clay content ranges from 35.6 to 58.3 percent in the Creedmoor soil at depths between 43 and 170 centimeters. White Store has somewhat higher clay content in the B horizon: it ranges from 60.5 to 69.2 percent at depths between 33 and 114 centimeters. Clay content in the A horizon of both soils is low and increases as depth increases to reach maximum quantities in the B horizon. This pattern of increased clay content is typical of soils in Durham County. The character of the clay and its differing properties are illustrated by cation exchange capacities and the base saturation of the two soils. In the Creedmoor soil, cation exchange capacities in the B horizon reach a maximum of 31.7 and 30.5 milliequivalents (NH_4OAc basis), while those of the White Store soil reach an appreciably higher 47.3 and 47.8 milliequivalents. Extractable aluminum is by far the dominant cation in both soils, as has been reported by McCracken (*2*) and others. The quantities of basic cations (Ca, Mg, Na, K) are negligible in Creedmoor soil. As a consequence, base saturation remains at 6 percent and less throughout all parts of the soil. The White Store soil is much better supplied with basic cations. The surface layer and upper part of the B horizon contain modest quantities of basic cations. They are

TABLE 11.—*Chemical*

[Analyses made at U.S. Department of Agriculture Soil Survey Laboratory,

Soil and sample number	Depth from surface	Organic carbon [1]	Extractable iron as Fe [2]	Aluminum (C-D) [3]	Liquid limit [4]	Plasticity index [5]
	Cm	*Percent*	*Percent*	*Percent*		
Creedmoor sandy loam:						
S69NC32-2	3–13	0.50	0.15	0.06		
	13–24	.23	.18	.06		
	24–43	.14	.48	.10		
	43–76	.18	.53	.29	57	24
	76–101	.10	1.37	.24		
	101–132	.06	.94	.19		
	132–142	.05	1.85	.33	65	27
	142–170	.04	1.92	.33		
	142–170	.03	6.29	.39		
	170–175		3.01	.22		
	175–200		.08	.08		
	200–208		.12	.06		
White store loam:						
S69NC32-1	0–10	1.32	.69	.11		
	10–16	.35	.86	.12		
	16–33	.20	1.27	.20		
	33–50	.23	2.79	.48		
	50–68	.19	2.70	.50	74	27
	68–79	.14	2.41	.46		
	79–98	.12	2.20	.42		
	98–113	.10	1.83	.37		
	113–122	.07	1.27	.23		
	122–138	.01	1.89	.21	40	11
	138–168	.02	1.85	.15		
	168–183		1.06	.06		

[1] Based on Investigations method 6A1a.
[2] Based on Investigations method 6C2b.
[3] Based on Investigations method 6G7a.
[4] Based on Investigations method 4F1.
[5] Based on Investigations method 4F.
[6] Based on Investigations methods 4A1e and 4A1h.

more plentiful as depth increases, and the total basic cations equal or exceed the extractable acidity at a depth of 49 inches and deeper. The amount of basic cations in White Store soil is insufficient to have significant effect on soil reaction (pH). Both soils are below pH 5.0 in all horizons.

As earlier noted, the Creedmoor soil and similar soils were not observed to shrink to any great extent as they lose moisture and dry. White Store soil, however, shrinks to a significant degree, and cracks form when the soil dries. Several workers have shown that the kind of secondary silicate minerals of clay size influences the amount of change in volume which takes place as the soil is wetted by rain and subsequently dries and loses moisture again through evaporation/transpiration. Soils that have kaolinitic clay change volume to a small extent and are correspondingly stable sites for houses, roads, and similar structures. Soils that contain a significant amount of montmorillonite, however, are known to swell when wet and shrink as they dry and therefore are difficult to use for such structures.

Two laboratory procedures have been used to explore these differing characteristics: X-ray analysis is used to interpret kinds of secondary silicate clays in a soil, and the coefficient of linear extensibility (COLE) is used to measure the change in volume in one plane as a soil undergoes wetting and drying. The X-ray analyses confirm that some five kinds of secondary minerals are in the clay-size part of the two soils (table 13). In the Creedmoor soil, the kaolinite type of clay is dominant to about 101 centimeters, and its COLE ranges to 0.05 in this part of the soil. These measurements confirm the observations made by soil scientists that such soils are moderately stable sites upon which buildings may be rested. Structures would have moderate stresses imparted to them from their foundations. On the other hand, X-ray analyses show the White Store soil to contain a dominant amount of montmorillonite in the clay fraction of the soil between depths of 33 and 98 centimeters. The COLE value is 0.13 to 0.15 in this part. These measurements confirm that significant changes occur in the soil volume when wet as compared to that of the dry soil. Structures rested in the soil would undergo significant stresses, and unreinforced walls would shift and cracks form over the years.

