United States Department of Agriculture

Soil Conservation Service

In cooperation with North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and the Martin County Board of Commissioners

Soil Survey of Martin County, North Carolina

How To Use This Soil Survey

General Soil Map

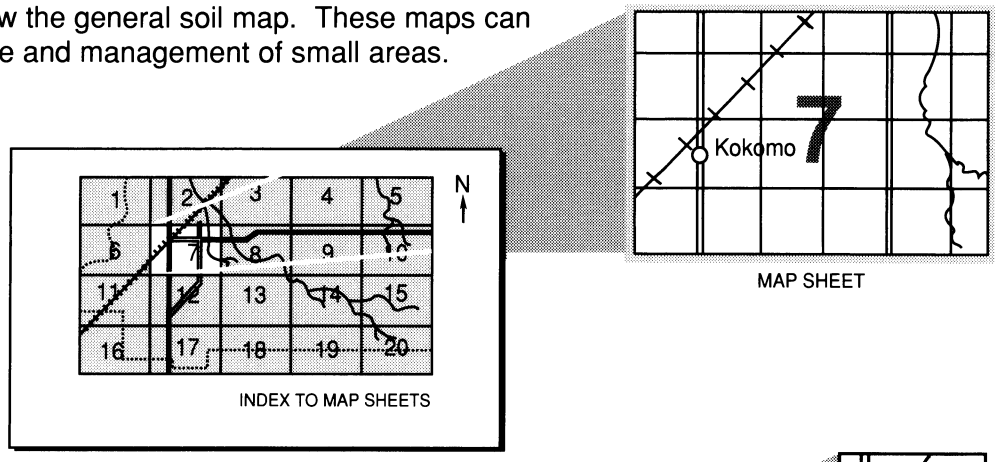
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

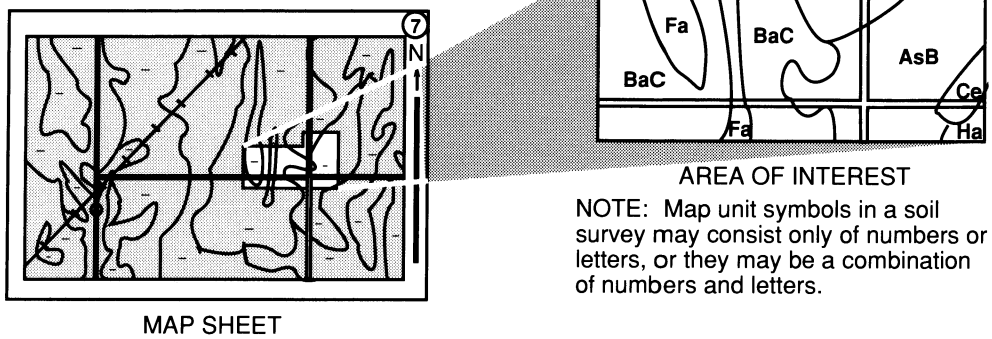
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This soil survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, the North Carolina Agricultural Research Service, the North Carolina Agricultural Extension Service, and the Martin County Board of Commissioners. It is part of the technical assistance furnished to the Martin County Soil and Water Conservation District.

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

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: This grassed waterway is on Norfolk loamy fine sand, 2 to 6 percent slopes.

Contents

Issued September 1989

Index to Map Units

Summary of Tables

Foreword

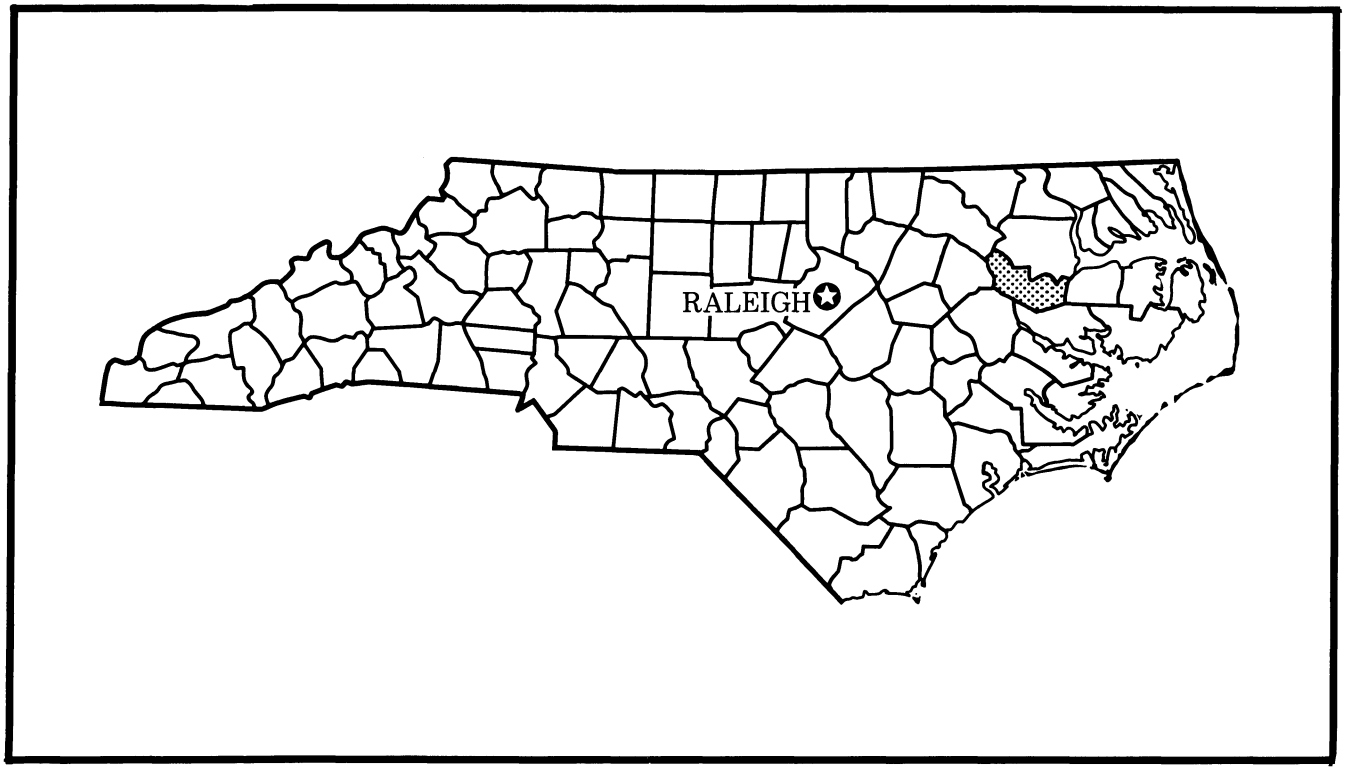
This soil survey contains information that can be used in land-planning programs in Martin County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

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

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

Bobbye Jack Jones
State Conservationist
Soil Conservation Service



Location of Martin County in North Carolina.

Soil Survey of Martin County, North Carolina

By Robert M. Kirby, Soil Conservation Service, and Karl A. Shaffer, North Carolina Department of Natural Resources and Community Development

Fieldwork by Robert M. Kirby, Everette Coats, and Eugene Mellette, Soil Conservation Service; Karl A. Shaffer, North Carolina Department of Natural Resources and Community Development; and Fred D. Smith, Martin County

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Martin County Board of Commissioners

MARTIN COUNTY is in northeastern North Carolina, about 90 miles east of Raleigh, the State Capital. It is bounded on the north by the Roanoke River, which separates Martin County from Bertie County; on the east by Washington County; on the south by Beaufort and Pitt Counties; and on the west by Edgecombe and Halifax Counties. The area of Martin County is about 468 square miles, or 299,686 acres.

General Nature of the Survey Area

This section gives general information concerning the history and economic development; physiography, relief, and drainage; and climate of Martin County.

History and Economic Development

Martin County was organized in 1774 from parts of Halifax and Tyrrell Counties. Williamston, in an area along the Roanoke River near the center of the county, is the county seat and the largest city. The early settlers were mainly English, Scotch, and Scotch-Irish immigrants. Many blacks had also been transported into the area.

According to the 1980 U.S. Census, the population of Martin County was 25,948. Williamston, Robersonville, Oak City, and Jamesville are the major trading and educational centers. Federal and state roads cross the county from north to south and to the west, connecting the county with Norfolk, Virginia; Raleigh, the state capital; and points south. U.S. Highway 64 connects the county with the coast. The Seaboard Coast Line Railroad operates two tracks, one running north-south and the other east-west. The Roanoke River provides other means of transportation through Albemarle Sound.

Farming is a major industry. Peanuts, cotton, tobacco, corn, and soybeans are important crops. Lumber and timber products and clothing manufacturing are major industrial enterprises in the county. Hunting, fishing, and boating contribute to the county's recreation-related enterprises.

Physiography, Relief, and Drainage

Martin County lies within the Southern Coastal Plain physiographic region. Elevations range from about 5 feet in the northeast to about 90 feet at the county line northwest of Oak City. The overall physiography ranges from level to gently sloping with strongly sloping to steep bluffs along parts of the Roanoke River.

Water is plentiful throughout the county. Municipal

water supplies for the major towns are drawn from deep wells. Well water is available at depths ranging from 10 to 60 feet, and, in parts of the county, artesian water is drawn from depths of 90 to 150 feet.

The county is drained mainly by the Roanoke River through its tributaries, Conoho, Sweetwater, and Gardners Creeks, and Ready and Dog Branches. The southern part of the county is drained by Tranters Creek through Collie and Turkey Swamps.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Williamston, North Carolina, in the period 1953 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44 degrees F, and the average daily minimum temperature is 33 degrees. The lowest temperature on record, which occurred at Williamston on January 13, 1981, is 6 degrees. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred on June 27, 1954, is 101 degrees.

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

Of the total annual precipitation, 28 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 7.40 inches at Williamston on October 1, 1971. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 7 inches. The greatest snow depth at any one time during the period of record was 17 inches. On the average, 2 days each year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 60 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

Every few years a hurricane crosses the area.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and

other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

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

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

Each map unit description discusses the suitability of the unit for *cultivated crops, woodland, urban uses,* and *recreation areas*. Cultivated crops are those grown extensively in the survey area. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments. Recreation areas are campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

1. Goldsboro-Lynchburg-Norfolk

Nearly level to gently sloping, somewhat poorly drained to well drained soils that have a sandy or loamy surface layer and a loamy subsoil; on uplands

This map unit is in the western and central parts of the county and on the uplands adjoining the Roanoke River flood plain. The landscape is broad ridges and short side slopes that are adjacent to terraces and flood plains. Slopes range from 0 to 6 percent.

This map unit makes up about 48 percent of the county. It is about 19 percent Goldsboro soils, 18 percent Lynchburg soils, 15 percent Norfolk soils, and 48 percent soils of minor extent. The minor soils include Bonneau, Pantego, Rains, Stallings, and Woodington soils.

Goldsboro soils are nearly level and are moderately well drained. The surface layer is dark grayish brown fine sandy loam, and the subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown, brownish yellow, and gray sandy clay loam with mottles in shades of brown, gray, yellow, and red.

Lynchburg soils are nearly level and are somewhat poorly drained. The surface layer is dark grayish brown fine sandy loam, and the subsurface layer is yellowish brown fine sandy loam with mottles in shades of brown. The subsoil is pale brown, light brownish gray, and light gray sandy clay loam with mottles in shades of gray and yellow.

Norfolk soils are nearly level to gently sloping and are well drained. The surface layer is light yellowish brown loamy fine sand. The upper part of the subsoil is yellowish brown sandy loam. The next layer is yellowish brown sandy clay loam underlain by a layer of yellowish brown clay loam with mottles in shades of red. The lower part of the subsoil is brownish yellow sandy clay loam with mottles in shades of red and gray.

The major soils are used mainly as cropland, pastureland, or woodland. Norfolk and Goldsboro soils are well suited to use as cropland, pasture, and woodland. Lynchburg soils are suited to cropland but can require artificial drainage for crops sensitive to wetness. Norfolk and Goldsboro soils are suited to most urban uses, although wetness is a limitation for Goldsboro soils. Norfolk soils are well suited to recreational uses, but Goldsboro soils have some limitations for recreational uses because of wetness. Lynchburg soils are poorly suited to urban or recreational uses. Wetness is the main limitation.

2. Craven-Lenoir

Nearly level to strongly sloping, moderately well drained and somewhat poorly drained soils that have a loamy surface layer and a clayey subsoil; on uplands

This map unit is in the eastern part of the county. The landscape is broad uplands and short side slopes that are above small streams. Slopes range from 0 to 12 percent.

This map unit makes up about 8 percent of the county. It is about 55 percent Craven soils, 28 percent Lenoir soils, and 17 percent soils of minor extent. The minor soils include Bibb, Bethera, Goldsboro, Lynchburg, and Winton soils.

Craven soils are nearly level to strongly sloping and are moderately well drained. The surface layer is dark grayish brown fine sandy loam. In eroded areas it is clay loam. The upper part of the subsoil is light yellowish brown clay loam. The next layer is brownish yellow clay and gray clay with mottles in shades of yellow, red, and brown. The lower part of the subsoil is gray clay loam with mottles in shades of brown and yellow. The underlying material is light gray clay loam with mottles in shades of yellow and red.

Lenoir soils are nearly level and are somewhat poorly drained. The surface layer is very dark gray loam. The upper part of the subsoil is yellowish brown clay loam with mottles in shades of gray, and the middle part is silty clay with mottles in shades of yellow and brown. The lower part of the subsoil is gray clay with mottles in shades of yellow and brown.

The major soils are used mainly as cropland or woodland. In a few areas they are used for pasture. Craven soils that are nearly level to gently sloping are suited to crops and pasture. Craven soils that are gently sloping to strongly sloping are poorly suited to these uses because of the severe hazard of erosion. If drained, Lenoir soils are suited to use as cropland. Craven soils are suited to most urban and recreational uses. Lenoir soils are poorly suited to most urban and recreational uses, mainly because of wetness and slow permeability.

3. Rains-Lynchburg

Nearly level, poorly drained and somewhat poorly drained soils that are loamy throughout; on uplands

This map unit is in the western and central parts of the county. The landscape is broad flats, and slopes are less than 2 percent.

This map unit makes up about 11 percent of the county. It is about 68 percent Rains soils, 24 percent Lynchburg soils, and 8 percent soils of minor extent. The minor soils include Bethera, Goldsboro, and Pantego soils.

Rains soils are poorly drained. The surface layer is very dark gray fine sandy loam. The subsurface layer is gray fine sandy loam. The upper part of the subsoil is grayish brown sandy clay loam with mottles in shades of brown and gray. The lower part is mottled gray, grayish brown, and yellowish brown sandy clay loam.

Lynchburg soils are somewhat poorly drained. The surface layer is dark grayish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam with mottles in shades of brown. The subsoil is pale brown, light brownish gray, and light gray sandy clay loam with mottles in shades of gray and yellow.

The major soils are used mainly as woodland or pasture, and a few areas are cropland. If Rains soils are drained, they are suited to crops and pasture. Lynchburg soils are suited to crops and pasture, but can require artificial drainage for crops sensitive to wetness. These soils are poorly suited to most urban and recreational uses mainly because of wetness.

4. Chastain-Bibb-Dorovan

Nearly level, poorly drained and very poorly drained soils that have a muck or loamy surface layer and a sandy or loamy subsoil or underlying material; on flood plains

This map unit is along the Roanoke River and other major streams in the county. The landscape is low-lying flood plains and swamps. Slopes are less than 2 percent.

This map unit makes up about 14 percent of the county. It is about 63 percent Chastain soils, 26 percent Bibb soils, 8 percent Dorovan soils, and 3 percent soils of minor extent. The minor soils include Altavista, Augusta, Roanoke, and Seabrook soils.

Chastain soils are poorly drained. The surface layer is grayish brown silt loam. The subsoil is grayish brown silty clay with mottles in shades of brown. The underlying material is grayish brown silty clay and light brownish gray clay loam with mottles in shades of brown and red.

Bibb soils are poorly drained. The surface layer is very dark grayish brown loam with mottles in shades of gray. The subsurface layer is gray loam with mottles in shades of gray and yellow. The underlying material is light gray sandy loam and gray loamy sand with mottles in shades of brown.

Dorovan soils are very poorly drained. Typically, they have very dark brown and black muck layers more than 51 inches thick underlain by gray sand.

The major soils are mostly used as woodland. They are poorly suited to crops, pasture, and urban and recreational uses mainly because of wetness and the

hazard of flooding. A few areas of Chastain and Bibb soils that are protected from flooding are used as pastureland or cropland.

5. Altavista-Wickham-Tarboro

Nearly level to gently sloping, moderately well drained to somewhat excessively drained soils that are loamy or sandy throughout; on terraces

This map unit is along the Roanoke River and its tributaries. The landscape is low ridges adjacent to flood plains. Slopes range from 0 to 6 percent.

This map unit makes up about 3 percent of the county. It is about 26 percent Altavista soils, 22 percent Wickham soils, 16 percent Tarboro Soils, and 36 percent soils of minor extent. The minor soils include Augusta, Conetoe, Roanoke, and Seabrook soils.

Altavista soils are nearly level and are moderately well drained. The surface layer is grayish brown fine sandy loam. The subsurface layer is pale brown fine sandy loam. The upper part of the subsoil is yellowish brown sandy clay loam with mottles in shades of brown and red. The middle part is brownish yellow sandy clay loam with mottles in shades of gray and brown. The lower part of the subsoil is strong brown sandy loam with mottles in shades of gray and brown. The underlying material is light gray sandy loam with mottles in shades of yellow.

Wickham soils are nearly level to gently sloping and are well drained. The surface layer is yellowish brown sandy loam. The subsurface layer is light yellowish brown sandy loam. The upper part of the subsoil is yellowish red sandy clay loam. The middle part is strong brown sandy clay loam with mottles in shades of brown. The lower part of the subsoil is reddish yellow sandy loam with mottles in shades of red and brown. The underlying material is pale brown and very pale brown loamy sand and sand with mottles in shades of yellow and red.

Tarboro soils are nearly level to gently sloping and are somewhat excessively drained. The surface layer is dark brown loamy sand. The underlying material is strong brown sand.

The major soils are used mainly as cropland. In a few areas they are used as pastureland or woodland. Altavista and Wickham soils are well suited to crops and pasture. Tarboro soils are suited to crops and pasture but low available water capacity and the hazard of soil blowing are limitations. The Altavista and Wickham soils are poorly suited to urban and recreational uses because of flooding. Tarboro soils are suited to urban and recreational uses, but rapid permeability can be a problem where these soils are used for septic tank absorption fields.

6. Rains-Bethera-Pantego

Nearly level, poorly drained and very poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; on uplands

This map unit is mostly in the southeastern part of the county. The landscape is large flats and broad depressions. Slopes are less than 2 percent.

This map unit makes up about 16 percent of the county. It is about 50 percent Rains soils, 40 percent Bethera soils, 5 percent Pantego soils, and 5 percent soils of minor extent. The minor soils include Craven, Goldsboro, and Lynchburg soils.

Rains soils are poorly drained. The surface layer is very dark gray fine sandy loam. The subsurface layer is gray fine sandy loam. The upper part of the subsoil is grayish brown sandy clay loam with mottles in shades of brown and gray. The lower part is mottled gray, grayish brown, and yellowish brown sandy clay loam.

Bethera soils are poorly drained. The surface layer is very dark gray loam. The subsoil is gray clay loam with mottles in shades of brown and yellow.

Pantego soils are very poorly drained. The surface layer is black loam. The subsoil is gray sandy clay loam and clay loam with mottles in shades of brown.

The major soils are used mainly as woodland or pastureland. A few drained areas are cropland. Wetness is the main limitation. If the major soils are drained, they are suited to crops and pasture. These soils are poorly suited to most urban and recreational uses mainly because of wetness and slow permeability.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Craven clay loam, 4 to 12 percent slopes, eroded, is one of several phases in the Craven series.

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

A *soil complex* consists of two or more components in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the components are somewhat similar in all areas. Norfolk-Urban land complex, 0 to 6 percent slopes, is an example.

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps.

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

AaA—Altavista fine sandy loam, 0 to 2 percent slopes, occasionally flooded. This soil is nearly level and moderately well drained. It is on smooth, low ridges and flats of stream terraces. The areas are long and narrow and range from 4 to 40 acres.

Typically, this soil has a grayish brown fine sandy loam surface layer about 8 inches thick. The subsurface layer to a depth of 12 inches is pale brown fine sandy loam. The subsoil extends to a depth of 42 inches. The upper part is yellowish brown sandy clay loam with mottles in shades of brown. The middle part is brownish yellow sandy clay loam with mottles in shades of brown and gray. The lower part is strong brown sandy loam with mottles in shades of gray. The underlying material to a depth of 62 inches is light gray sandy loam with mottles in shades of yellow.

Included with this soil in mapping are small areas of Augusta and Wickham soils. Augusta soils, at a lower elevation than Altavista soil, are somewhat poorly drained. Wickham soils, at a slightly higher elevation, are well drained. The included soils make up 10 to 20 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of about 1.5 to 2.5 feet during wet months. This soil is flooded occasionally for very brief periods. The soil is very strongly acid to medium acid except where lime has been added.

In most areas, this Altavista soil is used as cropland or pasture. Some areas are used as woodland.