In summary, these studies confirm significant differences

analyses of selected soils

Beltsville, Maryland according to methods of Soil Survey Investigations Report (*5*)]

Bulk density [6]		COLE [7]	Water content [8]		Resistivity [9]	Water retention difference [10]	Reaction in 1:1 suspension of —[11]		
⅓ bar	Oven-dry		⅓ bar	15 bars			Calcium chloride	Potassium chloride	Water
g/cc	*g/cc*		*Percent*	*Percent*	*Ohms per cm at 60°F*	*Inches per inch*	*pH*	*pH*	*pH*
1.60	1.61	0.00	9.8	2.0		0.12	3.9	3.7	4.4
1.69	1.70	.00	10.4	2.3		.14	4.0	4.0	4.7
1.76	1.81	.01	13.5	6.7		.12	3.7	3.2	4.5
1.42	1.66	.05	29.2	19.9	28,000	.13	3.5	2.9	4.5
1.50	1.71	.04	26.6	19.4	28,000	.11	3.5	2.9	4.5
1.41	1.60	.04	29.0	17.2	23,000	.17	3.4	2.9	4.3
1.47	1.78	.07	29.6	22.4	15,000	.11	3.3	2.7	4.2
1.39	1.69	.07	30.0	21.7	10,000	.12	3.3	2.7	4.3
				24.0			3.3	2.6	4.2
				9.9			3.1	2.8	4.2
1.70	1.79	.02	16.0	8.5		.13	3.1	2.7	4.5
1.99	2.04	.01	9.1	3.8		.10	3.4	2.9	4.6
1.28	1.34	.02	25.6	5.7		.25	3.8	3.4	4.7
1.64	1.67	.001	16.5	6.5		.16	3.7	3.2	4.7
1.64	1.74	.02	18.8	10.6		.13	3.6	3.2	4.6
1.16	1.74	.14	43.2	23.5	11,000	.23	3.6	2.8	4.6
1.16	1.75	.15	42.6	27.7	8,000	.17	3.8	2.8	4.5
1.25	1.82	.13	39.4	27.2	8,000	.15	3.7	2.7	4.5
1.23	1.83	.14	38.4	25.9	7,000	.15	3.7	2.7	4.4
1.27	1.88	.14	37.4	25.2	5,000	.16	3.8	2.5	4.2
1.55	1.83	.06	22.0	16.9	5,000	.08	3.9	2.6	4.5
1.66	1.93	.05	20.2	15.5	6,000	.08	3.9	2.5	4.5
1.74	2.07	.06	19.0	14.9	5,000	.07	4.0	2.7	4.6
1.63	1.92	.06	19.1	10.8	4,000	.14	4.0	2.5	4.9

[7] Coefficient of linear extensibility (COLE) based on Investigations method 4D1.
[8] Based on Investigations methods 4B1c and 4B2a.
[9] Based on Investigations method 8E1.
[10] Based on Investigations method 4C1.
[11] Based on Investigations method 8C.

in properties of the two soils. The Creedmoor soil has substantial amounts of clay of dominantly kaolinitic type in the B horizon, is quite acid in all horizons, and contains few basic cations. These facts confirm its placement in the soil family shown in table 9. The White Store soil has a somewhat higher amount of clay in the B horizon, and the clay is dominated by montmorillonite which has properties that differ significantly from those of Creedmoor soil. The soil is acid in reaction, though in the lower horizons basic cations exceed acidic cations. These facts confirm placement of the White Store soil in the fine, mixed, thermic soil family.

Profile of Creedmoor sandy loam that has 4 percent slopes, 1.5 miles east of Cedar Fork Church at Nelson on State Highway 1973 and half mile northwest on farm road; 15 feet north of road in an area of loblolly pine that has an understory of maple, sweetgum, and sourwood. The moderately well drained, slowly permeable soil formed in material weathered from sandstone in the Piedmont upland. Sample number S69NC32-2.

O1—3 to 0 centimeters (1 to 0 inches), undecomposed pine and hardwood litter.
O2—1 to 0 centimeter (½ to 0 inches), black decomposed organic material.
A1—0 to 3 centimeters (0 to 1 inch), dark-gray loamy sand; weak, fine, granular structure; loose, nonsticky and nonplastic; many fibrous and fine woody roots; very strongly acid; abrupt, smooth boundary.
A21—3 to 13 centimeters (1 to 5 inches), light yellowish-brown (2.5Y 6/4) sandy loam; weak, fine and medium, granular structure; soft, very friable, nonsticky and nonplastic; many fine fibrous and woody roots; very strongly acid; clear, smooth boundary.
A22—13 to 24 centimeters (5 to 9 inches), light yellowish-brown (2.5Y 6/4) sandy loam; weak, medium, granular structure; soft, friable, nonsticky and nonplastic; few fine fibrous and woody roots; very strongly acid; clear, wavy boundary.
B1—24 to 43 centimeters (9 to 17 inches), yellow (2.5Y 7/6) sandy clay loam; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine fibrous and woody roots; very strongly acid; clear, wavy boundary.
B21t—43 to 76 centimeters (17 to 30 inches), pale-yellow (2.5Y 7/4) clay; common, medium, distinct, gray (5Y 6/1) mottles; moderate, coarse, prismatic structure parting to blocky; hard, firm, sticky and plastic; few fine woody roots; few, thin, discontinuous clay films on ped faces; very strongly acid; gradual, wavy boundary.
B22tg—76 to 101 centimeters (30 to 40 inches), light-gray (10YR 7/1) clay to silty clay; few, medium, faint, yellowish-brown (10YR 6/4) mottles and few, medium, prominent,