The major crops are corn, soybeans, peanuts, tobacco, cotton, and small grains. Wetness and the hazard of flooding are the main limitations for cropland use and management. Conservation tillage and the use of field borders and crop rotations that include close-growing crops are commonly used in cropland management. Artificial drainage generally is required for tobacco. Where this soil is used for pasture, wetness and the hazard of flooding are the main limitations.

Forested areas of this soil are in mixed hardwoods or pines. Common trees include loblolly pine, shortleaf pine, sweetgum, yellow poplar, white oak, and red oak. Understory plants are dogwood, red maple, sassafras, and American holly. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness and the hazard of flooding are limitations for most urban and recreational uses.

This Altavista soil is in capability subclass IIw. The woodland ordination symbol is 9W.

Ag—Augusta loam, occasionally flooded. This soil is nearly level and somewhat poorly drained. It is on low ridges and flats on stream terraces. Slopes are less than 2 percent. The areas are long and narrow and range from 4 to 20 acres.

Typically, this soil has a dark brown loam surface layer about 5 inches thick. The subsoil extends to a depth of 49 inches. The upper part is brownish yellow sandy clay loam with mottles in shades of brown and gray. The middle part is mottled pale brown, light brownish gray, and strong brown sandy clay loam. The lower part of the subsoil is gray clay loam with mottles in shades of brown and yellow. The underlying material to a depth of 64 inches is gray sand with mottles in shades of brown.

Included with this soil in mapping are small areas of Altavista and Roanoke soils. Altavista soils, at a slightly higher elevation than Augusta soil, are moderately well drained. Roanoke soils, in depressions, have a clayey subsoil and are poorly drained. The included soils make up 10 to 20 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of about 1 to 2 feet during wet months. This soil is flooded occasionally for brief periods. The soil is very strongly acid to medium acid except where lime has been added.

About half of the acreage of this Augusta soil is used as cropland or pasture. The rest is used as woodland.

The major crops are corn and soybeans. Wetness and the hazard of flooding are the main limitations for cropland use and management. Drainage generally is required for crops sensitive to wetness. Conservation tillage and crop residue management help maintain tilth and production. The use of winter cover crops, field borders, and crop rotations that include close-growing crops is also beneficial in cropland management. Wetness and the hazard of flooding are the main limitations where this soil is used for pasture.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, longleaf pine, sweetgum, American sycamore, white oak, and southern red oak. Understory plants include American holly, flowering dogwood, common persimmon, red maple, and greenbrier. Seedlings have moderate potential for survival and growth if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness and the hazard of flooding are limitations for most urban and recreational uses.

This Augusta soil is in capability subclass IIIw. The woodland ordination symbol is 9W.

Ba—Bethera loam. This soil is nearly level and poorly drained. It is in broad, flat areas and shallow depressions on uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 10 to more than 200 acres.

Typically, this soil has a very dark gray loam surface layer 6 inches thick. The subsoil to a depth of 65 inches is gray clay loam with mottles in shades of brown and yellow.

Included with this soil in mapping are a few small areas of Lenoir and Rains soils. Lenoir soils, in a slightly higher position than Bethera soil, are somewhat poorly drained. Rains soils, in a slightly lower position, are poorly drained. The included soils make up 10 to 20 percent of the map unit.

Permeability is slow or moderately slow, and the available water capacity is moderate to high. The

shrink-swell potential is moderate. The seasonal high water table is at or within 1 foot of the surface. This soil is sometimes ponded. It is extremely acid to strongly acid except where lime has been added.

In most areas, this Bethera soil is used as woodland. In a few areas, it is used as pasture or cropland.

In drained areas, the major crops are corn and soybeans. This soil rarely is used for tobacco, cotton, or peanuts. Wetness is the main limitation. Conservation tillage and the use of cover crops and crop rotations that include grasses and legumes help maintain tilth and production. Tillage can be delayed in spring because of wetness. Lack of suitable outlets and slow permeability are limitations to the installation and function of drainage systems. Wetness is the main limitation where this soil is used for pasture.

Common trees are water oak, sweetgum, blackgum, and loblolly pine. Understory plants include sweetbay, blackberry, switchcane, and waxmyrtle. Wetness is the main limitation for woodland use and management. Seedlings have low survival rates or grow poorly unless the soil is drained and bedded. Competing vegetation should be controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are severe for planting and harvesting trees.

Wetness, ponding, and slow permeability are the main limitations for urban and recreational uses. Low strength is a limitation for local roads and streets.

This Bethera soil is in capability subclass VIw. The woodland ordination symbol is 10W.

Bb—Bibb loam, frequently flooded. This soil is nearly level and poorly drained. It is on flood plains. Slopes are less than 2 percent. The areas are long and narrow and range from 3 to 100 acres.

Typically, this soil has a very dark grayish brown loam surface layer with mottles in shades of gray. It is about 10 inches thick. The subsurface layer extends to a depth of 16 inches and is gray loam with mottles in shades of gray and yellow. The upper part of the underlying material is light gray sandy loam with mottles in shades of brown and yellow. The lower part to a depth of 61 inches is gray loamy sand.

Included with this soil in mapping are a few small areas of soils that have a muck surface layer that is as much as 20 inches thick. Also included are soils with a sandy surface and subsurface layer. The included soils make up about 20 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 0.5 to 1.5 feet during wet months. This soil is flooded frequently for brief periods. It is very strongly acid or strongly acid except where lime has been added.

In most areas, this Bibb soil is used as woodland.

This Bibb soil generally is not used for crop production. Wetness and the hazard of flooding are the main limitations. Lack of suitable outlets limits the installation of drainage systems. Pasture grasses, such as fescue and ladino clover, can be grown where drainage is feasible.

Common trees are sweetgum, cottonwood, American sycamore, yellow poplar, green ash, water tupelo, and water oak. Wetness and the hazard of flooding are the main limitations for woodland use and management. Using special equipment and logging during the drier months can overcome harvesting difficulty. Seedlings have a low survival rate or grow poorly unless the soil is bedded and, where feasible, drained. Competing vegetation should be controlled or removed by site preparation, spraying, cutting, or girdling.

Wetness and the hazard of flooding are the main limitations for urban and recreational uses.

This Bibb soil is in capability subclass Vw. The woodland ordination symbol is 9W.

BoB—Bonneau loamy sand, 0 to 6 percent slopes. This soil is gently sloping and well drained. It is on broad, smooth to slightly convex slopes on uplands. The areas generally are oval and range from 10 to 75 acres.

Typically, this soil has a grayish brown loamy sand surface layer 10 inches thick. The subsurface layer to a depth of about 26 inches is light yellowish brown loamy sand. The subsoil extends to a depth of about 75 inches. The upper part is brownish yellow and light yellowish brown sandy loam. The middle part is brownish yellow and yellowish brown sandy clay loam with mottles in shades of red and brown. The lower part of the subsoil is brownish yellow sandy clay and sandy clay loam with mottles in shades of red, gray, and white.

Included with this soil in mapping are a few areas of Goldsboro and Norfolk soils. Goldsboro soils, in lower areas, are moderately well drained. Norfolk soils, in positions similar to those of the Bonneau soil, are well drained. In some places is a soil that is sandy throughout. The included soils make up about 10 percent of the map unit.

Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low to moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of

3.5 to 5 feet during the wet months. This soil is strongly acid or very strongly acid except where lime has been added.

In most areas, this Bonneau soil is used as cropland. In a few areas, it is used as pasture or woodland.

Major crops are corn, soybeans, peanuts, tobacco, and small grains. This soil is subject to droughtiness and soil blowing. Blowing sand can damage young plants. Conservation tillage, crop residue management, and the use of winter cover crops and windbreaks help maintain tilth and conserve moisture. Fertilizers, particularly nitrogen, should be added in split applications. Pasture grasses, such as coastal bermudagrass and bahiagrass, are also grown on this soil.

Needle-leaf trees, especially loblolly pine, are dominant on this soil. Survival of seedlings is limited because of droughtiness. Once established, however, they grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of the thick sandy surface layer, equipment use limitations are moderate for planting and harvesting trees.

This soil has few limitations for most urban uses. The sandy surface layer is a moderate limitation for recreational uses.

This Bonneau soil is in capability subclass IIs. The woodland ordination symbol is 7S.

BoC—Bonneau loamy sand, 6 to 12 percent slopes. This soil is sloping and well drained. It is on narrow side slopes on uplands. The areas are long and narrow or irregular in shape, generally following the contour of the side slope. They range from 10 to 75 acres.

Typically, this soil has a very dark gray loamy sand surface layer 5 inches thick. The subsurface layer to a depth of 28 inches is very pale brown loamy sand. The subsoil extends to a depth of 62 inches. The upper part is yellowish brown and brownish yellow sandy clay loam with mottles in shades of red and brown. The lower part is mottled yellow, brown, and gray sandy loam.

Included with this soil in mapping are small areas of Winton soils in positions similar to those of the Bonneau soil. The included soils make up about 15 percent of the map unit.

Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The available water capacity is low to moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 3.5 to 5 feet during the wet months. This soil is strongly acid or very strongly acid except where lime has been added.

In most areas, this Bonneau soil is used as woodland. In some small areas, it is used as pasture or cropland.

This soil is cultivated in some areas, especially those adjacent to less sloping soils. Corn, soybeans, peanuts, tobacco, and small grains are common crops. Steepness of slope is a limitation, and this soil is subject to droughtiness and soil blowing. Blowing sand can damage young plants. Conservation tillage, crop residue management, and the use of winter cover crops help maintain tilth and conserve moisture. Fertilizers, particularly nitrogen, should be added in split applications. Coastal bermudagrass and bahiagrass are typical pasture grasses where this soil is used for pasture.

Common trees are loblolly pine, longleaf pine, red maple, hickory, sweetgum, black tupelo, black cherry, American beech, southern red oak, white oak, and post oak. The understory plants are mainly dogwood, sassafras, American holly, sourwood, and southern waxmyrtle. The available water capacity is the main limitation in woodland use and management. Survival of seedlings is limited because of droughtiness. Once established, however, they grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of the thick sandy surface layer, equipment use limitations are moderate for planting and harvesting trees.

This soil has few limitations for most urban uses. The thick sandy surface layer and steepness of slope are moderate limitations for recreational uses.

This Bonneau soil is in capability subclass IIIs. The woodland ordination symbol is 7S.

Ch—Chastain silt loam, frequently flooded. This soil is nearly level and poorly drained. It is on flood plains. Slopes are less than 2 percent. The areas are long and narrow or irregular in shape and range from 50 to more than 1,000 acres.

Typically, this soil has a grayish brown silt loam surface layer 5 inches thick. The subsoil to a depth of 16 inches is grayish brown silty clay with mottles in shades of brown. The upper part of the underlying material is grayish brown silty clay with mottles in shades of brown. The lower part to a depth of 60 inches is light brownish gray clay loam with mottles in shades of brown and red.

Included with this soil in mapping are a few areas of Dorovan soils and small areas of somewhat poorly

drained soils in higher positions than Chastain soil. Dorovan soils, in depressions, are very poorly drained. The included soils make up about 20 percent of this map unit.

Permeability is slow. The available water capacity is moderate. The shrink-swell potential is moderate. The seasonal high water table is at or near the surface during wet months. This soil is frequently flooded for very long periods. It is medium acid or very strongly acid.

In most areas, this Chastain soil is used as woodland. It generally is not used as cropland because of wetness and flooding. Major flood control structures, along with extensive drainage systems, would be required for this use.

Common trees are baldcypress, water tupelo, water oak, and sweetgum. Understory plants include sweetbay, switchcane, and waxmyrtle. Wetness and flooding restrict the use of equipment and cause high rates of seedling mortality.

Wetness and the hazard of flooding are the main limitations for urban or recreational uses.

This Chastain soil is in capability subclass VIw. The woodland ordination symbol is 9W.

CnA—Conetoe loamy sand, 0 to 3 percent slopes. This soil is nearly level and well drained. It is on smooth to slightly rounded low ridges of stream terraces. The areas are irregular in shape and range from 4 to 25 acres.

Typically, this soil has a dark brown loamy sand surface layer 14 inches thick. The subsurface layer to a depth of 26 inches is strong brown loamy sand. The subsoil extends to a depth of 58 inches. The upper part is strong brown sandy loam; the middle part is strong brown sandy clay loam; and the lower part is reddish yellow sandy loam. The underlying material to a depth of 74 inches is reddish yellow loamy sand.

Included with this soil in mapping are a few areas of Tarboro and Wickham soils. Tarboro soils are somewhat excessively drained, and Wickham soils are well drained. The included soils make up about 20 percent of the map unit.

Permeability is moderately rapid, and the available water capacity is low to moderate. The shrink-swell potential is low. The water table is not within a depth of 6 feet. This soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Conetoe soil is used as cropland or pasture. In some areas, it is used as woodland.

The major crops are corn, soybeans, tobacco, peanuts, and small grains. This soil is subject to droughtiness and soil blowing. Blowing sand can damage young plants. Conservation tillage, crop residue management, and the use of winter cover crops help maintain organic matter content and conserve moisture. Windbreaks and crop rotations that include close-growing crops are also beneficial in cropland management. Fertilizers, particularly nitrogen, should be added in split applications. Coastal bermudagrass and bahiagrass are common pasture grasses.

Forested areas of this soil are in mixed hardwoods or pines. Common trees include loblolly pine, white oak, hickory, sweetgum, American beech, and red maple. Understory plants include dogwood, sassafras, waxmyrtle, and American holly. Seedling mortality is moderate because of the thick sandy surface layer. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of the thick sandy surface layer, equipment use limitations are moderate for planting and harvesting trees.

This soil has few limitations for urban uses. The thick sandy surface layer is a moderate limitation for most recreational uses.

This Conetoe soil is in capability subclass IIs. The woodland ordination symbol is 8S.

CrA—Craven fine sandy loam, 0 to 1 percent slopes. This soil is nearly level and moderately well drained. It is on broad, smooth slopes on uplands. The areas generally are oval and range from 4 to 75 acres.

Typically, this soil has a dark grayish brown fine sandy loam surface layer 9 inches thick. The subsoil extends to a depth of 58 inches. The upper part is light yellowish brown clay loam. The next part is brownish yellow clay underlain by gray clay with mottles in shades of red and yellow. The lower part of the subsoil is gray clay loam with mottles in shades of yellow, red, and brown. The underlying material to a depth of 67 inches is light gray clay loam with mottles in shades of yellow and red.

Included with this soil in mapping are some areas of Goldsboro and Lenoir soils. Goldsboro soils, in positions similar to those of Craven soil, are moderately well drained. Lenoir soils, in shallow depressions, are somewhat poorly drained. The included soils make up 10 to 15 percent of the map unit.

Permeability is slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The seasonal high water table is at a depth of about 2 to 3 feet during wet months. The soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Craven soil is used as cropland.

In a few areas, it is used as pasture or woodland.

The major crops are corn, soybeans, tobacco, cotton, and small grains. Bedding of rows generally is required for tobacco. Conservation tillage, crop residue management, and the use of winter cover crops help maintain tilth and production. The use of field borders and crop rotations that include close-growing crops helps to conserve moisture and prevent subsoil compaction. The slow permeability of the subsoil is a major factor in the installation of drainage systems. Pasture grasses do well on this soil.

Forested areas of this soil are in mixed hardwoods or pines. Common trees are loblolly pine, sweetgum, white oak, red maple, and red oak. Understory plants include American holly, dogwood, sourwood, and bayberry. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness, slow permeability, and the moderate shrink-swell potential are limitations for urban and recreational uses. Low strength is a limitation for local roads and streets.

This Craven soil is in capability subclass IIw. The woodland ordination symbol is 9W.

CrB—Craven fine sandy loam, 1 to 4 percent slopes. This soil is gently sloping and moderately well drained. It is on slightly rounded ridges on uplands. The areas generally are oval and range from 5 to 100 acres.

Typically, this soil has a brown fine sandy loam surface layer 6 inches thick. The subsoil extends to a depth of 54 inches. The upper part is brownish yellow and light olive brown clay loam. The lower part is pale brown, yellowish brown, and gray clay with mottles in shades of yellow, red, and brown. The underlying material to a depth of 60 inches is gray clay with mottles in shades of yellow and red.

Included with this soil in mapping are a few small areas of Goldsboro soils that are moderately well drained and in positions similar to those of the Craven soil. Also included are areas, indicated by special map symbols, where the surface is moderately to severely eroded. The included soils make up about 20 percent of the map unit.

Permeability is slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The seasonal high water table is at a depth of 2 to 3 feet during wet months. This soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Craven soil is used as cropland. The rest is used as pasture or woodland.

The major crops are corn, soybeans, cotton, and small grains. Bedding of rows generally is required for tobacco. Wetness and a moderate hazard of erosion are the main limitations for cropland use and management. Conservation tillage, crop residue management, and winter cover crops help control erosion and maintain tilth. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. The slow permeability of the subsoil makes this soil difficult to drain. Pasture grasses grow well on this soil.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, sweetgum, white oak, red maple, and red oak. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness, slow permeability, and the moderate shrink-swell potential are limitations for urban and recreational uses. Low strength is a limitation for local roads and streets.

This Craven soil is in capability subclass IIIe. The woodland ordination symbol is 9W.

CrC2—Craven clay loam, 4 to 12 percent slopes, eroded. This soil is gently sloping to strongly sloping and moderately well drained. It is on side slopes on uplands. The areas are irregular in shape and range from 5 to 40 acres.

Typically, this soil has a dark grayish brown clay loam surface layer 3 inches thick. The subsoil extends to a depth of 52 inches. The upper part is yellowish brown and strong brown clay loam and clay with mottles in shades of yellow and brown. The lower part is yellowish brown and gray clay loam with mottles in shades of yellow, red, and brown. The underlying material to a depth of 60 inches is gray clay loam with mottles in shades of yellow and red.

Included with this soil in mapping are small areas of Goldsboro soils that are moderately well drained. Also included are small areas of uneroded soils that have a fine sandy loam surface layer. The included soils make up about 15 percent of the map unit.

Permeability is slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The seasonal high water table is at a depth of 2 to 3 feet during wet months. This soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Craven soil is used as woodland or pasture. It is used for cultivated crops in a few areas.

This soil generally is not suited to cultivated crops because it has been severely eroded and is subject to further erosion. Pasture grasses do well if runoff and erosion problems can be overcome.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are sweetgum, red maple, willow oak, white oak, southern red oak, water oak, and loblolly pine. The understory plants are mainly dogwood, sweetbay, sourwood, American holly, southern waxmyrtle, and sassafras. Wetness is the main limitation for woodland use and management. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Steepness of slope, wetness, slow permeability, and the shrink-swell potential are the main limitations for urban uses. Low strength is a limitation for local roads and streets. Steepness of slope and surface texture are limitations for recreational uses.

This Craven soil is in capability subclass VIe. The woodland ordination symbol is 9W.

Ct—Croatan muck, rarely flooded. This soil is nearly level and very poorly drained. It is in depressions on uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 3 to 25 acres.

Typically, this soil has a dark brown muck surface layer about 4 inches thick that is underlain by a layer of black muck to a depth of about 18 inches. The upper part of the underlying material is dark gray sandy loam. The lower part to a depth of 65 inches is gray clay loam.

Included with this soil in mapping are a few areas of Dorovan soils that make up about 10 percent of the map unit.

Permeability is moderate or moderately slow, and the available water capacity is high. The shrink-swell potential is low. The seasonal high water table is normally at or near the surface. The surface layer is extremely acid except where lime has been added. The underlying material is extremely acid to slightly acid.

Corn, soybeans, and small grains can be grown where this soil is drained. Wetness and the hazard of soil blowing are the main limitations for cropland use and management. The proper maintenance of drainage systems and the use of winter cover crops and windbreaks to prevent soil blowing help to overcome these problems. Pasture grasses grow well where the soil is drained.

Most areas of this soil are in pine plantations. The dominant native trees are loblolly pine, pond pine, baldcypress, and white cedar. The understory plants are mainly bayberry, American holly, greenbrier, and switchcane. There are severe limitations to the use of this soil for woodland production. Equipment use is limited by wetness and poor trafficability. Only a small proportion of planted seedlings will survive if competing vegetation is not controlled.

Wetness and the hazard of flooding are the main limitations for urban and recreational uses. Low strength is a limitation for local roads and streets.

This Croatan soil is in capability subclass VIIw. The woodland ordination symbol is 6W.

Do—Dorovan muck, frequently flooded. This soil is nearly level and very poorly drained. It is in swampy areas on the Roanoke River flood plain. Slopes are less than 1 percent. The areas are irregular in shape and range from 100 to more than 1,000 acres.

Typically, this soil has a very dark brown muck surface layer 8 inches thick that is underlain by black muck to a depth of about 65 inches. The underlying material to a depth of 95 inches is gray sand with a few fragments of partly decayed wood.

Included with this soil in mapping are a few small areas of very poorly drained mineral soils. Also included are small overwash areas that have a thin mineral layer deposited over the muck. The included soils make up about 10 percent of the map unit.

Permeability is moderate, and the available water capacity is very high. The shrink-swell potential is low. The seasonal high water table is at or within 0.5 foot of the surface. This soil is ponded sometimes and is flooded frequently for very long periods. The muck layers are extremely acid. The underlying material is very strongly acid or strongly acid.

In most areas, this Dorovan soil is used as woodland. It generally is not used as cropland because of wetness and flooding. Major flood control structures, along with extensive drainage systems, are required for this use.

In forested areas, native trees are blackgum, sweetbay, and baldcypress. Seedling mortality can be a severe concern in woodland management. Use of equipment for planting and harvesting trees can be severely restricted because of wetness and instability of the soil material.

Wetness and the hazard of flooding are limitations for most urban and recreational uses. Low strength is a limitation for local roads and streets.

This Dorovan soil is in capability subclass VIIw. The woodland ordination symbol is 7W.

Fo—Foreston loamy fine sand. This soil is nearly level and moderately well drained. It is on smooth flats and in shallow depressions on uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 4 to 20 acres.

Typically, this soil has a dark grayish brown loamy fine sand surface layer 10 inches thick. The subsoil extends to a depth of 72 inches. The upper part is light olive brown sandy loam with mottles in shades of brown. The middle part is light olive brown loamy sand with mottles in shades of gray and brown and mottled light olive brown, yellowish brown, and light gray loamy sand. The lower part of the subsoil is gray sandy loam with mottles in shades of brown and red.

Included with this soil in mapping are a few small areas of Goldsboro and Stallings soils. Goldsboro soils are moderately well drained, and Stallings soils are somewhat poorly drained. The included soils make up 10 to 15 percent of the map unit.

Permeability is moderately rapid, and the available water capacity is low to moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of about 2 to 3.5 feet during wet months. This soil is very strongly acid to medium acid except where lime has been added.

In most areas, this Foreston soil is used as cropland. In a few areas, it is used as woodland or pasture.

The major crops are corn, soybeans, peanuts (fig. 1), tobacco, cotton, and small grains. Wetness is the main limitation for cropland use and management. Conservation tillage, crop residue management, and winter cover crops help maintain tilth and production. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. Artificial drainage generally is required for tobacco. Pasture grasses do well on this soil.

Forested areas of this soil are in mixed hardwoods and pines. The dominant native trees are black tupelo, elm, yellow poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, post oak, southern red oak, water oak, and loblolly pine. The understory plants are mainly dogwood, American holly, southern waxmyrtle, switchgrass, and gallberry. Wetness is the main limitation for woodland use and management. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness is a moderate limitation for urban uses, such as septic tank absorption fields and dwellings without basements. This limitation can be overcome by careful design and installation of structures. Wetness is also a moderate limitation for most recreational uses.

This Foreston soil is in capability subclass IIw. The woodland ordination symbol is 9W.

GoA—Goldsboro fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is on smooth uplands. The areas are oblong and range from 5 to more than 100 acres.

Typically, this soil has a dark grayish brown fine sandy loam surface layer about 9 inches thick. The subsurface layer to a depth of about 14 inches is light yellowish brown fine sandy loam. The subsoil extends to a depth of about 67 inches. The upper part is yellowish brown sandy clay loam with mottles in shades of brown. The middle part is yellowish brown and brownish yellow sandy clay loam with mottles in shades of gray and red. The lower part of the subsoil is gray sandy clay loam with mottles in shades of red.

Included with this soil in mapping are small areas of Lynchburg and Norfolk soils. Lynchburg soils, in small depressions, are somewhat poorly drained. Norfolk soils, in slightly higher positions than the Goldsboro soil, are well drained. The included soils make up about 10 percent of the map unit.

Permeability is moderately slow, and the available water capacity is moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 2 to 3 feet during wet months. This soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Goldsboro soil is used as cropland. In a few areas, it is used as woodland or pasture.

The major crops are corn, soybeans, peanuts, tobacco, cotton, and small grains. Wetness is the main limitation for cropland use and management. Conservation tillage, crop residue management, and winter cover crops help maintain tilth and production. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. Artificial drainage generally is required for tobacco. Pasture grasses do well on this soil.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, slash pine, sweetgum, red oak, and white oak. Understory plants include American holly, dogwood, and greenbrier. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness and moderately slow permeability are

Figure 1.—Harvesting peanuts in an area of Foreston loamy fine sand. This soil is subject to wind erosion, and proper management is needed to conserve soil and moisture.

limitations for urban uses, such as septic tank absorption fields and dwellings without basements. These limitations can be overcome by careful design and installation of structures. Wetness is also a moderate limitation for most recreational uses.

This Goldsboro soil is in capability subclass IIw. The woodland ordination symbol is 9W.

GuA—Goldsboro-Urban land complex, 0 to 2 percent slopes. This Goldsboro soil is moderately well drained. Areas of this soil and Urban land are too small or intricately mixed to be mapped separately at the selected scale. The complex consists of about 50 percent Goldsboro soil and about 30 to 40 percent Urban land.

Typically, this Goldsboro soil has a dark grayish brown fine sandy loam surface layer 9 inches thick. The subsurface layer to a depth of about 14 inches is light yellowish brown fine sandy loam. The subsoil extends to a depth of 67 inches. The upper part is yellowish brown sandy clay loam with mottles in shades of brown. The middle part is yellowish brown and brownish yellow sandy clay loam with mottles in shades of gray and red. The lower part of the subsoil is sandy clay loam with mottles in shades of yellow and red.

The Urban land consists of areas where the original soil has been cut, filled, graded, paved, or otherwise modified to the extent that most soil properties have been altered. It includes shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other areas where buildings are closely spaced or the soil is covered with pavement. Slope generally is modified to fit the needs. The extent of site modification varies greatly. Many areas have been disturbed to only a small degree while others have been extensively graded or filled.

Included in mapping are small areas of Bonneau and Norfolk soils that are well drained. The included soils make up about 10 to 20 percent of the map unit.

Permeability of the Goldsboro soil is moderately

slow, and the available water capacity is moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 2 to 3 feet during wet months.

Wetness and the moderately slow permeability are the main limitations for urban uses. Recommendations for urban uses generally require onsite investigations.

The soils of this complex are not assigned a capability subclass nor a woodland ordination symbol.

Le—Lenoir loam. This soil is nearly level and somewhat poorly drained. It is in broad, smooth areas and in shallow depressions on uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 5 to about 100 acres.

Typically, this soil has a very dark gray loam surface layer 8 inches thick. The subsoil extends to a depth of 61 inches. The upper part is yellowish brown clay loam with mottles in shades of gray. The lower part is gray silty clay and clay with mottles in shades of yellow, brown, and red.

Included with this soil in mapping are small areas of Bethera and Craven soils. Bethera soils, in depressions, are poorly drained. Craven soils, in a slightly higher position on knolls, are moderately well drained. The included soils make up about 20 percent of the map unit.

Permeability is slow, and the available water capacity is moderate. The shrink-swell potential is moderate. The seasonal high water table is at a depth of 1 to 2.5 feet during wet months. This soil is extremely acid to strongly acid except where lime has been added.

In most areas, this Lenoir soil is used as woodland. In a few areas, it is used as pasture or cropland.

Corn and soybeans are grown where this soil is drained. Tobacco and peanuts are grown only after ditching and land shaping. Wetness and slow permeability are the main limitations to use and management of cropland and pasture. Conservation tillage and the use of cover crops and crop rotations that include grasses and legumes help maintain tilth and production. Tillage can be delayed in spring because of wetness. Lack of suitable outlets and slow permeability are limitations to the installation of drainage systems. Pasture grasses, such as fescue and ladino clover, are grown where the soil is drained.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, longleaf pine, sweetgum, American sycamore, white oak, and southern red oak. Understory plants include American holly, flowering dogwood, common persimmon, red maple, and greenbrier. Seedlings have moderate potential for survival and growth if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees. Ditching and bedding may be needed.

Wetness and slow permeability are limitations for most urban and recreational uses. Low strength is a limitation for local roads and streets.

This Lenoir soil is in capability subclass IIIw. The woodland ordination symbol is 8W.

Ly—Lynchburg fine sandy loam. This soil is nearly level and somewhat poorly drained. It is in broad, smooth areas and in shallow depressions on uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 5 to 50 acres.

Typically, this soil has a dark grayish brown fine sandy loam surface layer 10 inches thick. The subsurface layer to a depth of 14 inches is yellowish brown fine sandy loam with mottles in shades of brown. The subsoil extends to a depth of 63 inches. The upper part is pale brown sandy clay loam with mottles in shades of gray. The lower part is light brownish gray and light gray sandy clay loam with mottles in shades of yellow.

Included with this soil in mapping are small areas of Goldsboro and Rains soils. Also included are soils that have a sandy surface layer that is more than 20 inches thick. Goldsboro soils, in slightly higher positions than Lynchburg soil, are moderately well drained. Rains soils, in slight depressions, are poorly drained. The included soils make up about 20 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 0.5 to 1.5 feet during wet months. The soil is extremely acid to strongly acid except where lime has been added.

About half of the acreage of this Lynchburg soil is cropland. The rest is woodland or pasture.

The major crops are corn, soybeans, peanuts, and small grains. Wetness is the main limitation for cropland use and management. Conservation tillage, crop residue management, and winter cover crops help maintain tilth and production. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. Artificial drainage generally is required for tobacco or peanuts. Pasture grasses do well on this soil.

Forested areas of this soil are mainly in pines. Some are in hardwoods. Common trees are loblolly pine, yellow poplar, sweetgum, and white oak. Seedlings survive and grow well if competing vegetation is

controlled or removed by site preparation, spraying, cutting, or girdling. Ditching and bedding may be needed. Because of wetness, equipment use limitations are moderate for planting and harvesting trees.

Wetness is a severe limitation for most urban and recreational uses.

This Lynchburg soil is in capability subclass IIw. The woodland ordination symbol is 9W.

NoA—Norfolk loamy fine sand, 0 to 2 percent slopes. This soil is nearly level and well drained. It is on smooth slopes on broad uplands. The areas are irregular in shape and range from 4 to 40 acres.

Typically, this soil has a light yellowish brown loamy fine sand surface layer 6 inches thick. The subsoil extends to a depth of 62 inches. The upper part is yellowish brown sandy loam. The middle part is yellowish brown sandy clay loam and clay loam. The lower part of the subsoil is brownish yellow sandy clay loam with mottles in shades of red, brown, and gray.

Included with this soil in mapping are small areas of Bonneau and Goldsboro soils. Bonneau soils, which have a thick sandy surface layer, are well drained. Goldsboro soils, in depressions, are moderately well drained. The included soils make up about 20 percent of this map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 4 to 6 feet during wet months. The soil is very strongly acid or strongly acid except where lime has been added.

In most areas, this Norfolk soil is used as cropland. In a few areas, it is used as woodland.

The major crops are corn, soybeans, peanuts, tobacco, cotton, and small grains. There is no major limitation to the use of this soil for crops. Conservation tillage (fig. 2) and the use of field borders and crop rotations that include close-growing crops are beneficial in cropland management. Pasture grasses, such as improved bermudagrass, grow well on this soil.

In forested areas of this soil, common trees are loblolly pine and longleaf pine. Understory plants include American holly, flowering dogwood, common persimmon, and greenbrier. Seedlings survive and grow well if competing vegetation is controlled by site preparation, spraying, cutting, or girdling. There are few limitations to the use of equipment for planting and harvesting trees.

This soil has few limitations for most urban and recreational uses.

This Norfolk soil is in capability class I. The woodland ordination symbol is 8A.

NoB—Norfolk loamy fine sand, 2 to 6 percent slopes. This soil is gently sloping and well drained. It is on uplands. The areas are elongated or irregularly shaped and range from 4 to more than 60 acres.

Typically, this soil has a light yellowish brown loamy fine sand surface layer 6 inches thick. The subsoil extends to a depth of 62 inches. The upper part is yellowish brown sandy loam. The middle part is yellowish brown sandy clay loam and clay loam. The lower part of the subsoil is brownish yellow sandy clay loam with mottles in shades of red, brown, and gray.

Included with this soil in mapping are small areas of Bonneau and Goldsboro soils. Bonneau soils, in a slightly higher position on knolls, are well drained. Goldsboro soils, in lower-lying areas, are moderately well drained. The included soils make up about 5 to 10 percent of this map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 4 to 6 feet during wet months. The soil is strongly acid except where lime has been added.

In most areas, this Norfolk soil is used for cultivated crops. It is used as woodland or pasture in a few areas.

The major crops are corn, soybeans, peanuts, tobacco, cotton, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations for cropland use and management. Conservation tillage and the use of field borders and crop rotations that include close-growing crops are beneficial in cropland management. Pasture grasses, such as improved bermudagrass, grow well on this soil.

In forested areas of this soil, the common trees are loblolly pine and longleaf pine. Understory plants include American holly, dogwood, common persimmon, and greenbrier. Seedlings survive and grow well if competing vegetation is controlled by site preparation, spraying, cutting, or girdling. There are few limitations to the use of equipment for planting and harvesting trees.

This soil has few limitations for most urban and recreational uses.

This Norfolk soil is in capability subclass IIe. The woodland ordination symbol is 8A.

NuB—Norfolk-Urban land complex, 0 to 6 percent slopes. This Norfolk soil is well drained. Areas of this soil and Urban land are too small or intricately mixed to be mapped separately at the selected scale. The map unit is about 40 to 50 percent Norfolk soil and about 30 to 40 percent Urban land.

Typically, this Norfolk soil has a light yellowish brown

Figure 2.—These soybeans, on Norfolk loamy fine sand, 0 to 2 percent slopes, are planted in wheat stubble to reduce erosion.

loamy fine sand surface layer 6 inches thick. The subsoil extends to a depth of 62 inches. The upper part is yellowish brown sandy loam. The middle part is yellowish brown sandy clay loam and clay loam. The lower part of the subsoil is brownish yellow sandy clay loam with mottles in shades of red, brown, and gray.

The Urban land consists of shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other uses where buildings are closely spaced or the soil is covered with pavement. Slope has been modified to fit the needs. The extent of site modification varies greatly. Many areas have been disturbed to only a small degree while others have been extensively graded or filled.

Included in mapping are small areas of Bonneau and Goldsboro soils. Bonneau soils, which have a thick sandy surface layer, are well drained, and Goldsboro soils are moderately well drained. In a few places are soils that have slopes of more than 6 percent. The included soils make up about 20 percent of the map unit.

Permeability and the available water capacity of the Norfolk soil are moderate. The shrink-swell potential is low. The seasonal high water table is at a depth of 4 to 6 feet during wet months.

Norfolk soils have few limitations for urban uses.

The soils of this complex are not assigned a capability subclass nor a woodland ordination symbol.

Pn—Pantego loam. This soil is nearly level and very poorly drained. It is on broad uplands. Slopes are less than 2 percent. The areas are oblong and range from 10 to more than 100 acres.

Typically, this soil has a black loam surface layer 18 inches thick. The subsoil to a depth of 76 inches is gray sandy clay loam with mottles in shades of brown.

Included with this soil in mapping are small areas of Rains soils and a few areas of soils that have a firm, slowly permeable subsoil. Rains soils, in a slightly higher position than Pantego soil, are poorly drained. The included soils make up about 15 percent of the map unit.

Permeability is moderate, and the available water capacity is high. The shrink-swell potential is low. The seasonal high water table is within a depth of 1.5 feet during wet months. This soil is extremely acid to strongly acid except where lime has been added.

In most areas, this Pantego soil is used as woodland. In a few areas, it is used for cultivated crops or pasture.

Corn and soybeans are grown where this soil is drained. Wetness is the main limitation for cropland use and management. Lack of suitable outlets can make drainage impractical. Ponding of brief duration occurs during periods of high rainfall. Pasture grasses can be grown where the soil is drained.

In forested areas of this soil, common trees are mostly loblolly pine and oaks. There are also areas of pond pine and baldcypress. The understory plants are mainly sweetbay, red maple, large gallberry, and southern bayberry. Wetness is the main limitation for woodland use and management.

Wetness is the main limitation for most urban and recreational uses.

This Pantego soil is in capability subclass VIw. The woodland ordination symbol is 10W.

Ra—Rains fine sandy loam. This soil is nearly level and poorly drained. It is on broad flats or in shallow depressions on smooth uplands. Slopes are less than 2 percent. The areas are irregular in shape and range from 10 to more than 200 acres.

Typically, this soil has a very dark gray fine sandy loam surface layer 5 inches thick. The subsurface layer to a depth of 12 inches is gray fine sandy loam 7 inches thick. The subsoil extends to a depth of 64 inches. The upper part is grayish brown sandy clay loam with mottles in shades of brown and gray. The lower part is mottled gray, grayish brown, and yellowish brown sandy clay loam.

Included with this soil in mapping are small areas of Lynchburg and Pantego soils. Lynchburg soils, in a higher position on the landscape, are somewhat poorly drained. Pantego soils, in a lower position, are very poorly drained. The included soils make up about 15 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The seasonal high water table is within a depth of 1 foot during wet months. This soil is extremely acid to strongly acid except where lime has been added.

In most areas, this Rains soil is used as woodland. In a few areas, it is used as cropland or pasture.

Where this soil is drained, the major crops are corn, soybeans, tobacco, and small grains. Conservation tillage and the use of cover crops are beneficial in cropland management. Tillage can be delayed in the spring because of wetness. In some areas, the lack of suitable outlets is a limitation to the installation of drainage systems. Wetness is the main limitation in areas used for pasture.

In forested areas of this soil, the common trees are loblolly pine, sweetgum, and American sycamore. The understory plants are switchgrass, large gallberry, and little bluestem. Wetness is the main limitation for woodland use and management. Seedlings have low survival rates or grow poorly unless the soil is drained or bedded. Competing vegetation should be controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are severe for planting and harvesting trees.

Wetness is a limitation for most urban and recreational uses.

This Rains soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Ro—Roanoke loam, frequently flooded. This soil is nearly level and poorly drained. It is on broad flats and in drainageways. Slopes are less than 2 percent. The areas are irregular in shape and range from 10 to more than 100 acres.

Typically, this soil has a surface layer that is grayish brown loam with mottles in shades of brown. It is 7 inches thick. The subsoil extends to a depth of 54 inches. The upper part is gray silty clay loam with mottles in shades of brown. The middle part is light brownish gray and gray clay with mottles in shades of brown. The lower part of the subsoil is mottled gray, light yellowish brown, and yellowish red clay loam. The underlying material to a depth of 69 inches is white sandy loam with mottles in shades of brown.

Included with this soil in mapping are small areas of Augusta soils in slightly higher positions than Roanoke soil. Augusta soils are somewhat poorly drained. The

included soils make up about 10 percent of the map unit.

Permeability is slow, and the available water capacity is moderate to high. The shrink-swell potential is moderate. The seasonal high water table is within a depth of 1 foot during wet months. This soil is subject to frequent flooding of brief duration. Except where lime has been added the surface layer and subsoil are extremely acid to strongly acid. The underlying material is extremely acid to slightly acid.

In most areas, this Roanoke soil is used as woodland. In a few areas, it is used as pasture or cropland.

Where this soil is drained, the major crops are corn and soybeans. This soil rarely is used for tobacco, cotton, or peanuts, mainly because of wetness and flooding. Lack of suitable outlets and slow permeability are limitations to the installation and functioning of drainage systems. Conservation tillage and the use of cover crops and crop rotations that include grasses and legumes are beneficial in cropland management. Tillage can be delayed in spring because of wetness. Wetness is the main limitation where this soil is used for pasture.

In forested areas of this soil, the common trees are loblolly pine, yellow poplar, willow oak, and white oak. Understory plants include greenbrier, American holly, and switchcane. Wetness is the main limitation to woodland management. Planted seedlings have low survival rates or grow poorly unless the soil is bedded. Because of wetness, equipment use limitations are severe for planting and harvesting trees.

Wetness, slow permeability, and the hazard of flooding are limitations for urban and recreational uses. Low strength is a limitation for local roads and streets.

This Roanoke soil is in capability subclass Vw. The woodland ordination symbol is 7W.

RuA—Rumford loamy fine sand, 0 to 2 percent slopes. This soil is nearly level and well drained. It is on smooth slopes on uplands. The areas are rounded or irregular in shape and range from 3 to 15 acres.

Typically, this soil has a dark grayish brown loamy fine sand surface layer 9 inches thick. The subsurface layer to a depth of 15 inches is light yellowish brown loamy fine sand. The subsoil extends to a depth of 35 inches. It is yellowish brown sandy loam in the upper part and yellowish brown loamy sand in the lower part. The underlying material to a depth of 74 inches is mottled yellowish brown, light gray, and white sand.

Included with this soil in mapping are small areas of Foreston and Norfolk soils. Foreston soils, in lower positions than Rumford soil, are moderately well drained. Norfolk soils, in positions similar to those of the Rumford soil, are well drained. The included soils make up 10 to 15 percent of the map unit.

Permeability is moderately rapid, and the available water capacity is low. The shrink-swell potential is low. The water table is not within a depth of 6 feet. This soil is extremely acid to medium acid except where lime has been added.

In most areas, this Rumford soil is used as cropland. In a few areas, it is used as woodland or pasture.

The major crops are tobacco, peanuts, corn, and soybeans. Blowing sand and droughtiness are the main concerns in cropland management. Conservation tillage and the use of winter cover crops and crop residue management help maintain organic matter and conserve moisture. Windbreaks and close-growing crops reduce wind erosion damage. Coastal bermudagrass and bahiagrass are commonly grown pasture grasses.