TABLE 12.—*Extractable bases*

[Analyses made at U.S. Department of Agriculture Soil Survey Laboratory,

Soil and sample number	Depth from surface	Extractable bases in milliequivalents per 100 grams [1]					Extractable aluminum [2]	Calcium magnesium ratio [3]
		Calcium	Magnesium	Sodium	Potassium	Sum		
	Cm						*Meq/100 gms*	
Creedmoor sandy loam:								
S69NC32-2	3–13	0.1	[4] T	T	T	0.1	1.0	----------
	13–24	.1	T	----------	T	.1	1.0	----------
	24–43	.1	T	----------	T	.1	2.1	----------
	43–76	.1	0.4	0.1	0.1	.7	10.6	----------
	76–101	.1	.3	.1	.2	.7	10.3	----------
	101–132	T	.2	.2	.2	.6	13.0	----------
	132–142	----------	.3	.4	.4	1.1	25.6	----------
	142–170	----------	.4	.4	.4	1.2	24.1	----------
	170–175	.1	.3	.4	.3	1.1	28.6	----------
	170–175	.1	.2	.2	.1	.6	13.1	----------
	175–200	.1	.1	.1	.1	.4	9.0	----------
	200–208	.2	.1	.1	.1	.5	3.9	----------
White Store loam:								
S69NC32-1	0–10	1.8	.9	T	.2	2.9	2.1	----------
	10–16	1.4	1.0	T	.1	2.5	2.9	1.4
	16–33	1.5	1.7	T	.2	3.4	7.5	.9
	33–50	3.5	5.2	.3	.4	9.4	19.1	.7
	50–68	5.2	7.8	.6	.6	14.2	24.3	.7
	68–79	6.4	8.8	.8	.7	16.7	25.2	.7
	79–98	7.6	9.6	.9	.7	18.8	23.1	.8
	98–113	9.0	10.7	1.0	.7	21.4	19.6	.8
	113–122	7.6	8.7	.8	.5	17.6	12.8	.9
	122–138	9.7	10.1	1.0	.4	21.2	11.8	1.0
	138–168	13.3	12.7	1.2	.4	27.6	8.3	1.0
	168–183	13.5	12.0	1.3	.3	27.1	3.1	1.1

[1] Based on Investigations methods 5B1c and 6N2e, 6O2d, 6P2b, and 6Q2b.
[2] Based on Investigations method 6G13.
[3] Based on Investigations method 8D3.
[4] Based on Investigations method 6H2a.

yellowish-red (5YR 5/6) mottles; moderate, medium, prismatic structure; very hard, very firm, very sticky and very plastic; few discontinuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

B23tg—101 to 132 centimeters (40 to 50 inches), light-gray (10YR 7/1) silty clay; common, medium, distinct, strong-brown (7.5YR 5/8) mottles; moderate, medium, prismatic structure and some moderate, medium platiness in lower part; very hard, very firm, very sticky and very plastic; medium discontinuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

B31tg—132 to 142 centimeters (52 to 56 inches), light-gray (10YR 7/1) clay; few, fine and medium, prominent, dark-red (2.5YR 3/6) mottles and few, fine, prominent, yellowish-red (5YR 5/8) mottles; moderate, medium, subangular and blocky structure; very hard, very firm, very sticky and very plastic; very strongly acid; abrupt, smooth boundary.

B32tg—142 to 170 centimeters (56 to 67 inches), light-gray (5YR 7/1) clay; few, fine and medium, distinct, reddish-yellow (7.5YR 6/8) and reddish-brown (5YR 4/3) mottles; weak, medium, prismatic structure; very hard, very firm, very sticky and very plastic; very strongly acid; abrupt, smooth boundary.

IIC1—170 to 175 centimeters (67 to 69 inches), white (2.5Y 8/2) clay loam; common, fine and medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; hard, firm, slightly plastic; very strongly acid; abrupt, smooth boundary.

IIC2—175 to 200 centimeters (69 to 79 inches), white (5Y 8/1) sandy loam, light yellowish-brown (10YR 6/4) loamy sand in lower part; massive in place (material is soft sandstone); very hard, very firm, nonsticky and nonplastic; very strongly acid; abrupt, smooth boundary.

IIIC3—200 to 207 centimeters (79 to 82 inches), dark reddish-brown (5YR 3/3) sandy loam or sandy clay loam; massive; hard, firm, nonsticky and nonplastic; very strongly acid.

Profile of White Store loam that has 4 percent slopes, 1 mile north of Nelson on State Road 1959, 50 feet west of road at intersection with State Road 1969 in an area of loblolly pine in a pine forest. The moderately well drained, slowly permeable soil formed in material weathered from Triassic siltstone in the Piedmont upland. Sample number S69-NC32-1.

O1—¼ inch, partly decayed pine needle litter.

O2—¼ inch, black (10YR 2/1), partly decomposed organic matter.

A1—0 to 10 centimeters (0 to 4 inches), dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; friable, nonsticky and nonplastic; many fibrous and few medium woody roots; medium acid; abrupt, smooth boundary.

A2—10 to 16 centimeters (4 to 6 inches), light yellowish-brown (10YR 6/4) loam; weak, fine, granular structure; friable; few medium woody roots; strongly acid; clear, smooth boundary.

and related chemical analyses

Beltsville, Maryland, according to methods of Soil Survey Investigations Report (*5*)]

Extractable acidity [4]	Cation exchange capacity (CEC) [5]		Fine clay less than 0.0002 mm [6]	Ratios to clay				Base saturation [7]	
	Sum of cations	Ammonium acetate		Fine clay	CEC sum	Extractable iron	15-bar water	Sum of cations	Ammonium acetate
Meq/100 gms	*Meq/100 gms*	*Meq/100 gms*	*Percent*					*Percent*	*Percent*
2.7	2.8	1.8	1.6	0.34	0.60	0.83	0.43	4	6
2.3	2.4	1.6	1.7	.27	.39	.29	.37	4	6
4.2	4.3	3.6	5.4	.35	.28	.31	.43	2	3
12.6	13.3	13.7	20.9	.46	.29	.34	.44	5	5
15.5	16.2	15.0	20.7	.48	.38	.32	.45	4	5
17.1	17.7	17.1	18.4	.52	.50	.26	.48	3	4
32.3	33.4	31.7	21.0	.36	.57	.32	.38	3	3
28.2	29.4	30.5	17.8	.37	.62	.40	.46	4	4
36.0	37.1	35.4	12.2	.27	.81	1.37	.52	3	3
14.6	15.2	15.0	4.4	.38	1.30	2.57	.85	4	4
11.3	11.7	10.6	6.2	.41	.78	.05	.57	3	4
5.7	6.2	5.9	2.0	.43	1.32	.26	.81	8	8
9.0	11.9	8.8	5.1	.45	1.05	.61	.50	24	33
8.2	10.7	8.4	7.8	.47	.64	.52	.39	23	30
14.1	17.5	14.8	13.2	.48	.64	.46	.39	19	23
31.1	40.5	35.0	35.7	.59	.67	.46	.39	23	27
32.8	47.0	45.4	42.2	.61	.68	.39	.40	30	31
35.7	52.4	47.3	39.8	.59	.78	.36	.40	32	35
29.6	48.4	47.0	36.6	.57	.75	.34	.40	39	40
31.1	52.5	47.8	15.5	.25	.86	.30	.41	41	45
22.5	40.1	35.8	9.9	.31	1.27	.40	.54	44	49
20.4	41.6	38.4	8.4	.38	1.86	.85	.70	51	55
14.1	41.7	40.6	2.7	.31	2.06	.92	.74	66	68
8.8	35.9	34.2	----------	----------	3.82	1.13	1.15	75	79

[5] Based on Investigations methods 5A3a and 5A6a.
[6] Based on Investigations method 3A1b.
[7] Based on Investigations methods 5C3 and 5C1.
[8] T means trace.

B1—16 to 33 centimeters (6 to 13 inches), yellowish-brown (10YR 5/8) clay loam; common, medium, faint, light yellowish-brown (10YR 6/4) mottles; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium woody roots; very strongly acid; clear, wavy boundary.

B21t—33 to 50 centimeters (13 to 30 inches), yellowish-red (5YR 5/8) clay; common, medium, prominent, light yellowish-brown (10YR 6/4) mottles; moderate, medium, blocky structure; very hard, firm, sticky and very plastic; thin clay films on ped faces; few medium woody roots; very strongly acid; gradual, smooth boundary.

B22t—50 to 68 centimeters (20 to 27 inches), yellowish-red (5YR 5/6) clay; common, medium, prominent, pale-brown (10YR 6/3) mottles; moderate, medium, blocky structure that is massive in place when wet; very hard, very firm, very sticky and very plastic; thin discontinuous clay films on ped faces; few medium woody roots; very strongly acid; clear, smooth boundary.

B23t—68 to 79 centimeters (27 to 31 inches), yellowish-red (5YR 5/6) clay; many, medium, prominent, pale-brown (10YR 6/3) mottles; moderate, medium and coarse, blocky structure that is massive in place when wet; very hard, very firm, very sticky and very plastic; thin discontinuous clay films on ped faces; few woody roots; very strongly acid; clear, wavy boundary.

B24t—79 to 98 centimeters (31 to 39 inches), strong-brown (7.5YR 5/6) clay; many, medium, prominent, light brownish-gray (2.5Y 6/2) mottles; weak, medium, blocky structure; very hard, very firm, very sticky and very plastic; few, thin, discontinuous clay films; few medium woody roots; very strongly acid; clear, wavy boundary.

B25t—98 to 113 centimeters (39 to 45 inches), yellowish-brown (10YR 5/6) clay; common, medium, distinct, strong-brown (7.5YR 5/6) mottles and many, medium, prominent, light brownish-gray (2.5Y 6/2) mottles; weak to moderate, fine, subangular blocky structure; very hard, very firm, very sticky and very plastic; very few woody roots; very strongly acid; clear, wavy boundary.

B26tg—113 to 122 centimeters (45 to 48 inches), reddish-brown (5YR 4/3) silty clay loam and few pockets of clay; many, fine, distinct pale-red (2.5YR 6/2) mottles; weak to moderate, fine, subangular blocky structure; hard, friable, sticky and plastic; very few woody roots; few small rock fragments; very strongly acid; clear, wavy boundary.