Forested areas of this soil are mostly in mixed hardwoods and pines. Common trees are loblolly pine, longleaf pine, red maple, sweetgum, red oak, white oak, and post oak. The understory plants are mainly dogwood, sourwood, American holly, and waxmyrtle. The low available water capacity is the main limitation for woodland use and management.

This soil has few limitations for urban and recreational uses.

This Rumford soil is in capability class IIs. The woodland ordination symbol is 8A.

Se—Seabrook sand, rarely flooded. This soil is nearly level and moderately well drained. It is on stream terraces. Slopes are less than 2 percent. The areas are irregular in shape and range from 5 to 20 acres.

Typically, this soil has a dark brown sand surface layer 10 inches thick. The underlying material extends to a depth of 65 inches. The upper part is yellowish brown sand and the lower part is light yellowish brown sand with mottles in shades of gray and brown.

Included with this soil in mapping are small areas of Tarboro soils that are somewhat excessively drained. Tarboro soils are in positions higher than those of Seabrook soil. This soil makes up about 10 percent of the map unit.

Permeability is rapid, and the available water capacity is low. The shrink-swell potential is low. The seasonal high water table is within a depth of 2 to 4 feet during wet months. This soil is subject to rare flooding. This soil is very strongly acid to slightly acid except where lime has been added.

About half of the acreage of this Seabrook soil is

cropland and about half is woodland.

The major crops are corn, soybeans, peanuts, tobacco, and small grains. Wetness and rapid leaching of nutrients are the main limitations to use of this soil for cultivated crops. The low available water capacity is a limitation during dry periods. Conservation tillage, crop residue management, and winter cover crops help maintain tilth and production. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. Artificial drainage generally is required for tobacco. Fertilizers, especially nitrogen, should be added in split applications. This soil is suited to pasture grasses.

In forested areas of this soil, common trees are loblolly pine and longleaf pine. The understory plants include little bluestem, switchcane, and large gallberry. Seedling survival and growth is improved if competing vegetation is controlled or removed. The low available water capacity during the growing season is the main limitation for woodland use and management. The sandy surface layer can limit the use of equipment.

Wetness is a limitation for most urban and recreational uses.

This Seabrook soil is in capability subclass IIIs. The woodland ordination symbol is 8S.

St—Stallings loamy sand. This soil is nearly level and somewhat poorly drained. It is on smooth slopes and in shallow depressions on uplands. Slopes range from 0 to 3 percent. The areas are oval and range from 5 to 50 acres.

Typically, this soil has a very dark gray loamy sand surface layer 9 inches thick. The subsurface layer to a depth of 12 inches is grayish brown loamy sand. The subsoil extends to a depth of 75 inches. The upper part is yellowish brown and light brownish gray sandy loam with mottles in shades of brown and yellow. The middle part is light gray sandy loam with mottles in shades of yellow. The lower part of the subsoil is light gray and yellowish brown loamy sand with mottles in shades of brown and gray.

Included with this soil in mapping are small areas of Lynchburg and Woodington soils. Lynchburg soils are somewhat poorly drained and are intermingled with the Stallings soil. Woodington soils, in depressions, are poorly drained. The included soils make up about 15 percent of the map unit.

Permeability is moderately rapid, and the available water capacity is moderate. The shrink-swell potential is low. The seasonal high water table is between depths of 1 and 2.5 feet during wet months. The soil is extremely acid to strongly acid except where lime has been added.

In most areas, this Stallings soil is used as cropland. In a few areas, it is used as woodland or pasture.

The major crops are corn, soybeans, peanuts, tobacco, and small grains. Wetness is the main limitation for cropland use and management. Conservation tillage and the use of field borders and crop rotations that include close-growing crops are beneficial in cropland management. Artificial drainage generally is required for tobacco. Wetness is the main limitation for pasture.

In forested areas of this soil, common trees are loblolly pine, longleaf pine, yellow poplar, sweetgum, and water oak. The understory plants are mainly dogwood, sweetbay, sourwood, and American holly. Wetness is the main limitation for woodland use and management. Seedlings survive and grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are moderate for planting and harvesting trees. Ditching and bedding may be needed.

Wetness is a severe limitation for urban uses and a moderate limitation for most recreational uses.

This Stallings soil is in capability subclass IIw. The woodland ordination symbol is 8W.

TaB—Tarboro loamy sand, 0 to 5 percent slopes. This soil is gently sloping and somewhat excessively drained. It is on smooth to slightly rounded ridges on terraces. The areas are oblong and range from 10 to more than 50 acres.

Typically, this soil has a dark brown loamy sand surface layer 7 inches thick. The underlying material to a depth of 62 inches is strong brown sand.

Included with this soil in mapping are small areas of Conetoe and Seabrook soils. Conetoe soils are well drained. Seabrook soils, in depressions, are moderately well drained. Also included are some sandy soils in low-lying areas that are subject to rare flooding. The included soils make up about 15 percent of the map unit.

Permeability is rapid, and the available water capacity is low. The shrink-swell potential is low. This soil is very strongly acid to slightly acid except where lime has been added. The water table is not within a depth of 6 feet.

In most areas, this Tarboro soil is used as cropland. In a few areas, it is used as woodland.

The major crops are peanuts, corn, and soybeans.

Low yields can be expected because of the low available water capacity and leaching of plant nutrients. Blowing sand can damage young plants. Crop residue management and windbreaks are commonly used to control erosion. Fertilizers, particularly nitrogen, should be added in split applications. The low available water capacity is the main limitation for pasture grasses, such as coastal bermudagrass and bahiagrass.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, longleaf pine, sweetgum, southern red oak, blackjack oak, white oak, post oak, and red maple. The understory plants include dogwood, sassafras, and American holly. The low available water capacity is the main limitation for woodland management. Seedling survival and growth is improved if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling. Because of the thick, loose sandy layers, equipment use limitations are moderate for planting and harvesting trees.

The rapid permeability and sandy surface layer are the main limitations for most urban and recreational uses.

This Tarboro soil is in capability subclass IIIs. The woodland ordination symbol is 7S.

Ud—Udorthents, loamy. This map unit consists of areas where the natural soil layering sequence has been destroyed by earth-moving machines. Operations, such as scraping, backfilling, trenching, or excavating, have completely altered the characteristics of the natural soil. In this map unit, the Udorthents have four distinct variations that are related to how the areas were disturbed.

Quarry spoil is adjacent to rock quarries. It consists of spoil material that was excavated and mounded during the operation of the quarry. The soil has poor physical properties for plant growth. Consequently, the areas that have reseeded naturally have poor stands of weeds, pines, and hardwood trees. These areas are supporting some wildlife.

Borrow pits are areas where the topsoil, the subsoil, and the parent material have been dug out and hauled away. These areas generally are on well drained landscapes. Some have been reclaimed by grading and spreading 8 to 12 inches of topsoil over the excavated area. The reclaimed areas are used for pasture and row crops. Most areas, however, have not been reclaimed, and erosion has been severe. Some have filled or partly filled with water. All of them support poor stands of weeds, pines, and hardwood trees. The topography is irregular with mounds of spoil up to 10 feet high and holes as deep as 30 feet. Gullies are common. The soils in the borrow pit areas commonly have poor physical properties for plant growth. The rooting depth generally is shallow, and the available water capacity, soil fertility, and organic matter content are low. Areas that are reseeded have a potential use for wildlife habitat.

Landfills are areas where the natural soils have been altered by landfill operations. These are excavated areas consisting of deeply graded trenches that are backfilled with alternate layers of solid refuse and spoil material. The final surface is covered with two or three feet of spoil. Closed landfills have landscapes with 0 to 6 percent slopes and are covered by perennial grasses, pines, hardwood trees, and annual weeds. Included are some areas of undisturbed soil. These are commonly just outside the area of the landfill. The soil between the trenches is relatively undisturbed, except for the final cover used to smooth the entire area. Landfills that are still active have trenches 20 to 30 feet deep with steep walls that are subject to caving in.

Cut and fill areas have been altered by removing soil from the high areas and filling in the low areas. These areas are usually reseeded with annual and perennial grasses, and some have pine and hardwood trees. These areas have often been subject to rill erosion.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol. The characteristics of the soil material within these different areas of Udorthents, loamy, have been altered to such a degree that interpretive statements cannot be made except where onsite examinations are made.

Ur—Urban land. This map unit consists of areas where more than 85 percent of the surface is covered with streets, buildings, parking lots, railroad yards, or airport facilities. The natural soils were greatly altered by cutting, filling, grading, and shaping during urbanization. The original landscape, topography, and, commonly, the drainage pattern have been changed. The areas between facilities are used as parks, lawns, playgrounds, cemeteries, and drainageways. Slope is commonly 0 to 6 percent.

Runoff is very rapid in this map unit and it increases the flood hazard in low-lying areas. Waterways and reservoirs are subject to siltation from areas that are graded and not stabilized.

Recommendations for use and management of soil and water in this map unit require onsite examination.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

WkB—Wickham sandy loam, 0 to 6 percent slopes, rarely flooded. This soil is gently sloping and well drained. It is on terraces. The areas are oblong and range from 5 to 60 acres.

Typically, this soil has a yellowish brown sandy loam surface layer 8 inches thick. The subsurface layer to a depth of 12 inches is light yellowish brown sandy loam. The subsoil extends to a depth of 50 inches. The upper part is yellowish red and strong brown sandy clay loam with mottles in shades of red and brown. The lower part is reddish yellow sandy loam with mottles in shades of red and brown. The underlying material to a depth of 61 inches is pale brown loamy sand and very pale brown sand with mottles in shades of yellow and red.

Included with this soil in mapping are small areas of Altavista, Conetoe, and Tarboro soils. Altavista soils, in depressions, are moderately well drained. Conetoe soils are well drained, and Tarboro soils are somewhat excessively drained. The included soils make up about 20 percent of the map unit.

Permeability and the available water capacity are moderate. The shrink-swell potential is low. The water table is not within a depth of 6 feet. This soil is subject to rare flooding. It is extremely acid to medium acid.

In most areas, this Wickham soil is used as cropland. In a few areas, it is used as pastureland or woodland.

The major crops are corn, soybeans, peanuts, tobacco, and small grains. Conservation tillage, crop residue management, and the use of winter cover crops help to control runoff and erosion and maintain tilth and the content of organic matter. The use of field borders and crop rotations that include close-growing crops is also beneficial in cropland management. Pasture grasses, such as coastal bermudagrass and bahiagrass, grow well on this soil.

Forested areas of this soil are in mixed hardwoods and pines. Common trees are loblolly pine, yellow poplar, and southern red oak. The understory plants include flowering dogwood, sassafras, redbud, American holly, and sourwood. Seedlings survive and grow well if competing vegetation is controlled or removed. There are no limitations to the use of equipment for planting and harvesting trees.

This soil has few limitations for most urban and recreational uses.

This Wickham soil is in capability subclass IIe. The woodland ordination symbol is 9A.

WnD—Winton fine sandy loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is on short side slopes of uplands. The areas are long and narrow and range from 5 to 30 acres.

Typically, this soil has a dark grayish brown fine sandy loam surface layer 6 inches thick. The subsoil extends to a depth of 45 inches. The upper part is yellowish brown clay loam, and the lower part is yellowish brown sandy clay loam with mottles in shades of gray. The underlying material to a depth of 61 inches is brownish yellow sandy loam with mottles in shades of gray.

Included with this soil in mapping are small areas of Bonneau soils that are well drained. Also included are small areas of soils that have a sandy clay loam surface layer. The included soils make up about 10 to 20 percent of the map unit.

Permeability is moderate, and the available water capacity is moderate to high. The shrink-swell potential is low. The seasonal high water table is between depths of 2 and 4 feet during wet months and generally is perched water that drains laterally from the adjacent soils. The soil is very strongly acid or strongly acid.

In most areas, this Winton soil is used as woodland.

This soil generally is not used for cultivated crops because the hazard of erosion is severe.

Forested areas of this soil are in mixed hardwoods and pine. Common trees are loblolly pine, southern red oak, sweetgum, and beech. The understory plants include American holly, flowering dogwood, blueberry, and sourwood. Seedlings grow well if competing vegetation is controlled or removed by site preparation, spraying, cutting, or girdling.

Steepness of slope and wetness are the main limitations for most urban and recreational uses.

This Winton soil is in capability subclass IVe. The woodland ordination symbol is 10A.

WnF—Winton fine sandy loam, 15 to 60 percent slopes. This soil is very steep and well drained. It is on side slopes of uplands and on bluffs that are adjacent to flood plains. The areas are long, narrow bands of 50 to 100 acres.

Typically, this soil has a dark grayish brown fine sandy loam surface layer 6 inches thick. The subsoil extends to a depth of 45 inches. The upper part is yellowish brown clay loam, and the lower part is yellowish brown sandy clay loam with mottles in shades of gray. The underlying material to a depth of 61 inches is brownish yellow sandy loam with mottles in shades of gray.

Included with this soil in mapping are a few areas of Bonneau, Craven, and Norfolk soils. Bonneau and Norfolk soils are well drained, and Craven soils are moderately well drained. These soils are in the higher positions on the landscape and generally are

intermingled. Also included are areas of soils that have a sandy surface layer that is more than 20 inches thick and soils that are sandy throughout. These soils are intermingled in the lower parts of this map unit. The included soils make up 10 to 20 percent of the map unit.

Permeability is moderate, and the available water capacity is moderate to high. This soil is very strongly acid or strongly acid. The hazard of erosion is severe in exposed areas.

In most areas, this Winton soil is used as woodland.

This soil generally is not suited to cultivated crops because of a severe hazard of erosion, which is very difficult to overcome.

In forested areas of this soil, the dominant trees are southern red oak, sweetgum, beech, and loblolly pine. The understory plants are mainly sourwood, American holly, and flowering dogwood. Steepness of slope is the main limitation for woodland use and management.

Steepness of slope is a severe limitation for most urban or recreational uses.

This Winton soil is in capability subclass VIIe. The woodland ordination symbol is 10R.

Wo—Woodington fine sandy loam. This soil is nearly level and poorly drained. It is in smooth areas and in shallow depressions on uplands. Slopes are less than 2 percent. The areas are oblong and range from 5 to 100 acres.

Typically, this soil has a black fine sandy loam surface layer 6 inches thick. The subsurface layer to a depth of 10 inches is light brownish gray fine sandy loam. The subsoil to a depth of 65 inches is light brownish gray and gray sandy loam with mottles in shades of yellow, gray, and white.

Included with this soil in mapping are small areas of Stallings and Rains soils. Stallings soils are somewhat poorly drained, and Rains soils are poorly drained. The included soils make up about 15 percent of the map unit.

Permeability is moderately rapid, and the available water capacity is low to moderate. The shrink-swell potential is low. The seasonal high water table is between depths of 0.5 to 1 foot during wet months. This soil is very strongly acid to medium acid except where lime has been added.

In most areas, this Woodington soil is used as woodland. In a few areas, it is used as cropland or pasture.

Where this soil is drained and cultivated, the major crops are corn and soybeans. Wetness is the main limitation for cropland use and management. Suitable drainage outlets are difficult to establish in some areas. Conservation tillage, crop residue management, and the use of winter cover crops help maintain tilth and production. Pasture grasses grow well where this soil is properly drained and managed.

In forested areas of this soil, common trees are loblolly pine, sweetgum, water tupelo, white oak, and southern red oak. The understory plants are mainly greenbrier, sourwood, American holly, and inkberry. Wetness is the main limitation for woodland use and management. Competing vegetation should be controlled or removed by site preparation, spraying, cutting, or girdling. Because of wetness, equipment use limitations are severe for planting and harvesting trees. Seedlings have low survival rates or grow poorly unless the soil is drained and bedded.

This soil is poorly suited to most urban and recreational uses because of wetness.

This Woodington soil is in capability subclass VIw. The woodland ordination symbol is 8W.

Important Farmland

Many of the soils in Martin County have a long history of agricultural uses. Interest in the relative value of the soils for these uses is great. To provide information about the farmland in Martin County, the soils are identified as prime farmland and farmland of state and local importance, based on definitions provided by the U.S. Department of Agriculture. The location of each listed map unit is shown on the detailed soil maps in the back of this publication, and the acreage of each map unit is given in table 4. Information about soil qualities that affect use and management is in the section "Detailed Soil Map Units." This information does not constitute a recommendation for a particular land use.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

The following map units, or soils, make up prime farmland in Martin County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

AaA	Altavista fine sandy loam, 0 to 2 percent slopes, occasionally flooded
CrA	Craven fine sandy loam, 0 to 1 percent slopes
CrB	Craven fine sandy loam, 1 to 4 percent slopes
Fo	Foreston loamy fine sand
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes
WkB	Wickham sandy loam, 0 to 6 percent slopes, rarely flooded

Farmland of State and Local Importance

Farmland of state and local importance consists of soils other than those designated as prime farmland. In one or more ways, their characteristics do not meet the requirements for prime farmland. These soils, however, are suited to producing crops economically when managed according to modern farming methods. These methods include such management practices as drainage, which is needed to control excess water.

Farmland of state and local importance can be in use as cropland, pasture, or woodland, or it can be in other uses. It must be used for producing food or fiber or be available for these uses. Urban or built-up land and water areas cannot be considered important farmland.

For detailed information on the criteria used in designating farmland of state or local importance, consult the local office of the Soil Conservation Service.

About 18 percent, or 53,500 acres, of Martin County meet the soil requirements for farmland of state and local importance. The main crops are peanuts, tobacco, cotton, corn, and soybeans.

The map units that meet the requirements for farmland of state and local importance are:

BoB	Bonneau loamy sand, 0 to 6 percent slopes
CnA	Conetoe loamy sand, 0 to 3 percent slopes
Ly	Lynchburg fine sandy loam
St	Stallings loamy sand

Use and Management of the Soils

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

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

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where wetness can cause difficulty in excavation.

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

Crops and Pasture

Rupert Hasty, district conservationist, Soil Conservation Service, helped prepare this section.

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

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

Acreage for crop production has changed very little in the last 10 years in Martin County. Losses of cropland to urban growth and development have been offset by new land clearing operations.

According to the 1978 Census of Agriculture, Martin County had 89,210 acres in cropland and 3,460 acres in pasture and hayland. The major crops were corn, 37,500 acres; soybeans, 25,800 acres; peanuts, 16,950 acres; tobacco, 6,110 acres; small grains, 1,900 acres; and cotton, 950 acres. Pasture and hayland is planted almost entirely in tall fescue.

Soil erosion is a concern on about 52 percent of the cropland in the county. This concern is most serious on Craven soils that have slopes of more than 1 percent. Other sloping soils that have an erosion hazard are Bonneau, Norfolk, and Wickham soils. Soils subject to wind erosion are Bonneau, Conetoe, Foreston, Norfolk, Rumford, Seabrook, and Tarboro soils.

Productivity and soil tilth decrease when the topsoil is eroded. When erosion occurs, costly herbicides, fertilizers, and lime are carried out of the field along with valuable topsoil and organic matter. Social and environmental costs are also incurred when sediment is deposited into streams, lakes, and reservoirs. Effective control of erosion maintains soil productivity and minimizes the public cost of maintaining water quality.

Erosion control systems provide protective surface cover, reduce runoff, and increase infiltration. Where

plant cover, such as winter cover crops and crop residues, are kept on the soil for extended periods, erosion losses are reduced to amounts that will not adversely affect soil productivity.

Using effective conservation cropping systems with substantial plant cover to control erosion is imperative on the sloping Bonneau, Craven, Norfolk, and Wickham soils. Conservation tillage is effective in controlling erosion on these soils. Grassed waterways, generally planted in tall fescue, provide safe disposal of surface water runoff. Field borders of fescue help filter sediment from runoff water as it leaves the area.

In some soils, most commonly in Bonneau, Goldsboro, Rumford, and Wickham soils, traffic pans are between the topsoil and subsoil. These traffic pans reduce infiltration, root penetration, and permeability. The potential for erosion is higher on sloping soils with traffic pans. Occurrence and severity of the traffic pan are related to the number of trips per cropping season and the amount of tillage during wet periods. Conservation tillage systems using rippers, subsoilers, and chisels are effective in breaking up the pan.

Terraces and diversions reduce erosion by intercepting excess surface runoff and safely routing this water to suitable outlets, such as grassed waterways. Contour tillage is also effective in slowing runoff. These conservation measures are often needed on sloping Bonneau, Craven, Norfolk, and Wickham soils.

Wind erosion is a problem on soils that have a sandy surface layer, such as Bonneau, Conetoe, Foreston, Norfolk, Rumford, Seabrook, and Tarboro soils. Most wind erosion damage occurs during March, April, and May when little cover is on recently plowed fields. Cropping systems that include cover crops and crop residue management can greatly reduce damage from wind erosion. Narrow strips of tall-growing small grains can be used in row crop patterns to reduce wind damage to young plants. Planted windbreaks of pine with shrub understories are also effective in large open areas.

Information about the design and application of erosion control practices can be obtained from the local Soil Conservation Service office.