B31t—122 to 138 centimeters (48 to 54 inches), dark reddish-brown (5YR 3/3) silty clay loam; common, medium, distinct, gray (N 6/0) mottles and many, fine distinct, pale-red (2.5YR 6/2) mottles; gross, prismatic structure consisting of weak, medium, blocky structure; hard, firm, sticky, and slightly plastic; few fine fibrous or woody roots; very strongly acid; gradual, smooth boundary.

B32t—138 to 168 centimeters (54 to 66 inches), dark reddish-brown (5YR 3/3) silty clay loam; few, medium, faint, light-gray (5YR 7/1) mottles; weak, medium, blocky structure; hard, firm, sticky and slightly plastic; few

TABLE 13.—*Analyses of clay and sand fraction in selected soils* [1]

[Analyses made at U.S. Department of Agriculture Soil Survey Laboratory, Beltsville, Maryland, according to methods of Soil Survey Investigations Report (5). The symbol < means less than]

Soil and sample number	Depth from surface	Clay fraction [2]		Sand fraction [3]	
		Relative amounts of minerals determined by X-ray analysis [4]	Amount of major mineral [5]	Petrographic analysis of sand grains 0.20 to 0.02 millimeters in diameter	Total weatherable minerals
	Cm		*Percent*	*Percent*	*Number*
Creedmoor sandy loam: S69NC32-2	3–13			QZ96, FE<1, ZR<1, SP<1, PO<1, FD3, MS<1	3
	13–24	KK4, VR3, VM2, MI2	KK25		
	24–43				
	43–76	KK4, MV3, VM2, MI1	KK50	QZ92, KH4, FE1, ZR<1, FD2, ST<1	2
	76–101				
	101–132	MT5, MI3, KK3	KK40	QZ89, KH3, FE2, ZR<1, FD4, MS1, AU<1	5
	132–142				
	142–170	KK4, MT4, MI2, QZ1	KK40	QZ94, FE1, FD3, MS1, VR1	5
	142–170	MT4, MI4, KK3	KK35		
	170–175				
	175–200	KK4, MT3, MI2	KK40		
	200–208			QZ89, FE1, ZR<1, FD6, VR3, MS1	10
White Store loam: S69NC32-1	0–10	VR5, MT2, MI2, KK2, MV2, QZ1	KK15	QZ81, FE1, TM<1, ZR<1, SP<1, PO<1, FD16, VR<1, AU<1, EN<1, HN<1, MS<1	16
	10–16				
	16–33				
	33–50	MT5, MI2, KK2	KK25	QZ77, FE1, TM1, SP<1, ZR<1, PO<1, FD19, MS<1, EN<1, ST<1, VR<1	19
	50–68	MT4, MV2, MI2, KK2	KK25		
	68–79				
	79–98	MT4, MV2, MI2, KK2	KK25	QZ71, FE2, ZR<1, TM<1, SP<1, FD24, VR1, MS1, EN<1, HN<1	26
	98–113				
	113–122				
	122–138	MT5, MI2, KK2	KK20	QZ17, SP2, FE1, VR44, FD25, SE5, MS5, EP1	80
	138–168				
	168–183	MT5, MI2, KK1, QZ1	KK5	QZ15, SP4, FE<1, TM<1, ZR<1, VR36, FD33, MS7, SE3, EP1	80

[1] Mineral code: AU = augite, EN = enstatite, EP = epidote, FD = feldspar, FE = iron oxides, HN = hornblende, KH = halloysite, KK = kaolinite, MI = mica, MS = muscovite, MT = montmorillonite, MV = montmorillonite-vermiculite, PO = plant opal, QZ = quartz, SE = sepiolite, SP = sphene, ST = staurolite, TM = tourmaline, VM = vermiculite-mica, VR = vermiculite, ZR = zircon.
[2] Instrumental analysis by organic-matter removal (Investigations method 7A1b, d) and particle-size fractionation.
[3] Instrumental analysis by carbonate removal, organic-matter removal, iron removal, and particle-size fractionation.
[4] 5 = dominant, 4 = abundant, 3 = moderate, 2 = small, and 1 = trace.
[5] Determined by differential thermal analysis.

fibrous or woody roots; very strongly acid; gradual, smooth boundary.

C—168 to 183 centimeters (66 to 72 inches), reddish-brown (5YR 4/3) silt loam; many, fine, distinct light-gray (5YR 7/1) mottles; massive in place parting to irregular, medium and coarse, blocky; hard, firm, nonsticky and nonplastic; few fine roots; strongly acid.

General Nature of the County

The first European settlers to arrive in what was then Orange County, Carolina colony, were of English and Scotch-Irish descent. The first important village in the area was Durhamville, named for Dr. Barlett Durham and later changed to Durham. In 1871 the name Durham was given to the county that was formed from parts of Orange and Wake Counties. The city of Durham was the county seat.

The earliest settlers grew cotton, corn, wheat, oats, and tobacco on the uplands and used the lowlands for raising cattle and hogs. With the introduction of a fine yellow tobacco leaf, the sandy soils of the county produced an excellent smoking tobacco for cigarettes. The city of Durham rapidly became an important tobacco center after the manufacture of cigarettes began in 1881. Tobacco then became the leading cash crop of the county.