About 66,000 acres of cropland in Martin County is affected by wetness. Poorly drained and somewhat poorly drained soils, such as Rains, Lynchburg, Bethera, Lenoir, Stallings, Woodington, and Augusta soils, can be artificially drained by tile drains or open ditches and land smoothing. Where these soils are drained, they are suited to production of crops, such as corn, soybeans, and small grains. In addition to drainage, Augusta soils may require protection from occasional flooding. Soils with a slowly permeable subsoil, such as Bethera, Lenoir, and Craven soils, do not respond well to tile drainage. These soils require extensive surface drainage systems of open channels and land smoothing to maintain acceptable crop production. Peanuts and tobacco can be grown on moderately well drained Goldsboro soils and somewhat poorly drained Lynchburg soils if adequate surface and subsurface drainage is installed and maintained (fig. 3).

Soil tilth is an important factor in crop production. It influences seed germination and water infiltration. Soils with good tilth have a surface layer that is granular and porous.

Most of the soils in Martin County have a surface layer that is low in organic matter content. After plowing, soils that have a surface layer of loam, silt loam, or clay loam, such as Bethera, Chastain, Lenoir, Roanoke, and eroded Craven soils, are prone to crusting after intense rainfalls. Fall plowing is not a good practice on these soils. The crust on these soils is hard, slows water infiltration, and increases runoff and erosion during the winter months. Addition of organic materials, such as crop residue, manure, cover crops, and mulch, reduces crusting and improves soil structure and general soil tilth. Conservation tillage, cover crops, and sod-based rotations help maintain or increase content of organic matter.

Poorly drained and somewhat poorly drained soils, such as Rains, Lenoir, Bethera, Lynchburg, Roanoke, and Augusta soils, tend to have poor tilth because they stay wet until late in spring. If they are wet when plowed, they tend to be cloddy when dry, and good seedbeds are difficult to prepare.

Tall fescue is the major pasture and hayland grass in Martin County; however, other grasses are better adapted to some soils. These other grasses include hybrid bermudagrass, common bermudagrass, switchgrass, and bahiagrass. Livestock producers need to plant the grass that is best adapted to the soil in the area they plan to manage for pasture or hayland. Good management practices, such as rotation grazing, proper fertilization, weed control, and controlled grazing, result in greater yields from pasture and hayland.

Well drained and moderately well drained soils that have a loamy or clayey subsoil, such as Craven, Foreston, Goldsboro, and Norfolk soils, are suited to all of the grasses commonly grown in the county. Fescue, fescue and clover, common bermudagrass, and bahiagrass can produce six to nine animal unit months

Figure 3.—This area of Lynchburg fine sandy loam is suited to tobacco because tile drains are used to lower the water table.

of grazing on those soils each year. Hybrid bermudagrass can produce an average of 10 animal unit months of grazing.

Soils that have thick sandy surface and subsurface layers or that are sandy throughout, such as Bonneau, Conetoe, and Tarboro soils, are subject to moisture stress and leaching of plant nutrients. They are not well suited to fescue or clover; they are better suited to grasses, such as hybrid bermudagrass, common bermudagrass, or bahiagrass. These grasses can produce five to nine animal unit months of grazing on these soils.

Poorly drained soils, such as Bethera, Bibb, Rains, and Roanoke soils, are best suited to fescue or fescue and legume mixtures, which can produce from five to nine animal unit months of grazing per year, depending on the management techniques used.

A well-rounded pasture and hayland management program includes the use of grasses that are best adapted to the soils, proper fencing for rotation of

grazing stock, and intensive fertilization. A well-managed system can produce pasture grazing from March through November in Martin County. Hayland crops of hybrid bermudagrass and field gleanings can then be used during the winter for livestock. However, field gleanings should not be used at the expense of organic matter and soil tilth.

Soil Fertility

The soils in Martin County are generally low in natural fertility, and they are naturally acid. Additions of lime and fertilizer are needed for most crop production.

Liming requirements are a major concern to the farmer because the acidity level in the soil affects the availability of many of the nutrient elements to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum, counteracting the adverse effects that high levels of aluminum have on many crops. Lime adds calcium (calcitic lime) or calcium and magnesium (dolomitic lime) to the soil.

A soil test is used as a guide to indicate how much and what kind of lime should be used. For example, in soils that have a sandy surface texture, magnesium and available calcium levels may be low. The desired pH level may differ depending upon the soil properties and the crop to be grown.

Nitrogen fertilization is required for most crops. It generally is not required for peanuts, clover, in some rotations of soybeans, or for alfalfa after it has been established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates are discussed in the section "Yields Per Acre." Because nitrogen can be readily leached from sandy soils, applications of nitrogen on these soils may be needed more than once during the growing season.

The need for phosphorus and potassium fertilizers can be predicted from soil tests. Because past applications of phosphorus and potassium tend to build up in the soil, requirements for these nutrients need to be determined.

Chemical Weed Control

The use of herbicides for weed control in crops is a common practice in Martin County. Successful use leads to less tillage and is an integral part of modern farming. Soil properties, such as content of organic matter and texture of the surface layer, affect the rate of herbicide application. Estimates for these properties were determined for the soils in this survey area. Table 15 shows a general range of organic matter content. The surface texture is shown in table 14 in the USDA texture column.

In some cases, the soil's content of organic matter can be outside the range shown in table 15 and can be higher in soils that have received high amounts of animal or manmade waste. Soils that have been recently brought into cultivation can have a higher content of organic matter in the surface layer than similar soils that have been in cultivation for a long time. Conservation tillage increases content of organic matter in the surface layer. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. Current soil tests are needed to measure content of organic matter before determining required herbicide rates. The herbicide label shows specific application rates based on content of organic matter and texture of the surface layer.

Yields Per Acre

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

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

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

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. Nitrogen rates for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds of nitrogen per acre. Where the yield potential is only 100 bushels per acre, then rates of 100 to 120 pounds of nitrogen per acre

should be used. Application of nitrogen in excess of potential yields generally is not a sound practice. Excess fertilizer causes water pollution as well as an unnecessary expense. If corn or cotton follow harvested soybeans or peanuts, nitrogen rates can be reduced 20 to 30 pounds per acre.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

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

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

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production. No class VIII soils have been recognized in Martin 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 a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Forest managers are challenged to produce greater yields from smaller areas of forest land. Meeting this challenge requires an intensity of management and silvicultural practices that were unheard of a few decades ago. Many of the silvicultural techniques applied in forestry resemble those long practiced in agriculture. The techniques include establishing, weeding, and thinning a desirable young stand; propagating more productive species and genetic varieties; planning for short rotations and complete fiber

utilization; controlling insects, disease, and weeds; and increasing growth by fertilization and drainage. Though timber crops require decades to grow, the goal of intensive management is similar to that of intensive agriculture—to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 183,261 acres *(11)*, or about 62 percent of the land area of Martin County. Commercial forest land is land that produces or can produce crops of industrial wood and is not withdrawn from timber utilization. Loblolly pine is the most important timber-producing tree in the county because it grows fast, adapts to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

One of the first steps for intensively managing forest land is to determine the productive capacity of the soil for several tree species. The most productive and valued trees are then selected for each parcel of land. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of decisions concerning future expenses and profits associated with intensive forest management, land acquisition, or industrial investments.

The productive capacity of forest lands depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The interaction of these soil properties and site characteristics determine site productivity. Other site factors, such as steepness and length of slope, affect water movement and availability. The amount of rainfall and length of growing season influence site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: R, W, and S.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if soil wetness restricts equipment use for more than 6

months per year, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Serious damage to forest sites during logging can be avoided through careful planning of logging, preparation of the site for logging, and close supervision of the work. Losses in productivity caused by compaction can be largely restored by cultivation and fertilization *(7)*.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer and depth and duration of the water table. Mortality generally is greatest on soils that have a sandy surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The productivity of the soils in this survey is mainly based on loblolly pine *(6)*. Indexes are also shown for sweetgum *(4)*, yellow poplar *(3)*, upland oak *(8)*, and water oaks *(5)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

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

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking

areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Soil Conservation Service, helped prepare this section.

Wildlife habitat in Martin County is strongly influenced by the Roanoke River. Soils associated with this river are fertile and are susceptible to flooding, which has a strong influence on land use patterns. Much of the river bottoms are still wooded. Wildlife populations are generally rated as moderate to high throughout much of the county. Deer, quail, rabbit, squirrel, ducks, and dove populations are high during most years, although cycle effects are sometimes observed.

Wild turkey populations are moderate to high along the Roanoke River bottoms. Habitat for this species is largely confined to soils on which mixed hardwood plant communities are predominant. In these areas, mixed oaks are prevalent and provide an excellent food source for turkey, deer, and squirrel.

The native and migratory duck populations are high along the Roanoke River and its adjacent wetlands. Other aquatic bird and furbearer populations are also extensive in these areas.

Small game habitat in the county is good. Agricultural crop fields are relatively small and well mixed with woodlands. This pattern of land use provides for a maximum of "edge" habitat, which is very favorable to such species as quail and rabbits. Soils associated with this habitat type are predominantly Craven, Goldsboro, Norfolk, and Wickham soils.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, barley, rye, millet, buckwheat, soybeans, cowpeas, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are

texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, switchgrass, clover, bahiagrass, trefoil, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggarweed, partridgepea, and pokeweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are the available water capacity and wetness. Examples of these plants are oak, poplar, sweetgum, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope. Examples of wetland plants are smartweed, wild millet, rushes, sedges, cutgrass, cattail, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning doves, many species of songbirds, cottontail, red fox, and deer.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, redwing blackbirds, muskrat, mink, raccoon, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to the seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals and mineralogy of the sand and silt fractions. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the soil texture and slope. The time of the year that excavations can be made is affected by the depth to the water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to the water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to the water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to the water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to the water table affect the traffic-supporting capacity.

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

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to the water table and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to the water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Steep slopes can cause construction problems.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to the water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use

as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by depth to the water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential or slopes of 15 to 25 percent. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. Sand is used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil) and the thickness of suitable material. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand that is up to 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, depth to the water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope and depth to the water table.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to

overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter. Depth to the water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on permeability, depth to the water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness and slope affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3

inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used. In Martin County, only soils with low or moderate shrink-swell potentials have been recognized.

Erosion factor K indicates the susceptibility of a soil

to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of well drained to excessively drained sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of soils that have a permanent high water table or soils that have a claypan or clay layer at or near the surface. These soils have a very slow rate of water transmission.

Some soils in table 16 are assigned to a dual hydrologic group, B/D. These soils are in hydrologic group B if they are artificially drained. They are in hydrologic group D if they are in the natural undrained condition.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

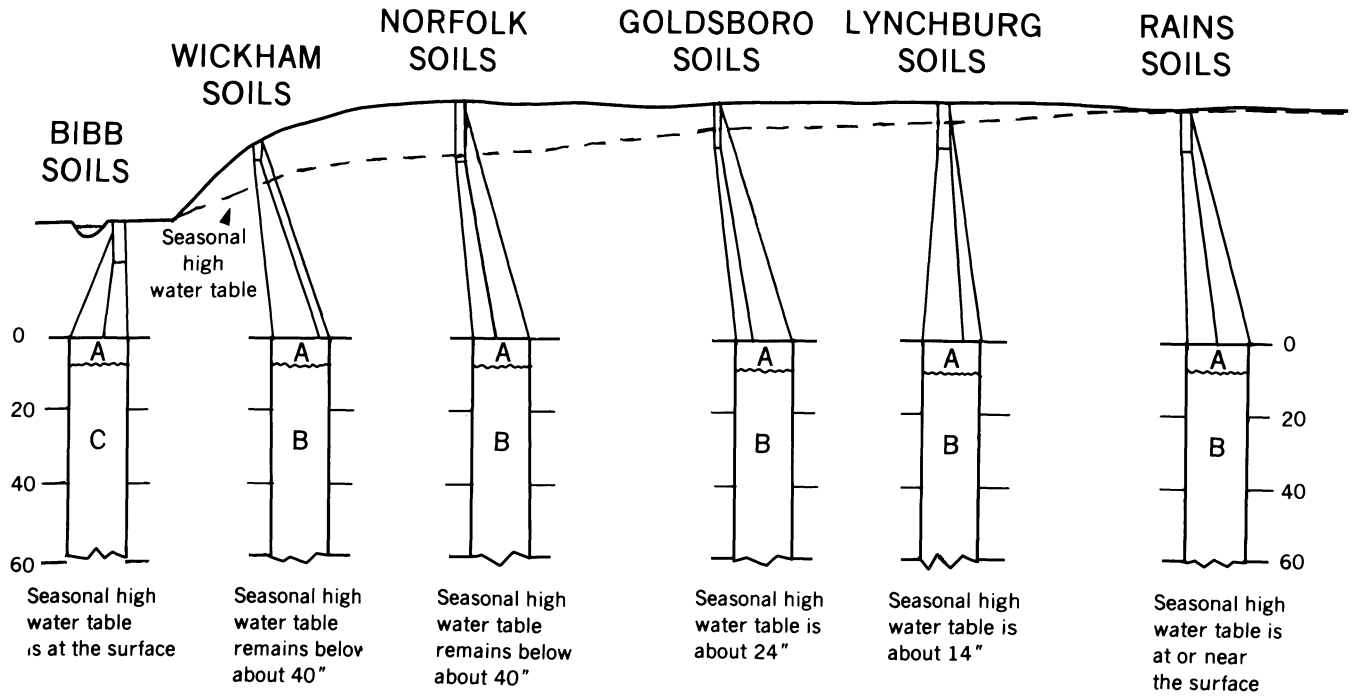


Figure 4.—Soil-landscape-seasonal high water table relationship among several soils in Martin County.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years (fig. 4). The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit.

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

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(10)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning river or flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, mixed, acid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. An example of a series that is a member of the fine, mixed, acid thermic Typic Fluvaquents family is the Chastain series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described along with the state plane coordinates (X; Y). The detailed description of each soil horizon follows standards in the *Soil Survey Manual (9)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (10)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Altavista Series

The Altavista series consists of moderately well drained soils on low stream terraces. Permeability is moderate. Slope is 0 to 2 percent.

Typical pedon of Altavista fine sandy loam, 0 to 2 percent slopes, occasionally flooded; from Jamesville, west 3.7 miles on U.S. Highway 64, north 0.5 mile on Secondary Road 1505, 200 feet west of road in a cultivated field (2,604,789X; 756,580Y):

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

E—8 to 12 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—12 to 16 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine roots; few distinct clay skins on faces of peds; medium acid; clear wavy boundary.

Bt2—16 to 24 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium distinct light yellowish brown (10YR 6/4) mottles and common medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine flakes of mica; few distinct clay skins on faces of peds; strongly acid; clear smooth boundary.

Bt3—24 to 35 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct light gray (10YR 7/2) mottles and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine flakes of mica; few distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BC—35 to 42 inches; strong brown (7.5YR 5/8) sandy loam; many medium prominent light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Cg—42 to 62 inches; light gray (10YR 7/1) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; some lenses of sandy clay material; massive; friable; few fine flakes of mica; very strongly acid.

The solum is 30 to 50 inches thick. Reaction is very strongly acid to medium acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 3.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 to 7, and dominant chroma of 3 to 8 in the upper part. Chroma of 2 or less is common in the lower part of the Bt horizon. Texture is sandy clay loam. The BC horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8. Texture is sandy loam. Some pedons do not have a BC horizon.

The C horizon has hue of 7.5YR to 2.5Y, value of 6 or 7, and chroma of 1 to 8. Texture is sandy loam or loamy sand and stratified layers of sandy clay. Few to many flakes of mica are throughout.

Augusta Series

The Augusta series consists of somewhat poorly drained soils on low stream terraces. Permeability is moderate. Slope is less than 2 percent.

Typical pedon of Augusta loam, occasionally flooded; from Williamston, northwest 2.6 miles on North Carolina Highway 125, north on Secondary Road 1421 to end, on private road 0.5 mile, 300 feet east of road in cutover woods (2,565,789X; 786,447Y):

A—0 to 5 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) rubbed; moderate medium granular structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

Bt1—5 to 14 inches; brownish yellow (10YR 6/6) sandy clay loam; ped faces are dominantly light gray (10YR 7/2); common medium distinct yellowish brown (10YR 5/4), light gray (10YR 7/2), and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky and slightly plastic; common fine roots; few distinct clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—14 to 37 inches; mottled pale brown (10YR 6/3), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/8) sandy clay loam; pockets of clay loam; ped faces are dominantly light brownish gray (10YR 6/2); weak medium subangular blocky structure; friable, sticky and slightly plastic; few distinct clay skins on faces of peds; common fine mica flakes; strongly acid; gradual wavy boundary.

Btg—37 to 49 inches; gray (10YR 6/1) clay loam; many coarse prominent strong brown (7.5YR 5/8) mottles

and common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few distinct clay skins on faces of peds; many fine mica flakes; strongly acid; gradual wavy boundary.

2Cg—49 to 64 inches; gray (10YR 6/1) sand; many medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; single grained; loose; very strongly acid.

The solum is 40 to 80 inches thick. Reaction is very strongly acid to medium acid except where lime has been added to the soil.

The A horizon has hue of 10YR, value of 4, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 to 8 in the upper part and chroma of 1 or 2 in the lower part. Mottles in shades of gray, brown, and yellow are common throughout the Bt horizon. Texture is dominantly sandy clay loam, but the range includes clay loam.

Some pedons have a CB horizon that has colors similar to those of the Bt horizon. Texture is loamy sand.

The 2Cg horizon has hue of 10YR or 7.5YR, value of 5 or 6, chroma of 1, and high chroma mottles. Texture is sand or stratified sandy loam and sand.

Bethera Series

The Bethera series consists of poorly drained soils on uplands. Permeability is slow or moderately slow. Slope is less than 2 percent.

Typical pedon of Bethera loam; from Jamesville, south 8.7 miles on North Carolina Highway 171, east 1.85 miles on Secondary Road 1541, 50 feet south of road in woods (2,608,158X; 721,316Y):

Ap—0 to 6 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; many fine roots and pores; very strongly acid; abrupt smooth boundary.

Btg1—6 to 11 inches; gray (10YR 5/1) clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, sticky and plastic; common fine roots; few distinct clay skins on faces of peds; very strongly acid; clear smooth boundary.

Btg2—11 to 45 inches; gray (10YR 5/1) clay loam; many medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; very firm, very sticky and very plastic; few fine roots; common distinct clay skins on faces of peds; very strongly acid; gradual smooth boundary.

Btg3—45 to 65 inches; gray (10YR 6/1) clay loam; many medium distinct very pale brown (10YR 7/4) mottles and many medium prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few distinct clay skins on faces of peds; very strongly acid.

The solum is more than 60 inches thick. Reaction is extremely acid to strongly acid except where lime has been added to the soil.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2.

Some pedons have an E horizon that has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. Texture is clay loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 or less. Mottles are in shades of brown, yellow, or red. Texture is clay, silty clay, sandy clay, silty clay loam, or clay loam.

Bibb Series

The Bibb series consists of poorly drained soils on flood plains. Permeability is moderate. Slope is less than 2 percent.

Typical pedon of Bibb loam, frequently flooded; on a wooded flood plain 8.5 miles northwest of Williamston on North Carolina Highway 125, 500 feet east of bridge over Conoho Creek, 50 feet north of creek (2,531,526X; 791,395Y):

A—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; common medium faint grayish brown (10YR 5/2) mottles; weak fine granular structure; very friable; many fine roots; strongly acid; abrupt wavy boundary.

Ag—10 to 16 inches; gray (N 5/0) loam; common medium faint dark gray (10YR 4/1) mottles and few fine distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; friable; many fine roots; strongly acid; clear wavy boundary.

Cg1—16 to 29 inches; light gray (10YR 7/1) sandy loam; few fine distinct pale brown (10YR 6/3) mottles and few medium distinct brownish yellow (10YR 6/6) mottles; massive; very friable; common fine roots; very strongly acid; clear wavy boundary.

Cg2—29 to 61 inches; gray (N 6/0) loamy sand; stratified sandy loam lenses; massive; very friable; few fine roots; very strongly acid.

The surface layer is 4 to 20 inches thick. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 2 to 4, and chroma of 1 or 2.

The Cg horizon has hue of 10YR to 5Y, value of 3 to 7, and chroma of 1 or 2; or it is neutral and has value of 3 to 7. Mottles in shades of yellow or brown are few to common. Texture is stratified loamy sand, sandy loam, or loam.

Bonneau Series

The Bonneau series consists of well drained soils on uplands. Permeability is rapid in the upper part of the solum and moderate in the lower part. Slope ranges from 0 to 12 percent.

Typical pedon of Bonneau loamy sand, 0 to 6 percent slopes; from Williamston, 2 miles northwest on North Carolina Highway 125 to Edmonson's Grocery, north 300 feet in a cultivated field (2,562,895X; 779,474Y):

Ap—0 to 10 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

E—10 to 26 inches; light yellowish brown (10YR 6/4) loamy sand; weak medium granular structure; very friable; few fine roots; medium acid; clear wavy boundary.

BE—26 to 30 inches; brownish yellow (10YR 6/8) and light yellowish brown (10YR 6/4) sandy loam; weak medium subangular blocky structure; friable; strongly acid; clear wavy boundary.

Bt1—30 to 42 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few distinct clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—42 to 56 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent red (2.5YR 4/8) mottles and few fine distinct very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky; few distinct clay skins on faces of peds; few small pieces of hard plinthite; very strongly acid; gradual wavy boundary.

Bt3—56 to 66 inches; brownish yellow (10YR 6/8) sandy clay; common fine prominent light red (2.5YR 6/8) mottles and common medium prominent light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct clay skins on faces of peds; very strongly acid; gradual irregular boundary.

Bt4—66 to 75 inches; brownish yellow (10YR 6/8) sandy clay loam: sandy loam lenses; many medium prominent white (10YR 8/2) mottles and common medium prominent light red (2.5YR 6/8) mottles; weak medium and coarse subangular blocky structure; friable; few distinct clay skins on faces of peds; very strongly acid.

The solum is 60 to 80 inches thick. Reaction is very strongly acid to medium acid in the A and E horizons except where lime has been added. It is very strongly acid or strongly acid in the BE and Bt horizons.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4. Texture is dominantly loamy sand, but the range includes loamy fine sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 6 to 8. Texture is mainly sandy clay loam, but some pedons have layers of sandy loam and sandy clay. The silt content is less than 30 percent.

Chastain Series

The Chastain series consists of poorly drained soils on flood plains along the Roanoke River. Permeability is slow. Slope is less than 2 percent.

Typical pedon of Chastain silt loam, frequently flooded; 4.5 miles northeast of Oak City on North Carolina Highway 11, 200 feet east of highway in the woods on the Roanoke River flood plain (2,525,421X; 825,579Y):

A—0 to 5 inches; grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; medium acid; clear wavy boundary.

Bg—5 to 16 inches; grayish brown (2.5Y 5/2) silty clay; many fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, very sticky and very plastic; common fine roots; few fine mica flakes; strongly acid; gradual wavy boundary.

Cg1—16 to 40 inches; grayish brown (10YR 5/2) silty clay; many medium prominent yellowish brown (10YR 5/8) mottles; massive; firm, very sticky and very plastic; many black manganese concretions; many fine mica flakes; very strongly acid; diffuse wavy boundary.

Cg2—40 to 60 inches; light brownish gray (10YR 6/2) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles and few fine prominent yellowish red (5YR 4/6) mottles; massive; firm, sticky and plastic; common fine manganese concretions; many fine mica flakes; very strongly acid.

The solum is 16 to 42 inches thick. Reaction is very strongly acid or strongly acid except where lime has been added.

The A horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 2.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 0 to 2. Mottles are in shades of brown or yellow. Texture is silty clay or silty clay loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Mottles are common to many in shades of yellow, red, or brown. Texture is clay loam, silty clay loam, or silty clay.

Conetoe Series

The Conetoe series consists of well drained soils on river and stream terraces. Permeability is moderately rapid. Slope ranges from 0 to 3 percent.

Typical pedon of Conetoe loamy sand, 0 to 3 percent slopes; from Williamston, west 0.3 mile from U.S. Highway 17 bypass on business U.S. Highway 17, 0.5 mile north on a private road, 20 feet east of road in a cultivated field (2,577,895X; 780,789Y):

Ap—0 to 14 inches; dark brown (10YR 4/3) loamy sand; weak medium granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

E—14 to 26 inches; strong brown (7.5YR 5/6) loamy sand; weak medium granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.

Bt1—26 to 31 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; few faint clay bridges between sand grains; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt2—31 to 52 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; many fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3—52 to 58 inches; reddish yellow (7.5YR 6/8) sandy loam; weak medium subangular blocky structure; very friable; few faint clay bridges between sand grains; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—58 to 74 inches; reddish yellow (7.5YR 6/6) loamy sand; massive; very friable; common fine flakes of mica; very strongly acid.

The solum is 16 to 60 inches thick. Reaction is very strongly acid to medium acid except where lime has been added to the soil.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 1 to 3.

The E horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. The texture is loamy sand or loamy fine sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 5 to 8. The texture is sandy loam or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 3 to 8. The texture is loamy sand, coarse loamy sand, or sand.

Craven Series

The Craven series consists of moderately well drained soils on uplands. Permeability is slow. Slope ranges from 0 to 12 percent.

Typical pedon of Craven fine sandy loam, 0 to 1 percent slopes; in Jamesville, 2,400 feet west of Secondary Road 1577 on U.S. Highway 64, south 150 feet in a cultivated field (2,616,789X; 754,842Y):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable; common fine roots; medium acid; abrupt wavy boundary.

Bt1—9 to 13 inches; light yellowish brown (10YR 6/4) clay loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few fine pores; few faint clay skins on faces of peds; strongly acid; clear smooth boundary.

Bt2—13 to 22 inches; brownish yellow (10YR 6/6) clay; few fine faint mottles; weak medium subangular blocky structure; very firm, sticky and plastic; few fine roots; common fine and medium pores; few distinct clay skins on faces of peds; very strongly acid; gradual smooth boundary.

Btg1—22 to 47 inches; gray (10YR 6/1) clay; common medium distinct reddish yellow (7.5YR 6/8) and light red (2.5YR 6/6) mottles; weak medium subangular blocky structure; very firm, sticky and plastic; few fine roots; few fine and medium pores; common distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—47 to 53 inches; gray (10YR 6/1) clay; common medium distinct strong brown (7.5YR 5/8) mottles and common coarse distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; very firm, sticky and plastic; few fine pores; common distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—53 to 58 inches; gray (10YR 6/1) clay loam; few medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few coarse grains of quartz; very strongly acid; gradual smooth boundary.

Cg—58 to 67 inches; light gray (10YR 7/1) clay loam; common fine distinct brownish yellow (10YR 6/6) and red (2.5YR 5/8) mottles; massive; firm, sticky and slightly plastic; few coarse grains of quartz; very strongly acid.

The solum is 42 to 60 inches thick. Reaction is very strongly acid to strongly acid except where lime has been added to the soil.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4. Texture is fine sandy loam, very fine sandy loam, or silt loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. Mottles with chroma of 2 or less are few to common in the lower part of the Bt horizon, or the horizon has a matrix with chroma of 1 or 2. Texture is clay, silty clay loam, or clay loam.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture ranges from loamy sand to clay loam.

Croatan Series

The Croatan series consists of very poorly drained organic soils in depressions on uplands. Permeability is moderate or moderately slow. Slope is less than 2 percent.

Typical pedon of Croatan muck, rarely flooded; 0.2 mile northwest of Beaufort County line on the J and W Tram Road, to Blades Road (in Weyerhaeuser forests), west on Blades Road 0.5 mile, southwest on Potter Road 0.6 mile, west 20 feet into forest (2,606,316X; 706,316Y):

Oa1—0 to 4 inches; dark brown (7.5YR 3/2) muck; about 7 percent fiber unrubbed; 2 percent rubbed; moderate fine granular structure; very friable, slightly sticky; extremely acid; gradual wavy boundary.

Oa2—4 to 18 inches; black (7.5YR 2/0) muck; about 5 percent fiber, less than 2 percent rubbed; massive; very friable, slightly sticky; common fine and medium roots; common medium pieces of woody material; extremely acid; diffuse wavy boundary.

2Cg1—18 to 34 inches; dark gray (10YR 4/1) sandy loam; lenses of sandy clay loam; massive; very friable; extremely acid; gradual wavy boundary.

2Cg2—34 to 65 inches; gray (10YR 5/1) clay loam; massive; friable, sticky and plastic; extremely acid.

The combined thickness of the organic layers ranges from 16 to 51 inches. Reaction is extremely acid in the Oa horizon. It ranges from extremely acid to slightly acid in the 2Cg horizon.

The Oa horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 0 to 2.

The 2Cg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1. Texture is dominantly sandy loam or clay loam with lenses of sandy clay loam.

Dorovan Series

The Dorovan series consists of very poorly drained organic soils on flood plains. Permeability is moderate. Slope is less than 1 percent.

Typical pedon of Dorovan muck, frequently flooded; from Dardens, north 1.1 miles on Secondary Road 1565, west 0.9 mile on a farm road to a trail across a cultivated field, to a forest on a flood plain, 100 feet north of field (2,644,263X; 770,120Y):

Oa1—0 to 8 inches; very dark brown (10YR 2/2) muck; consisting of partly decomposed leaves, roots, and twigs mixed with well decomposed organic matter; about 40 percent fiber unrubbed, 15 percent rubbed; slightly sticky; extremely acid; gradual wavy boundary.

Oa2—8 to 40 inches; black (10YR 2/1) muck; about 30 percent fiber unrubbed and about 5 percent rubbed that is partly decomposed wood 0.5 to 1 inch in size; massive; nonsticky; common roots and partly decomposed limbs; extremely acid; diffuse wavy boundary.

Oa3—40 to 65 inches; black (10YR 2/1) muck; about 30 percent fiber unrubbed and about 5 percent rubbed that is partly decomposed wood; massive;

nonsticky; few roots; about 10 percent woody limbs and twigs; few logs; extremely acid; gradual wavy boundary.

2Cg—65 to 95 inches; gray (10YR 5/1) sand; single grained; loose; few partly decayed small fragments of wood; very strongly acid.

The organic material ranges from 51 inches to more than 80 inches in thickness. Reaction is extremely acid in the Oa horizon and very strongly acid or strongly acid in the 2Cg horizon.

The Oa horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. Fiber content ranges from 30 to 40 percent unrubbed and 3 to 15 percent rubbed.

The 2Cg horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 0 to 2. Texture ranges from sand to fine sandy loam.

Foreston Series

The Foreston series consists of moderately well drained soils on uplands. Permeability is moderately rapid. Slope is less than 2 percent.

Typical pedon of Foreston loamy fine sand; from Everetts, 0.8 mile east on U.S. Highway 64, 0.6 mile south on Secondary Road 1139, 60 feet east of road in a cultivated field (2,547,368X; 761,053Y):

Ap—0 to 10 inches; dark grayish brown (2.5Y 4/2) loamy fine sand; weak fine granular structure; very friable; medium acid; abrupt smooth boundary.

Bt1—10 to 20 inches; light olive brown (2.5Y 5/4) sandy loam; weak fine subangular blocky structure; very friable; few distinct clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—20 to 27 inches; light olive brown (2.5Y 5/8) sandy loam; common medium faint yellowish brown (10YR 5/8) mottles and few medium faint light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; very friable; few distinct clay skins on faces of peds; strongly acid; gradual wavy boundary.

E—27 to 37 inches; light olive brown (2.5Y 5/4) loamy sand; many fine distinct light gray (2.5Y 7/2) mottles and few medium faint yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

E/B—37 to 62 inches; mottled light olive brown (2.5Y 5/4), yellowish brown (10YR 5/8), and light gray (2.5Y 7/2) loamy sand; pockets of sandy loam; weak fine subangular blocky structure; very friable; clay bridging of sand grains; few pockets of clean sand grains; very strongly acid; gradual wavy boundary.

Btg—62 to 72 inches; gray (10YR 6/1) sandy loam; pockets of sandy clay loam; common medium prominent yellowish brown (10YR 5/6) mottles, common coarse prominent light yellowish brown (2.5Y 6/4) mottles, and few fine prominent red (2.5YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct clay skins on faces of peds; very strongly acid.

The solum is more than 60 inches thick. Reaction is very strongly acid to medium acid except where lime has been added to the soil.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. Texture is sandy loam or fine sandy loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. Texture is sand or loamy sand.

The E/B horizon has colors and textures similar to the E and Bt horizons.

The Btg horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2. Texture is sandy loam, fine sandy loam, or sandy clay loam. Some pedons have a Bt′ horizon with hue and value similar to those of the Btg horizon, but with chroma of 3 to 8. Texture is similar to that of the Btg horizon.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils on uplands. Permeability is moderately slow. Slope ranges from 0 to 2 percent.

Typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes; from Robersonville, 2 miles northeast on Secondary Road 1300, south 350 feet on farm lane, west 125 feet in a cultivated field (2,507,895X; 765,789Y):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

E—9 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

Bt1—14 to 24 inches; yellowish brown (10YR 5/6)

sandy clay loam; few fine distinct pale brown (10YR 6/3) mottles and common medium faint strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 46 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium distinct light gray (10YR 7/2) mottles and common fine distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—46 to 58 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium distinct light gray (10YR 7/1) mottles and few fine prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg—58 to 67 inches; gray (10YR 6/1) sandy clay loam; few pockets of sandy loam; common medium distinct yellow (10YR 7/6) mottles and common medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; very strongly acid.

The solum is 62 to 75 inches thick. Reaction is very strongly acid or strongly acid except where lime has been added to the soil.

The Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. Texture is fine sandy loam, sandy loam, or loamy fine sand.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is sandy clay loam or clay loam.

The Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is sandy clay loam or clay loam.

Some pedons have a BCg horizon that has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. A few high-chroma mottles are in some pedons. Texture is sandy loam.

Lenoir Series

The Lenoir series consists of somewhat poorly drained soils on uplands. Permeability is slow. Slope is less than 2 percent.

Typical pedon of Lenoir loam; 200 feet north of junction of Secondary Roads 1544 and 1538, 500 feet east on a farm lane, 50 feet north of lane in a cultivated field (2,608,158X; 727,632Y):

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam; weak fine subangular blocky structure; friable; many fine roots; medium acid; clear smooth boundary.

Bt—8 to 15 inches; yellowish brown (10YR 5/6) clay loam; ped faces are dominantly light brownish gray (10YR 6/2); few medium distinct light brownish gray (10YR 6/2) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Btg1—15 to 32 inches; gray (10YR 6/1) silty clay; many medium brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm, very sticky and very plastic; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Btg2—32 to 50 inches; gray (10YR 5/1) clay; few medium distinct brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8) mottles and few faint distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; very firm, very sticky and very plastic; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—50 to 61 inches; gray (10YR 6/1) clay; few medium distinct brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; very firm, very sticky and very plastic; few fine roots; few distinct clay skins on faces of peds; very strongly acid.

The solum is more than 60 inches thick. Reaction is extremely acid to strongly acid except where lime has been added to the soil.

The Ap or A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. Texture is clay, clay loam, or silty clay loam. The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of brown, yellow, or red. Texture is clay, silty clay, or silty clay loam.

Lynchburg Series

The Lynchburg series consists of somewhat poorly drained soils on uplands. Permeability is moderate. Slope is less than 2 percent.

Typical pedon of Lynchburg fine sandy loam; from Gold Point, southwest 2.2 miles on Secondary Road 1305 (0.5 mile southwest of Secondary Road 1306), 40 feet east of road in a cultivated field (2,509,210X; 769,045Y):

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

E—10 to 14 inches; yellowish brown (10YR 5/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

Bt—14 to 17 inches; pale brown (10YR 6/3) sandy clay loam; ped faces are dominantly light brownish gray (10YR 6/2); common medium faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; strongly acid; clear smooth boundary.

Btg1—17 to 26 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Btg2—26 to 44 inches; light gray (10YR 7/1) sandy clay loam; many medium prominent brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Btg3—44 to 55 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct yellow (10YR 7/8) and reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg4—55 to 63 inches; light gray (10YR 7/1) sandy clay loam; common medium distinct yellow (10YR 8/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay skins on faces of peds; very strongly acid.

The solum is more than 60 inches thick. The soil is extremely acid to strongly acid except where lime has been added to the soil.

The Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. Some higher chroma mottles are in some pedons. Texture is fine sandy loam.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 8. Texture is sandy clay loam or clay loam.

The Btg horizon has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2. Texture is sandy clay loam or clay loam. Pockets of sandy loam or sandy clay are in some pedons.

Norfolk Series

The Norfolk series consists of well drained soils on uplands. Permeability is moderate. Slope ranges from 0 to 6 percent.

Typical pedon of Norfolk loamy fine sand, 2 to 6 percent slopes; from Williamston, west 1 mile on U.S. Highway 64, west 3.5 miles on Secondary Road 1409, south 1,200 feet on farm road, west 50 feet in a field (2,550,000X; 766,947Y):

Ap—0 to 6 inches; light yellowish brown (10YR 6/4) loamy fine sand; moderate fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

BE—6 to 9 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

Bt1—9 to 17 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; strongly acid; gradual smooth boundary.

Bt2—17 to 29 inches; yellowish brown (10YR 5/8) clay loam; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt3—29 to 38 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt4—38 to 48 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine distinct pale brown (10YR

6/3) mottles and common medium prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky and slightly plastic; few distinct clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt5—48 to 62 inches; brownish yellow (10YR 6/8) sandy clay loam; pockets of sandy clay; common medium prominent yellowish red (5YR 5/6) mottles and common fine prominent light gray (10YR 7/2) mottles; weak medium subangular blocky structure; firm, sticky and slightly plastic; few distinct clay skins on faces of peds; strongly acid.

The solum is more than 60 inches thick. Reaction is very strongly acid or strongly acid except where lime has been added to the soil.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4.

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4. Texture is loamy fine sand, fine sandy loam, or sandy loam.

The BE horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is sandy loam.

The upper part of the Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 5 to 8. Texture is sandy clay loam or clay loam. The lower part has colors that are similar to the upper part but has few to many gray, brown, or red mottles. Texture is clay loam, sandy clay loam, or sandy clay.

Pantego Series

The Pantego series consists of very poorly drained soils on uplands. Permeability is moderate. Slope is less than 2 percent.

Typical pedon of Pantego loam; from Hassell, west 0.4 mile on North Carolina Highway 142, south 0.6 mile on Weyerhauser Road, 20 feet east of road (2,506,105X; 785,789Y):

A1—0 to 10 inches; black (10YR 2/1) loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear irregular boundary.

A2—10 to 18 inches; black (10YR 2/1) loam; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; clear irregular boundary.

Btg1—18 to 29 inches; gray (10YR 5/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common fine roots; few distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—29 to 61 inches; gray (10YR 6/1) clay loam; many medium distinct yellowish brown (10YR 5/6) mottles and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—61 to 76 inches; gray (10YR 6/1) sandy clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few faint discontinuous clay skins on ped faces; very strongly acid.

The solum is more than 60 inches thick. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

Some pedons have an E horizon that has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. Texture is fine sandy loam or sandy loam.

The Btg horizon has hue of 10YR, value of 4 to 6, chroma of 1 or 2, and higher chroma mottles. Texture is commonly sandy clay loam or clay loam, but thin layers of sandy clay and sandy loam are in the lower part of some pedons.

Rains Series

The Rains series consists of poorly drained soils on flats and in depressions on uplands. Permeability is moderate. Slope is less than 2 percent.

Typical pedon of Rains fine sandy loam; from Williamston, west on U.S. Highway 64, southwest 1 mile on Secondary Road 1142, south 0.7 mile on Secondary Road 1126, 0.2 mile south of junction of Secondary Roads 1126 and 1125, 25 feet east of Secondary Road 1126 in cutover woods (2,563,684X; 758,158Y):

A—0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Eg—5 to 12 inches; gray (10YR 5/1) fine sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.

Btg1—12 to 42 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles and many medium faint dark gray (10YR 4/1) mottles; weak medium subangular

blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—42 to 64 inches; mottled gray (10YR 6/1), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; few faint clay skins on faces of peds; friable; very strongly acid.

The solum is 60 to 90 inches thick. Reaction ranges from extremely acid to strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The Eg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is fine sandy loam or sandy loam.

The Btg horizon has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. Texture is sandy clay loam or clay loam. In some pedons the lower part of the Btg horizon is sandy clay.

Some pedons have a Cg or 2Cg horizon that has colors similar to those of the Btg horizon. Texture is variable, ranging from sand to sandy clay.

Roanoke Series

The Roanoke series consists of poorly drained soils on low terraces. Permeability is slow. Slope is less than 2 percent.

Typical pedon of Roanoke loam, frequently flooded; from the Williamston Roanoke River bridge, 0.3 mile south on U.S. Highway 17, 80 feet west of road in cutover woods (2,580,000X; 772,632Y):

A—0 to 7 inches; grayish brown (2.5Y 5/2) loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

Btg1—7 to 14 inches; gray (10YR 5/1) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles and few fine distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; common distinct clay skins on faces of peds; strongly acid; clear wavy boundary.

Btg2—14 to 26 inches; light brownish gray (2.5Y 6/2) clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; very firm, very sticky and very plastic; common distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—26 to 44 inches; gray (10YR 6/1) clay; many medium prominent strong brown (7.5YR 5/6) mottles and common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; very firm, very sticky and very plastic; common distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BC—44 to 54 inches; mottled gray (10YR 5/1), light yellowish brown (10YR 6/4), and yellowish red (5YR 4/8) clay loam; weak coarse subangular blocky structure; firm, sticky and plastic; very strongly acid; gradual wavy boundary.

2Cg—54 to 69 inches; white (10YR 8/1) sandy loam; many coarse dark brown (10YR 4/3) mottles; massive; friable; extremely acid.

The solum is 44 to 60 inches thick. Reaction in the A and B horizons ranges from extremely acid to strongly acid except where lime has been added to the soil. It ranges from extremely acid to slightly acid in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles of higher chroma are few to many. Texture is clay, silty clay, silty clay loam, or clay loam.

The BC horizon is mottled or has colors similar to those of the Btg horizon. Texture is clay loam or sandy clay loam.

The Cg or 2Cg horizon is variable in color and texture. Texture ranges from sand to clay.

Rumford Series

The Rumford series consists of well drained soils on uplands. Permeability is moderately rapid. Slope ranges from 0 to 2 percent.