A steady decline in farming has occurred during the last 10 years; however, the total value of farm products, such as tobacco, corn, small grain, poultry, cattle, and hogs, has increased steadily.

Many research organizations are located in the 5,000-acre Research Triangle in the southern part of the county, where many kinds of research for textile chemistry, environmental health, and computer component units are performed.

Nonagricultural industries of Durham are in manufacturing, research, and education. Manufacturing firms produce tobacco products, textiles, lumber, fabricated products, machinery, clay and stone products, and processed foods.

TABLE 14.—*Temperature and precipitation*

[All data recorded at Durham, or estimated as indicated]

Month	Temperature					Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have at least four days with—		Soil temperature 4 inch depth, bare, level ground (estimated)	Average monthly total	1 year in 10 will have		Days with snow cover 1 inch or more	Average depth of snow on days with snow cover
			Maximums equal to or higher than—	Minimums equal to or lower than—			Less than—	More than—		
	°F	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	53	31	69	13	40	3.3	1.5	5.8	3	2
February	55	31	72	18	42	3.4	1.2	5.5	2	2
March	63	37	76	23	48	3.6	1.6	5.6	2	3
April	73	46	86	32	59	3.4	1.6	5.4	(1)	(1)
May	81	55	91	42	67	3.2	.8	4.8	0	
June	88	64	97	53	76	3.7	1.8	6.0	0	
July	89	67	98	60	79	5.4	2.5	7.5	0	
August	88	66	97	58	79	4.7	1.7	7.8	0	
September	83	60	92	45	73	3.4	.7	7.6	0	
October	74	48	86	32	63	2.7	.6	5.4	0	
November	62	37	77	24	52	2.9	.5	6.3	(1)	(1)
December	53	31	67	13	43	3.0	1.2	4.9	1	1
Year	72	48	[2] 99	[3] 10	60	42.7	27.8	51.3	8	2

[1] Less than one-half.
[2] Average annual highest temperature.
[3] Average annual lowest temperature.

The county is served by four railroads. Interstate Highway 85 and United States Highways 70, 15, and 501 traverse the county. A good county road system provides access to schools and local markets.

A major commercial airport is located midway between Raleigh and Durham.

Information about physiography, relief, and drainage, the water supply, and the climate of Durham County follows.

Physiography, Relief, and Drainage

About two-thirds of Durham County lies in a basin or lowland that is underlain by Triassic rocks of the Newark Group. This basin is characterized by mature, U-shaped valleys and fairly wide flood plains. Distinct escarpments of resistant metavolcanic rocks border this basin on the northwest and southeast. An undulating surface dissected by many drainageways has formed on these resistant metavolcanic rocks. There are some Granodiorite intrusions in these volcanic rocks. The Triassic rocks and some areas of volcanic rocks have intrusions of diabasic materials.

Many young, V-shaped valleys that have short, steep sides formed near streams where differences in elevation range from 50 to 100 feet. The topography generally slopes in a southeasterly direction.

Elevation ranges from 450 to 600 feet above sea level in the northern section of the county and from 275 to 400 feet in the southern part. The highest elevation, 700 feet, is in the northwest part of the county, south of Mt. Lebanon Church. The lowest elevation, 234 feet, is south of the city of Durham near the intersection of Farrington and Stagecoach roads.

A thick layer of soil material and soft weathered rock overlies the bedrock throughout most of the county. In some places where roadbanks are deep, this soft weathered material is exposed to a depth of more than 15 feet.

The county is drained by the New Hope and Neuse River systems. The confluence of the Eno and Flat Rivers east of Fairntosh marks the beginning of the Neuse River. Major streams, including New Hope, Ellerbe, Morgan, Little, Burden Northeast, Third Fork, Sandy, Buffalo, Dial, Camp, Deep, and Panther Creeks and the Little River, are tributaries to the major rivers (*3*).

Natural surface drainage is generally medium to rapid. It is slow, however, on nearly level interstream divides and the flood plains.

Water Supply

Water for most of the industry, research facilities, educational institutions, and more than 75 percent of the people in Durham County comes from the surface water impounded in Lake Michie, located near Bahama. The rest of the water supply comes from wells.

Drilled wells, rather than dug wells, are the most dependable source of ground water. Wells drilled in the volcanic rocks yield nearly twice the amount of water per foot of uncased well as wells in the Triassic rocks. A yield of approximately 12 gallons per minute can be obtained from wells that penetrate the metavolcanic rocks to an average depth of 108 feet.

Ground water in Durham County is principally a calcium bicarbonate type suitable for most domestic, municipal, and industrial purposes (*3*).