Typical pedon of Rumford loamy fine sand, 0 to 2 percent slopes; 2.5 miles south of Everetts on Secondary Road 1138, 0.1 mile north of Secondary Road 1142, 80 feet west in a cultivated field (2,547,700X; 748,950Y):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy fine sand; moderate fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

E—9 to 15 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very

friable; few fine roots; strongly acid; clear smooth boundary.
Bt—15 to 30 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; friable; thin clay coatings on sand grains; strongly acid; gradual smooth boundary.
BC—30 to 35 inches; yellowish brown (10YR 5/8) loamy sand; weak medium subangular blocky structure; very friable; strongly acid; diffuse smooth boundary.
C—35 to 74 inches; mottled yellowish brown (10YR 5/8), light gray (10YR 7/2), and white (10YR 8/1) sand; single grained; loose; few lenses of loamy sand; strongly acid.

The solum is 28 to 60 inches thick. Reaction ranges from extremely acid to medium acid in the A, E, and Bt horizons except where lime has been added to the soil. Reaction of the BC and C horizons ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4. Texture is loamy fine sand or loamy sand.

The Bt horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. Texture is sandy loam.

The BC horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. Texture is loamy sand.

The C horizon is mottled. It has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 1 to 8. Texture is sand or gravelly sand with loamy sand or sandy loam lenses.

Seabrook Series

The Seabrook series consists of moderately well drained soils on stream terraces. Permeability is rapid. Slope is less than 2 percent.

Typical pedon of Seabrook sand, rarely flooded; from Williamston, 0.5 mile east of the intersection of U.S. Highways 64 and 17, on U.S. Highway 64, 120 feet northeast in a cultivated field (2,578,842X; 766,210Y):

Ap—0 to 10 inches; dark brown (10YR 4/3) sand; weak fine granular structure; very friable; many fine roots; common fine mica flakes; strongly acid; abrupt smooth boundary.
C1—10 to 25 inches; yellowish brown (10YR 5/6) sand; single grained; loose; common fine mica flakes; strongly acid; diffuse wavy boundary.
C2—25 to 65 inches; light yellowish brown (10YR 6/4) sand; common fine distinct light gray (10YR 7/2) mottles and few fine distinct strong brown (7.5YR 5/6) mottles; single grained; loose; common fine mica flakes; strongly acid.

Seabrook soils have sandy horizons that have a combined thickness of more than 60 inches. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the soil.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The C horizon has hue of 7.5YR to 10YR and value of 4 to 7. Chroma is 3 to 6 in the upper part and 1 to 8 in the lower part. Texture is dominantly sand, but some pedons include loamy coarse sand.

Stallings Series

The Stallings series consists of somewhat poorly drained soils on uplands. Permeability is moderately rapid. Slope ranges from 0 to 3 percent.

Typical pedon of Stallings loamy sand; from Hamilton, north 1.3 miles on North Carolina Highway 903, west 730 feet on a farm road, 25 feet south of road in a cultivated field (2,527,211X; 810,421Y):

Ap—0 to 9 inches; very dark gray (10YR 3/1) loamy sand; weak fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.
E—9 to 12 inches; grayish brown (10YR 5/2) loamy sand; weak medium granular structure; very friable; many fine roots; medium acid; clear wavy boundary.
Bt—12 to 16 inches; yellowish brown (10YR 5/6) sandy loam; common fine distinct grayish brown (10YR 5/2) mottles and few fine distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; very friable; common fine roots; sand grains bridged and coated with clay; strongly acid; clear wavy boundary.
Btg1—16 to 36 inches; light brownish gray (2.5Y 6/2) sandy loam; common medium distinct brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; very friable; few fine roots; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.
Btg2—36 to 47 inches; light gray (10YR 7/1) sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; very friable; few fine roots; sand grains coated and bridged with clay; very strongly acid; gradual wavy boundary.

BC1—47 to 60 inches; light gray (10YR 7/1) loamy sand; many sandy loam lenses; common medium prominent strong brown (7.5YR 5/8) mottles; weak medium granular structure; very friable; sand grains in sandy loam lenses coated and bridged with clay; very strongly acid; gradual wavy boundary.
BC2—60 to 75 inches; yellowish brown (10YR 5/6) loamy sand; common medium distinct light brownish gray (10YR 6/2) and brown (7.5YR 5/4) mottles; weak fine subangular blocky structure; very friable; few small pockets of clean sand grains; very strongly acid.

The solum is more than 60 inches thick. Reaction is extremely acid to strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR or 5YR, value of 3 to 5, and chroma of 1 or 2.

The E horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 2 to 4. Texture is loamy sand or loamy fine sand.

The Bt horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 6. Texture is sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Texture is sandy loam.

The BC horizon has colors similar to those of the Bt or Btg horizon. Texture is loamy sand or loamy fine sand.

Tarboro Series

The Tarboro series consists of somewhat excessively drained soils on stream terraces. Permeability is rapid. Slope ranges from 0 to 5 percent.

Typical pedon of Tarboro loamy sand, 0 to 5 percent slopes; from business U.S. Highway 64 in Williamston, 1 mile north on a farm road, 100 feet northeast of road in a field (2,576,579X; 786,316Y):

Ap—0 to 7 inches; dark brown (7.5YR 4/2) loamy sand; weak fine granular structure; very friable; few fine and medium roots; medium acid; abrupt smooth boundary.
C1—7 to 40 inches; strong brown (7.5YR 5/6) sand; single grained; loose; few fine roots; many fine flakes of mica; strongly acid; gradual wavy boundary.
C2—40 to 62 inches; strong brown (7.5YR 5/8) sand; single grained; loose; many fine flakes of mica; strongly acid.

The sandy material is more than 60 inches thick. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the soil.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8.

Wickham Series

The Wickham series consists of well drained soils on low river terraces. Permeability is moderate. Slope is 0 to 6 percent.

Typical pedon of Wickham sandy loam, 0 to 6 percent slopes, rarely flooded; east of Williamston, 5.7 miles by way of U.S. Highway 64 and State Road 1504 to Secondary Road 1505, north 0.4 mile, east 125 feet in a cultivated field (2,600,947X; 764,473Y):

Ap—0 to 8 inches; yellowish brown (10YR 5/4) sandy loam; weak medium granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.
E—8 to 12 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; common fine roots; many fine flakes of mica; medium acid; clear smooth boundary.
Bt1—12 to 26 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; common fine roots; few faint clay skins on faces of peds; many fine flakes of mica; medium acid; clear wavy boundary.
Bt2—26 to 36 inches; strong brown (7.5YR 5/8) sandy clay loam; many medium distinct yellowish red (5YR 5/8) mottles and few fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; few distinct clay skins on faces of peds; many fine flakes of mica; medium acid; gradual wavy boundary.
BC—36 to 50 inches; reddish yellow (7.5YR 6/8) sandy loam; many medium distinct yellowish red (5YR 5/8) mottles and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; common fine flakes of mica; few gray sand lenses; strongly acid; gradual wavy boundary.
C1—50 to 56 inches; pale brown (10YR 6/3) loamy sand; many medium distinct brownish yellow (10YR 6/6) mottles and few medium prominent yellowish red (5YR 4/8) mottles; single grained; loose; few fine flakes of mica; strongly acid; gradual smooth boundary.
C2—56 to 61 inches; very pale brown (10YR 6/4) sand;

many medium faint brownish yellow (10YR 6/6) mottles; single grained; loose; common fine flakes of mica; strongly acid.

The solum is 36 to 50 inches thick. Reaction is extremely acid to medium acid except where lime has been added to the soil.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 4. Texture is sandy loam or loamy sand.

The Bt horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. Texture is sandy clay loam or sandy loam.

The BC horizon has colors that are similar to the Bt or C horizon. Texture is sandy loam or loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8, or it is mottled. Texture is loamy sand or sand.

Winton Series

The Winton series consists of moderately well drained soils on river bluffs and side slopes. Permeability is moderate. Slope ranges from 8 to 60 percent.

Typical profile of Winton fine sandy loam, 8 to 15 percent slopes; west of Jones Chapel, 2.4 miles to North Carolina Highway 903 and Secondary Road 1332, northeast 1 mile across a cultivated field to a wooded area on the Roanoke River bluffs (2,495,105X; 844,210Y):

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; diffuse irregular boundary.

Bt1—6 to 25 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine roots; few distinct clay skins on faces of peds; strongly acid; diffuse irregular boundary.

Bt2—25 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few distinct clay skins on faces of peds; very strongly acid; gradual wavy boundary.

C—45 to 61 inches; brownish yellow (10YR 6/8) sandy loam; common medium distinct light gray (10YR 7/2) mottles; massive; very friable; very strongly acid.

The solum is 24 to 60 inches thick. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2.

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4. Texture is fine sandy loam or sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6. In some pedons, the lower part of the Bt horizon has mottles in shades of gray, brown, or yellow. The texture of the Bt horizon is sandy clay loam or clay loam.

Some pedons have a BC horizon that has hue of 10YR, value of 4 to 7, and chroma of 2 to 8, or it is mottled. Texture is sandy loam or fine sandy loam.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 8, or it is mottled. Texture ranges from sandy loam to silty clay and is stratified in some pedons.

Woodington Series

The Woodington series consists of poorly drained soils on uplands. Permeability is moderately rapid. Slope is less than 2 percent.

Typical pedon of Woodington fine sandy loam; 1.1 miles north of the intersection of North Carolina Highways 125 and 903 in Hamilton, on North Carolina Highway 903, 0.3 mile west of the road in cutover woods (2,527,000X; 804,000Y):

A—0 to 6 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Eg—6 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Btg1—10 to 16 inches; light brownish gray (10YR 6/2) sandy loam; few medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; sand grains bridged and coated with clay; very strongly acid; clear wavy boundary.

Btg2—16 to 28 inches; gray (10YR 5/1) sandy loam; few medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; very friable; sand grains bridged and coated with clay; very strongly acid; gradual wavy boundary.

Btg3—28 to 34 inches; light brownish gray (10YR 6/2) sandy loam; many medium prominent brownish

yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual smooth boundary.

Btg4—34 to 65 inches; gray (10YR 6/1) sandy loam; few fine faint white (10YR 8/1) mottles; weak fine subangular blocky structure; friable; strongly acid.

The solum is more than 60 inches thick. Reaction is very strongly acid to medium acid except where lime has been added to the soil.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 2. Texture commonly is sandy loam but ranges to loamy sand or loamy fine sand.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. Texture is sandy loam or loamy sand.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Clayey (general: soil textural class). A general textural term that includes sandy clay, silty clay, and clay (Soil Taxonomy, p. 470).

Clayey (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, containing 35 percent or more clay by weight; rock fragments are less than 35 percent by volume (Soil Taxonomy, p. 385).

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Diversion (or diversion terrace). A ridge of earth,

generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Horizon, soil. A layer of soil, approximately parallel to

the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy (general: soil textural class). A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam (Soil Taxonomy, p. 470).

Loamy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, of loamy very fine sand or finer that contains less than 35 percent clay by weight; rock fragments are less than 35 percent by volume (Soil Taxonomy, p. 385).

Low strength. The soil is not strong enough to support loads.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*.

The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH value are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy (general: soil textural class). A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand (Soil Taxonomy, p. 470).

Sandy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, of sand or loamy sand that contains less than 50 percent very fine sand by weight; rock fragments are less than 35 percent by volume (Soil Taxonomy, p. 385).

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt 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."

Thin layer (in tables). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1953-81 at Williamston, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	52.9	31.7	42.3	76	11	52	3.78	2.37	5.05	8	2.3
February---	55.7	33.2	44.5	79	14	53	3.61	1.96	5.05	7	1.9
March------	63.6	40.1	51.9	86	22	156	3.97	2.77	5.06	7	1.7
April------	74.5	48.4	61.5	91	30	345	3.20	1.88	4.37	6	.0
May--------	80.6	56.5	68.6	95	37	577	4.46	2.32	6.33	7	.0
June-------	86.3	63.8	75.1	98	48	753	4.25	2.18	6.04	6	.0
July-------	89.4	68.2	78.8	98	54	893	5.68	3.00	8.03	9	.0
August-----	88.6	67.6	78.1	98	54	871	5.72	2.33	8.58	7	.0
September--	83.7	61.8	72.8	97	44	684	4.43	1.81	6.64	5	.0
October----	74.1	50.1	62.1	89	28	375	3.37	1.15	5.20	5	.0
November---	65.2	40.8	53.0	83	22	135	2.65	1.19	3.90	5	.0
December---	56.0	33.6	44.8	77	13	64	3.05	1.69	4.24	7	.7
Yearly:											
Average--	72.6	49.7	61.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	10	---	---	---	---	---	---
Total----	---	---	---	---	---	4,958	48.17	41.87	54.25	79	6.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1953-81 at Williamston, North Carolina]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 19	April 1	April 17
2 years in 10 later than--	March 13	March 27	April 12
5 years in 10 later than--	February 27	March 16	April 2
First freezing temperature in fall:			
1 year in 10 earlier than--	November 10	October 27	October 18
2 years in 10 earlier than--	November 15	November 2	October 23
5 years in 10 earlier than--	November 26	November 14	November 2

TABLE 3.--GROWING SEASON

[Data recorded in the period 1953-81 at Williamston, North Carolina]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	243	218	187
8 years in 10	253	226	196
5 years in 10	270	242	214
2 years in 10	288	250	232
1 year in 10	298	266	241

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaA	Altavista fine sandy loam, 0 to 2 percent slopes, occasionally flooded	2,186	0.7
Ag	Augusta loam, occasionally flooded	404	0.1
Ba	Bethera loam	25,610	8.5
Bb	Bibb loam, frequently flooded	22,795	7.6
BoB	Bonneau loamy sand, 0 to 6 percent slopes	14,369	4.8
BoC	Bonneau loamy sand, 6 to 12 percent slopes	2,615	0.9
Ch	Chastain silt loam, frequently flooded	27,078	9.0
CnA	Conetoe loamy sand, 0 to 3 percent slopes	983	0.3
CrA	Craven fine sandy loam, 0 to 1 percent slopes	6,316	2.1
CrB	Craven fine sandy loam, 1 to 4 percent slopes	4,356	1.5
CrC2	Craven clay loam, 4 to 12 percent slopes, eroded	3,176	1.1
Ct	Croatan muck, rarely flooded	197	0.1
Do	Dorovan muck, frequently flooded	3,775	1.3
Fo	Foreston loamy fine sand	3,154	1.1
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	28,737	9.6
GuA	Goldsboro-Urban land complex, 0 to 2 percent slopes	489	0.2
Le	Lenoir loam	7,383	2.5
Ly	Lynchburg fine sandy loam	34,528	11.5
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes	8,609	2.9
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes	12,893	4.3
NuB	Norfolk-Urban land complex, 0 to 6 percent slopes	949	0.3
Pn	Pantego loam	7,010	2.3
Ra	Rains fine sandy loam	58,773	19.6
Ro	Roanoke loam, frequently flooded	1,569	0.5
RuA	Rumford loamy fine sand, 0 to 2 percent slopes	275	0.1
Se	Seabrook sand, rarely flooded	1,017	0.3
St	Stallings loamy sand	3,620	1.2
TaB	Tarboro loamy sand, 0 to 5 percent slopes	1,543	0.5
Ud	Udorthents, loamy	864	0.3
Ur	Urban land	548	0.2
WkB	Wickham sandy loam, 0 to 6 percent slopes, rarely flooded	1,822	0.6
WnD	Winton fine sandy loam, 8 to 15 percent slopes	2,434	0.8
WnF	Winton fine sandy loam, 15 to 60 percent slopes	2,521	0.8
Wo	Woodington fine sandy loam	2,288	0.8
	Water	4,800	1.6
	Total	299,686	100.0

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Cotton lint	Peanuts	Improved bermudagrass
		Bu	Bu	Lbs	Bu	Lbs	Lbs	AUM*
AaA--Altavista	IIw	120	45	2,600	55	550	---	10.0
Ag--Augusta	IIIw	100	40	2,200	---	---	2,800	---
Ba--Bethera	VIw	---	---	---	---	---	---	---
Bb--Bibb	Vw	---	---	---	---	---	---	---
BoB--Bonneau	IIs	85	30	2,600	---	700	2,900	8.5
BoC--Bonneau	IIIs	80	25	2,500	---	650	---	8.0
Ch--Chastain	VIw	---	---	---	---	---	---	---
CnA--Conetoe	IIs	75	25	2,200	---	---	3,000	9.0
CrA--Craven	IIw	115	45	2,700	55	600	2,900	---
CrB--Craven	IIIe	105	40	2,500	50	500	2,800	---
CrC2--Craven	VIe	---	---	---	---	---	---	---
Ct--Croatan	VIIw	---	---	---	---	---	---	---
Do--Dorovan	VIIw	---	---	---	---	---	---	---
Fo--Foreston	IIw	120	35	2,600	50	700	---	10.0
GoA.--Goldsboro	IIw	125	45	3,000	60	700	3,600	10.0
GuA. Goldsboro-Urban land								
Le--Lenoir	IIIw	100	40	2,200	45	525	2,700	---
Ly--Lynchburg	IIw	115	45	2,800	---	675	---	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Tobacco	Wheat	Cotton lint	Peanuts	Improved bermudagrass
		Bu	Bu	Lbs	Bu	Lbs	Lbs	AUM*
NoA---------- Norfolk	I	110	40	3,000	60	700	4,000	9.5
NoB---------- Norfolk	IIe	100	35	2,900	55	650	3,700	9.5
NuB. Norfolk-Urban land								
Pn---------- Pantego	VIw	---	---	---	---	---	---	---
Ra---------- Rains	IIIw	110	40	2,300	---	450	---	---
Ro---------- Roanoke	Vw	---	---	---	---	---	---	---
RuA---------- Rumford	IIs	90	20	2,500	25	650	3,200	9.0
Se---------- Seabrook	IIIs	75	30	2,200	35	---	---	9.0
St---------- Stallings	IIw	100	35	2,500	---	550	---	---
TaB---------- Tarboro	IIIs	50	20	---	---	---	2,000	---
Ud. Udorthents								
Ur. Urban land								
WkB---------- Wickham	IIe	115	---	2,600	---	750	3,300	9.0
WnD---------- Winton	IVe	60	---	---	---	---	---	---
WnF---------- Winton	VIIe	---	---	---	---	---	---	---
Wo---------- Woodington	VIw	---	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	8,609	---	---	---	---
II	108,883	14,715	78,541	15,627	---
III	76,091	4,356	66,560	5,175	---
IV	2,434	2,434	---	---	---
V	24,364	---	24,364	---	---
VI	65,162	3,176	61,986	---	---
VII	6,493	2,521	3,972	---	---
VIII	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity	
							$ft^3/ac/yr$	
AaA---------- Altavista	9W	Slight	Moderate	Slight	Loblolly pine--------	91	133	Loblolly pine, hardwoods*.
					Longleaf pine--------	84	110	
					Sweetgum------------	84	90	
					White oak-----------	---	---	
					Red maple-----------	---	---	
					Yellow poplar--------	---	---	
					Southern red oak-----	---	---	
					Northern red oak-----	---	---	
					Water oak-----------	---	---	
Ag---------- Augusta	9W	Slight	Moderate	Slight	Loblolly pine--------	90	131	Loblolly pine, hardwoods*.
					Sweetgum------------	90	106	
					American sycamore----	---	---	
					White oak-----------	---	---	
					Southern red oak-----	---	---	
					Water oak-----------	---	---	
					Shortleaf pine-------	---	---	
Ba---------- Bethera	10W	Slight	Severe	Severe	Loblolly pine--------	92	136	Loblolly pine**, hardwoods*.
					Sweetgum------------	95	122	
					Cypress-------------	---	---	
					Water oak-----------	---	---	
Bb---------- Bibb	9W	Slight	Severe	Severe	Loblolly pine--------	90	131	Hardwoods*.
					Sweetgum------------	90	106	
					Water oak-----------	90	---	
					Blackgum------------	---	---	
BoB, BoC---------- Bonneau	7S	Slight	Moderate	Moderate	Loblolly pine--------	77	105	Loblolly pine, longleaf pine.
					Longleaf pine--------	---	---	
					White oak-----------	---	---	
					Hickory-------------	---	---	
Ch---------- Chastain	9W	Slight	Severe	Severe	Loblolly pine--------	90	131	Loblolly pine**, hardwoods*.
					Sweetgum------------	95	---	
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Water oak-----------	---	---	
CnA---------- Conetoe	8S	Slight	Moderate	Moderate	Loblolly pine--------	89	110	Loblolly pine, longleaf pine.
					Longleaf pine--------	65	67	
					Southern red oak-----	---	---	
					Post oak------------	---	---	
					White oak-----------	---	---	
					Hickory-------------	---	---	
					Sweetgum------------	---	---	
					Red maple-----------	---	---	
					Shumard oak----------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity	
							$ft^3/ac/yr$	
CrA, CrB, CrC2----- Craven	9W	Slight	Moderate	Slight	Loblolly pine--------	89	129	Loblolly pine.
					Longleaf pine--------	67	72	
					Water oak----------	---	---	
					Sweetgum-----------	---	---	
					White oak----------	---	---	
					Southern red oak-----	---	---	
					Red maple----------	---	---	
					Blackgum-----------	---	---	
					Yellow poplar--------	---	---	
Ct----------------- Croatan	6W	Slight	Severe	Severe	Loblolly pine--------	70	93	Loblolly pine**.
					Pond pine----------	56	34	
					Water tupelo---------	---	---	
					Baldcypress----------	---	---	
					Sweetgum-----------	---	---	
					Swamp tupelo---------	---	---	
					Atlantic white cedar-	---	---	
Do----------------- Dorovan	7W	Slight	Severe	Severe	Blackgum-----------	70	57	Baldcypress, hardwoods*.
					Sweetbay-----------	---	---	
					Baldcypress----------	---	---	
					Swamp tupelo---------	---	---	
					Green ash----------	---	---	
Fo----------------- Foreston	9W	Slight	Moderate	Slight	Loblolly pine--------	90	131	Loblolly pine.
					Longleaf pine--------	75	90	
					Sweetgum-----------	---	---	
					Water oak----------	---	---	
GoA---------------- Goldsboro	9W	Slight	Moderate	Slight	Loblolly pine--------	90	131	Loblolly pine, hardwoods*.
					Longleaf pine--------	77	94	
					Sweetgum-----------	90	106	
					Southern red oak-----	---	---	
					White oak----------	---	---	
					Water oak----------	---	---	
					Red maple----------	---	---	
Le----------------- Lenoir	8W	Slight	Moderate	Slight	Loblolly pine--------	85	120	Loblolly pine, hardwoods*.
Ly----------------- Lynchburg	9W	Slight	Moderate	Slight	Loblolly pine--------	86	123	Loblolly pine, hardwoods*.
					Longleaf pine--------	74	88	
					Yellow poplar--------	92	93	
					Sweetgum-----------	90	106	
					Southern red oak-----	---	---	
					White oak----------	---	---	
					Blackgum-----------	---	---	
NoA, NoB----------- Norfolk	8A	Slight	Slight	Slight	Loblolly pine--------	82	114	Loblolly pine.
					Longleaf pine--------	68	74	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity	
							$ft^3/ac/yr$	
Pn---------- Pantego	10W	Slight	Severe	Severe	Loblolly pine--------	98	149	Loblolly pine**, hardwoods*.
					Pond pine----------	---	---	
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Water oak----------	---	---	
Ra---------- Rains	10W	Slight	Severe	Severe	Loblolly pine--------	94	140	Loblolly pine**, hardwoods*.
					Sweetgum----------	90	106	
Ro---------- Roanoke	7W	Slight	Severe	Severe	Sweetgum----------	90	106	Hardwoods*.
					Willow oak----------	76	68	
					White oak----------	75	57	
RuA---------- Rumford	8A	Slight	Slight	Moderate	Loblolly pine--------	80	110	Loblolly pine.
					Southern red oak-----	65	47	
Se---------- Seabrook	8S	Slight	Moderate	Moderate	Loblolly pine--------	81	112	Loblolly pine, longleaf pine.
					Longleaf pine--------	70	79	
St---------- Stallings	8W	Slight	Moderate	Slight	Loblolly pine--------	79	108	Loblolly pine, hardwoods*.
					Longleaf pine--------	---	---	
					Sweetgum----------	---	---	
					Yellow-poplar--------	---	---	
					Water oak----------	---	---	
TaB---------- Tarboro	7S	Slight	Moderate	Moderate	Loblolly pine--------	71	95	Loblolly pine, longleaf pine.
					Longleaf pine--------	---	---	
WkB---------- Wickham	9A	Slight	Slight	Slight	Loblolly pine--------	90	131	Loblolly pine.
					Yellow poplar--------	100	107	
					Southern red oak-----	---	---	
WnD---------- Winton	10A	Slight	Slight	Slight	Loblolly pine--------	95	142	Loblolly pine, hardwoods*.
					Southern red oak-----	---	---	
					Sweetgum----------	---	---	
					Beech----------	---	---	
WnF---------- Winton	10R	Severe	Severe	Moderate	Loblolly pine--------	95	142	Loblolly pine, hardwoods*.
					Southern red oak-----	---	---	
					Sweetgum----------	---	---	
					Beech----------	---	---	
Wo---------- Woodington	8W	Slight	Severe	Severe	Loblolly pine--------	83	116	Loblolly pine**, hardwoods*.
					Sweetgum----------	---	---	
					White oak----------	---	---	
					Southern red oak-----	---	---	
					Water tupelo---------	---	---	