TABLE 15.—*Probabilities of last freezing temperatures in spring and first in fall*

[From data recorded at Durham, modified for a rural environment]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	March 10	March 24	April 4	April 18	April 26
2 years in 10 later than	February 28	March 15	March 28	April 12	April 20
5 years in 10 later than	February 10	February 25	March 10	March 30	April 11
Fall:					
1 year in 10 earlier than	November 25	November 15	November 5	October 26	October 14
2 years in 10 earlier than	December 3	November 21	November 10	October 30	October 19
5 years in 10 earlier than	December 12	December 2	November 20	November 11	October 28

Climate[6]

Durham County is mostly rolling country, but the variation in elevation is not large. In the northern part of the county the higher ground is around 600 feet above mean sea level, and the lower streambeds are near 300 feet. The southern part of the county is lower. Some streambeds are at elevations of about 200 feet, and the higher elevations are about 500 feet. The Blue Ridge Mountains, about 100 miles to the northwest, form a northeast-southwest barrier at elevations of 3,000 to 5,000 feet; in the opposite direction the topography slopes gradually down to the Atlantic Ocean about 135 miles away. These features and the latitude and position are the principal factors influencing the climate. Data on temperature and precipitation are given in tables 14 and 15.

TEMPERATURE

The average length of the growing season is about 200 days. It lasts from the second week in April until the last week in October. Table 15 shows the probabilities of freezes of various intensities in spring and fall. The temperature falls below freezing at Durham on more than half the days in winter, but rarely remains that low for 24 hours. It drops to 0° F. less than once in 10 years. On the average, it rises about 100° perhaps once every 3 years. Temperatures of 90° are possible from late in March well into October and average about 50 occurrences in a summer.

PRECIPITATION

Much of the rain in the growing season comes from summer thunderstorms and varies widely from place to place and from one season to the next. Hail occasionally occurs during a thunderstorm, but in most cases only a small area is affected. A given locality can be without significant rain for 1 to 3 weeks. Irrigation is used in these areas to increase crop production. In winter rain results mainly from low-pressure storms moving through or near the area, and it is less variable than in summer. There are no distinct wet and dry seasons, however, and measurable rain falls on an average of 1 to 3 days per week.

Some snow falls in Durham County every winter, but total amounts vary from 1 inch to 1½ feet. The average total amount in winter is about 6 inches. Generally only a few inches accumulate at one time, and such accumulations generally melt within a few days. Once in several years, however, 8 or 10 inches fall at one time. About as often, snow covers the ground for a week or more. In 1960, the total amount of snow for February and March was 27 inches. Snow accumulated on the ground to a depth of 13 inches at Durham, and remained on the ground in varying amounts continuously from March 2 to March 18.

CLOUDINESS, STORMS, AND WINDINESS

On the average slightly more than half the sky is covered with clouds during daylight hours. The greatest amount of cloudiness occurs in winter and the least in autumn. The sun shines during about half of the daylight hours in winter and nearly two-thirds in other seasons. The average relative humidity is near 85 percent at sunrise, dropping off to around 50 percent by midafternoon.

Tropical storms from the Atlantic Ocean and Gulf of Mexico are greatly weakened if they move inland as far as Durham County. Highest winds most often result from summer thunderstorms. Such winds affect limited areas and are of short duration. A little hail occurs in the county every few years, but does not generally cause damage to more than 1 or 2 square miles of area. No destructive tornadoes have occurred in the county.

Surface wind directions are variable in all seasons. Winds from the southwest and northeast are dominant, and come from the two opposite directions with almost equal frequency. Northeasterlies are more prevalent late in summer and in autumn and southwesterlies at other seasons. Highest winds

[6] Prepared by A. V. HARDY, climatologist for North Carolina, National Oceanic and Atmospheric Administration, National Weather Service, U. S. Department of Commerce.

quite often come from the northwest quadrant. The average speed of the wind near the earth's surface is about 8 miles per hour.

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Glossary

Acidity, soil. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

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.

Cation exchange capacity. The sum total of exchangeable cations absorbed by a soil, expressed in milliequivalents per 100 grams of soil.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly shows as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to hardpan or to irregular aggregates upon repeated wetting and drying. It is a form of laterite.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is

alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sesquioxides. Oxides having trivalent cations, as iron or aluminum oxides.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. 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 on earthy parent material, as conditioned by relief over periods of time.

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 either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative 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."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Transpiration. The discharge of water vapor into the atmosphere from the leaves and stems of living plants.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. Other information is shown in tables as follows:

Acreage and extent, table 1, page 6.
Predicted yields, table 2, page 35.
Recreation, table 5, page 44.
Engineering, tables 6, 7, and 8, pages 48 to 61.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group
			Symbol	Page	Number
AlA	Altavista silt loam, 0 to 2 percent slopes	7	IIw-2	31	2w8
AlB	Altavista silt loam, 2 to 6 percent slopes	7	IIe-1	30	2w8
ApB	Appling sandy loam, 2 to 6 percent slopes	7	IIe-1	30	3o7
ApC	Appling sandy loam, 6 to 10 percent slopes	7	IIIe-1	32	3o7
Cc	Cartecay and Chewacla soils	8	IIIw-1	33	2w8
CfB	Cecil fine sandy loam, 2 to 6 percent slopes	9	IIe-1	30	3o7
CfC	Cecil fine sandy loam, 6 to 10 percent slopes	9	IIIe-1	32	3o7
CfE	Cecil fine sandy loam, 10 to 25 percent slopes	9	VIe-1	34	3r8
Ch	Chewacla and Wehadkee soils	9	IVw-1	34	1w8
Cp	Congaree silt loam	11	IIw-1	31	1o7
CrB	Creedmoor sandy loam, 2 to 6 percent slopes	12	IIe-3	30	3w8
CrC	Creedmoor sandy loam, 6 to 10 percent slopes	12	IIIe-3	33	3w8
DaB	Davidson clay loam, 2 to 6 percent slopes	13	IIe-2	30	3o7
DaC	Davidson clay loam, 6 to 10 percent slopes	14	IIIe-2	32	3o7
GeB	Georgeville silt loam, 2 to 6 percent slopes	14	IIe-2	30	3o7
GeC	Georgeville silt loam, 6 to 10 percent slopes	14	IIIe-2	32	3o7
GeD	Georgeville silt loam, 10 to 15 percent slopes	14	IVe-2	33	3o7
GlE	Goldston slaty silt loam, 10 to 25 percent slopes	15	VIIe-1	34	4r2
GlF	Goldston slaty silt loam, 25 to 45 percent slopes	15	VIIe-1	34	4r2
GrB	Granville sandy loam, 2 to 6 percent slopes	16	IIe-1	30	3o7
GrC	Granville sandy loam, 6 to 10 percent slopes	16	IIIe-1	32	3o7
Gu	Gullied land, clayey materials	16	VIIe-3	34	---
HeB	Helena sandy loam, 2 to 6 percent slopes	17	IIe-3	30	3w8
HeC	Helena sandy loam, 6 to 10 percent slopes	17	IIIe-3	33	3w8
HrB	Herndon silt loam, 2 to 6 percent slopes	18	IIe-2	30	3o7
HrC	Herndon silt loam, 6 to 10 percent slopes	18	IIIe-2	32	3o7
HsC	Herndon stony silt loam, 2 to 10 percent slopes	18	IVe-2	33	3x8
IrB	Iredell loam, 2 to 6 percent slopes	18	IIe-3	30	4c2
IrC	Iredell loam, 6 to 10 percent slopes	19	IIIe-3	33	4c2
IuB	Iredell-Urban land complex, 0 to 6 percent slopes	19	--------	--	---
IuC	Iredell-Urban land complex, 6 to 10 percent slopes	19	--------	--	---
LgB	Lignum silt loam, 2 to 6 percent slopes	20	IIe-3	30	3w8
MfB	Mayodan sandy loam, 2 to 6 percent slopes	20	IIe-1	30	3o7
MfC	Mayodan sandy loam, 6 to 10 percent slopes	20	IIIe-1	32	3o7
MfD	Mayodan sandy loam, 10 to 15 percent slopes	21	IVe-1	33	3o7
MfE	Mayodan sandy loam, 15 to 25 percent slopes	21	VIe-1	34	3r8
MrC	Mayodan-Urban land complex, 0 to 10 percent slopes	21	--------	--	---
MrD	Mayodan-Urban land complex, 10 to 15 percent slopes	21	--------	--	---
MuB	Mecklenburg loam, 2 to 6 percent slopes	21	IIe-3	30	4o1
MuC	Mecklenburg loam, 6 to 10 percent slopes	22	IIIe-3	33	4o1
NaD	Nason silt loam, 10 to 15 percent slopes	22	IVe-2	33	3o7
NaE	Nason silt loam, 15 to 25 percent slopes	22	VIe-1	34	3r8
NoD	Nason stony silt loam, 10 to 15 percent slopes	23	VIe-1	34	3x8
PfC	Pinkston fine sandy loam, 2 to 10 percent slopes	23	IVe-3	34	4o1
PfE	Pinkston fine sandy loam, 10 to 25 percent slopes	23	VIIe-1	34	4r2
Ro	Roanoke silt loam	24	IVw-1	34	2w9

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group
			Symbol	Page	Number
TaE	Tatum gravelly silt loam, 15 to 25 percent slopes--	24	VIe-1	34	4r2
Ur	Urban land----------	25	--------	--	---
Wh	Wahee loam, alkaline subsoil variant----------	25	IIIw-2	33	2w8
WmD	Wedowee sandy loam, 10 to 15 percent slopes--------	26	IVe-1	33	3o7
WmE	Wedowee sandy loam, 15 to 25 percent slopes--------	26	VIe-1	34	3r8
Wn	Wehadkee silt loam----------	26	IVw-1	34	1w9
WsB	White Store sandy loam, 2 to 6 percent slopes------	28	IIe-3	30	4c2
WsC	White Store sandy loam, 6 to 10 percent slopes-----	28	IIIe-3	33	4c2
WsE	White Store sandy loam, 10 to 25 percent slopes----	28	VIe-1	34	4c2
WvC2	White Store clay loam, 2 to 10 percent slopes, eroded----------	28	VIe-2	34	4c2
WvE2	White Store clay loam, 10 to 25 percent slopes, eroded----------	28	VIIe-2	34	4c2
WwC	White Store-Urban land complex, 0 to 10 percent slopes----------	28	--------	--	---
WwE	White Store-Urban land complex, 10 to 25 percent slopes----------	28	--------	--	---
WxE	Wilkes sandy loam, 10 to 25 percent slopes---------	29	VIe-1	34	4r2

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