* To establish hardwoods on a forested site, rely on natural reproduction (seeds and sprouts) of acceptable species. Special site preparation techniques may be required. Planting of hardwoods on a specific site should be done upon recommendations of a forester.

** Potential productivity is attainable in areas adequately drained or bedded, or both. In addition, phosphate supplement may be required at time of bedding.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA---- Altavista	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Ag---- Augusta	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Ba---- Bethera	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Bb---- Bibb	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
BoB---- Bonneau	Slight----	Slight----	Moderate: slope.	Slight----	Moderate: droughty.
BoC---- Bonneau	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: droughty, slope.
Ch---- Chastain	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CnA---- Conetoe	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
CrA---- Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight----	Slight.
CrB---- Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----	Slight.
CrC2---- Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Slight----	Slight.
Ct---- Croatan	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: too acid, wetness.
Do---- Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Fo---- Foreston	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight----	Moderate: droughty.
GoA---- Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight----	Slight.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GuA: Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
Urban land.					
Le: Lenoir	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ly: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NoA: Norfolk	Slight	Slight	Slight	Slight	Slight.
NoB: Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight.
NuB: Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land.					
Pn: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ra: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ro: Roanoke	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: flooding, wetness.
RuA: Rumford	Slight	Slight	Slight	Slight	Moderate: droughty.
Se: Seabrook	Severe: too sandy, flooding.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
St: Stallings	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
TaB: Tarboro	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Ud. Udorthents					
Ur. Urban land					
WkB: Wickham	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
WnD: Winton	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight	Moderate: slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WnF---------- Winton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wo---------- Woodington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaA---- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ag---- Augusta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ba---- Bethera	Very poor.	Very poor.	Poor	Fair	Poor	Good	Good	Very poor.	Fair	Good.
Bb---- Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
BoB, BoC---- Bonneau	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ch---- Chastain	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Fair	Good.
CnA---- Conetoe	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Very poor.
CrA---- Craven	Good	Good	Good	Good	Good	Poor	Good	Good	Good	Poor.
CrB---- Craven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC2---- Craven	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ct---- Croatan	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Do---- Dorovan	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Fo---- Foreston	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GoA---- Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Le---- Lenoir	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
Ly---- Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
NoA, NoB---- Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pn---------- Pantego	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Ra---------- Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Ro---------- Roanoke	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
RuA---------- Rumford	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Se---------- Seabrook	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
St---------- Stallings	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
TaB---------- Tarboro	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Ud. Udorthents										
WkB---------- Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WnD---------- Winton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WnF---------- Winton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wo---------- Woodington	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA--- Altavista	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
Ag--- Augusta	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
Ba--- Bethera	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
Bb--- Bibb	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
BoB--- Bonneau	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Slight---	Moderate: droughty.
BoC--- Bonneau	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Ch--- Chastain	Severe: wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CnA--- Conetoe	Severe: cutbanks cave.	Slight---	Slight---	Slight---	Slight---	Moderate: droughty.
CrA, CrB--- Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
CrC2--- Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
Ct--- Croatan	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness.	Severe: too acid, wetness.
Do--- Dorovan	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
Fo--- Foreston	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty.
GoA--- Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GuA: Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.
Urban land.						
Le: Lenoir	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Ly: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NoA: Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
NoB: Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight.
NuB: Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
Urban land.						
Pn: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ra: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ro: Roanoke	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: flooding, wetness.
RuA: Rumford	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Se: Seabrook	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: wetness, flooding.	Severe: flooding.	Moderate: wetness, flooding.	Severe: droughty.
St: Stallings	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
TaB: Tarboro	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Ud. Udorthents						
Ur. Urban land						
WkB: Wickham	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
WnD: Winton	Moderate: wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WnF---------- Winton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Wo---------- Woodington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA---- Altavista	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
Ag---- Augusta	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Ba---- Bethera	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Bb---- Bibb	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
BoB---- Bonneau	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
BoC---- Bonneau	Severe: wetness.	Severe: seepage, slope.	Severe: wetness.	Severe: seepage.	Fair: slope.
Ch---- Chastain	Severe: flooding, wetness, percs slowly.	Severe: flooding, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: wetness, too clayey, hard to pack.
CnA---- Conetoe	Slight----	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CrA---- Craven	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
CrB, CrC2---- Craven	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Ct---- Croatan	Severe: wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Do---- Dorovan	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fo Foreston	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: thin layer.
GoA Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
GuA: Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Urban land.					
Le Lenoir	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ly Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
NoA, NoB Norfolk	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight	Slight.
NuB: Norfolk	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight	Slight.
Urban land.					
Pn Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ro Roanoke	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
RuA Rumford	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Se Seabrook	Severe: wetness, poor filter.	Severe: seepage, wetness, flooding.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
St Stallings	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
TaB Tarboro	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Ud. Udorthents					

TABLE 11.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ur. Urban land					
WkB---------- Wickham	Moderate: flooding.	Severe: flooding.	Severe: seepage.	Moderate: flooding.	Fair: thin layer.
WnD---------- Winton	Severe: wetness, percs slowly.	Severe: seepage, slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, wetness, slope.
WnF---------- Winton	Severe: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wo---------- Woodington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Topsoil
AaA Altavista	Fair: wetness, thin layer.	Improbable: excess fines.	Good.
Ag Augusta	Fair: wetness.	Improbable: excess fines.	Good.
Ba Bethera	Poor: low strength, wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
Bb Bibb	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
BoB Bonneau	Good	Improbable: excess fines.	Fair: too sandy.
BoC Bonneau	Good	Improbable: excess fines.	Fair: too sandy, slope.
Ch Chastain	Poor: wetness.	Probable	Poor: too clayey, wetness.
CnA Conetoe	Good	Probable	Fair: too sandy.
CrA, CrB, CrC2 Craven	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
Ct Croatan	Poor: wetness.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
Do Dorovan	Poor: wetness.	Probable	Poor: excess humus, wetness.
Fo Foreston	Fair: wetness.	Improbable: excess fines.	Fair: too sandy.
GoA Goldsboro	Fair: wetness.	Improbable: excess fines.	Good.
GuA: Goldsboro	Fair: wetness.	Improbable: excess fines.	Good.
Urban land.			
Le Lenoir	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
Ly---------- Lynchburg	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
NoA, NoB---------- Norfolk	Good----------	Improbable: excess fines.	Fair: too clayey.
NuB: Norfolk----------	Good----------	Improbable: excess fines.	Fair: too clayey.
Urban land.			
Pn---------- Pantego	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ra---------- Rains	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ro---------- Roanoke	Poor: wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
RuA---------- Rumford	Good----------	Improbable: thin layer.	Fair: area reclaim.
Se---------- Seabrook	Fair: wetness.	Probable----------	Poor: too sandy.
St---------- Stallings	Fair: wetness.	Probable----------	Fair: too sandy.
TaB---------- Tarboro	Good----------	Probable----------	Fair: too sandy.
Ud. Udorthents			
Ur. Urban land			
WkB---------- Wickham	Fair: thin layer.	Improbable: excess fines.	Good.
WnD---------- Winton	Fair: wetness.	Improbable: excess fines.	Fair: slope, too clayey.
WnF---------- Winton	Poor: slope.	Improbable: excess fines.	Poor: slope.
Wo---------- Woodington	Poor: wetness.	Probable----------	Poor: wetness.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AaA---------- Altavista	Moderate: wetness.	Moderate: deep to water.	Flooding-------	Wetness--------	Wetness--------	Favorable.
Ag---------- Augusta	Severe: piping, wetness.	Moderate: slow refill.	Flooding-------	Wetness, flooding.	Wetness--------	Wetness.
Ba---------- Bethera	Severe: ponding, hard to pack.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Bb---------- Bibb	Severe: piping, wetness.	Moderate: slow refill.	Flooding-------	Wetness, flooding.	Wetness--------	Wetness.
BoB---------- Bonneau	Moderate: piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing---	Droughty.
BoC---------- Bonneau	Moderate: piping.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Slope, soil blowing.	Slope, droughty.
Ch---------- Chastain	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, flooding.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
CnA---------- Conetoe	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy------	Droughty.
CrA, CrB-------- Craven	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
CrC2---------- Craven	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
Ct---------- Croatan	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, subsides.	Wetness, percs slowly.	Wetness--------	Wetness, percs slowly.
Do---------- Dorovan	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding, flooding.	Ponding--------	Wetness.
Fo---------- Foreston	Severe: seepage, piping.	Severe: cutbanks cave.	Favorable------	Wetness, droughty, fast intake.	Wetness, soil blowing.	Droughty.
GoA---------- Goldsboro	Moderate: piping, wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness--------	Favorable.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GuA: Goldsboro	Moderate: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness	Favorable.
Urban land.						
Le: Lenoir	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ly: Lynchburg	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness	Wetness.
NoA: Norfolk	Moderate: piping.	Moderate: deep to water.	Deep to water	Fast intake	Favorable	Favorable.
NoB: Norfolk	Moderate: piping.	Moderate: deep to water.	Deep to water	Slope	Favorable	Favorable.
NuB: Norfolk	Moderate: piping.	Moderate: deep to water.	Deep to water	Slope	Favorable	Favorable.
Urban land.						
Pn: Pantego	Severe: wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness	Wetness.
Ra: Rains	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness, soil blowing.	Wetness.
Ro: Roanoke	Severe: wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
RuA: Rumford	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Se: Seabrook	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
St: Stallings	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, fast intake.	Wetness	Wetness.
TaB: Tarboro	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy	Droughty.
Ud. Udorthents						
Ur. Urban land						

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
WkB---------- Wickham	Moderate: thin layer.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
WnD, WnF-------- Winton	Moderate: piping, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetness.	Slope.
Wo---------- Woodington	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness--------	Wetness--------	Wetness.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classification and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AaA---------- Altavista	0-12	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	65-99	35-60	<23	NP-7
	12-35	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	35-62	Variable---------	---	---	---	---	---	---	---	---	---
Ag---------- Augusta	0-5	Loam----------	ML, CL-ML	A-4	0	95-100	90-100	75-100	51-75	<35	NP-10
	5-49	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	75-100	51-80	20-45	5-25
	49-64	Variable---------	---	---	---	---	---	---	---	---	---
Ba---------- Bethera	0-6	Loam----------	CL, ML	A-4, A-6	0	100	95-100	85-99	60-75	30-37	6-14
	6-65	Clay, clay loam, sandy clay.	CL, CH, ML, MH	A-6, A-7	0	100	98-100	93-100	55-95	37-55	12-30
Bb---------- Bibb	0-16	Loam----------	ML, CL-ML	A-4	0-5	95-100	90-100	80-90	50-80	<25	NP-7
	16-61	Sandy loam, loam, silt loam, loamy sand.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	20-90	<30	NP-7
BoB, BoC--------- Bonneau	0-26	Loamy sand-------	SM	A-2	0	100	100	50-95	15-35	---	NP
	26-75	Sandy loam, sandy clay loam, sandy clay.	CL, SC, SM-SC, CL-ML	A-4, A-6, A-2	0	100	100	60-95	25-60	20-40	4-18
Ch---------- Chastain	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	100	100	90-100	70-95	23-45	3-18
	5-60	Silty clay loam, silty clay, clay loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	85-98	35-75	12-40
CnA---------- Conetoe	0-26	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	100	50-99	5-30	<20	NP
	26-58	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	50-99	20-40	<30	NP-10
	58-74	Loamy sand, sand	SM, SP, SP-SM	A-2, A-3, A-1	0	100	100	40-99	4-30	<20	NP
CrA---------- Craven	0-9	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	9-58	Clay, silty clay, clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	58-67	Sandy clay loam, sandy loam, loamy sand, clay loam.	SM, SM-SC, SC, CL	A-2, A-4, A-6, A-7	0	100	95-100	50-100	15-65	<45	NP-28
CrB---------- Craven	0-6	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	6-60	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
CrC2---------- Craven	0-3	Clay loam--------	CL, CH	A-6, A-7	0	100	95-100	80-100	55-98	35-60	15-35
	3-53	Clay, silty clay, clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	52-60	Clay loam, sandy loam, loamy sand	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ct	0-18	Muck	PT	---	---	---	---	---	---	---	---
Croatan	18-34	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-85	25-49	<30	NP-10
	34-65	Loam, clay loam, sandy clay loam.	CL, SM, ML, SC	A-4, A-6	0	100	100	75-100	36-95	<36	NP-15
Do	0-65	Muck	PT	---	0	---	---	---	---	---	---
Dorovan	65-95	Sand, loamy sand, loam.	SP-SM, SM-SC, SM	A-1, A-3, A-4, A-2-4	0	100	100	5-70	5-49	<20	NP-7
Fo	0-10	Loamy fine sand	SM	A-2	0	100	100	60-100	15-30	---	NP
Foreston	10-27	Sandy loam, fine sandy loam.	SM	A-2	0	100	100	70-100	18-35	<25	NP-4
	27-62	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3	0	100	100	50-98	6-25	---	NP
	62-72	Sandy loam, sandy clay loam.	SC, SM-SC, SM	A-2, A-4, A-6, A-7	0	100	100	55-90	25-49	<45	NP-25
GoA	0-14	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	0	95-100	95-100	50-100	15-45	<25	NP-14
Goldsboro	14-58	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	60-100	25-55	16-37	4-18
	58-67	Sandy clay loam, clay loam, sandy clay.	SC, CL, CL-ML, CH	A-4, A-6, A-7-6	0	95-100	90-100	65-95	36-70	25-55	6-32
GuA:											
Goldsboro	0-14	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	0	95-100	95-100	50-100	15-45	<25	NP-14
	14-58	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	60-100	25-55	16-37	4-18
	58-67	Sandy clay loam, clay loam, sandy clay.	SC, CL, CL-ML, CH	A-4, A-6, A-7-6	0	95-100	90-100	65-95	36-70	25-55	6-32
Urban land.											
Le	0-8	Loam	ML, CL, CL-ML	A-4	0	100	100	85-95	60-85	20-35	4-10
Lenoir	8-61	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	100	100	85-95	55-95	30-55	11-35
Ly	0-14	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	0	92-100	90-100	75-100	25-55	<30	NP-7
Lynchburg	14-63	Sandy clay loam, sandy loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0	92-100	90-100	70-100	25-67	15-40	4-18
NoA, NoB	0-6	Loamy fine sand	SM	A-2	0	95-100	92-100	50-95	13-30	<20	NP
Norfolk	6-17	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-63	20-38	4-15
	17-62	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-52	4-23

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NuB:											
Norfolk	0-6	Loamy fine sand	SM	A-2	0	95-100	92-100	50-95	13-30	<20	NP
	6-17	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-63	20-38	4-15
	17-62	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-52	4-23
Urban land.											
Pn	0-18	Loam	SM, SM-SC, CL, ML	A-2, A-4	0	100	95-100	60-95	25-75	<35	NP-10
Pantego	18-76	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	0	100	95-100	90-100	36-80	25-49	11-24
Ra	0-12	Fine sandy loam	SM, ML	A-2, A-4	0	100	95-100	50-85	25-56	<35	NP-10
Rains	12-64	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	55-98	30-70	18-40	4-20
Ro	0-7	Loam	SM-SC, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	35-90	20-35	5-16
Roanoke	7-14	Clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	85-100	80-100	80-95	35-45	14-20
	14-54	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	54-69	Variable	---	---	---	---	---	---	---	---	---
RuA	0-15	Loamy fine sand	SM	A-2, A-1	0	90-100	85-100	45-75	15-30	<20	NP
Rumford	15-30	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	55-85	30-50	<34	NP-12
	30-74	Stratified sandy loam to gravelly sand.	SM, SP, GP, GM	A-1, A-2, A-3, A-4	0	50-100	50-100	20-85	2-40	<25	NP-6
Se	0-10	Sand	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-99	5-25	---	NP
Seabrook	10-65	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-100	5-25	---	NP
St	0-12	Loamy sand	SM	A-2	0	100	95-100	51-100	15-35	---	NP
Stallings	12-47	Sandy loam, fine sandy loam, loamy sand.	SM	A-2, A-4	0	100	95-100	51-100	15-50	<25	NP-3
	47-75	Sandy loam, loamy sand, loamy fine sand.	SM, SP-SM, SM-SC	A-2, A-4	0	100	95-100	51-100	10-50	<25	NP-4
TaB	0-7	Loamy sand	SM, SP-SM, SW-SM	A-2, A-3, A-1	0	95-100	95-100	40-99	8-35	---	NP
Tarboro	7-62	Sand, coarse sand, loamy sand.	SP, SP-SM, SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	3-15	---	NP
Ud.											
Udorthents											

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ur. Urban land											
WkB---------- Wickham	0-12	Sandy loam-------	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	12-36	Sandy clay loam, clay loam, loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
	36-61	Variable---------	---	---	---	---	---	---	---	---	---
WnD, WnF--------- Winton	0-6	Fine sandy loam	ML, SM, CL, SC	A-2, A-4, A-6	0-3	90-100	90-100	50-99	25-65	<30	NP-15
	6-45	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-45	8-30
	45-61	Variable---------	---	---	---	---	---	---	---	<30	---
Wo---------- Woodington	0-10	Fine sandy loam	SM	A-2, A-4	0	100	95-100	50-100	20-50	<25	NP-3
	10-65	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	100	95-100	50-100	20-50	<25	NP-3

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AaA----------	0-12	10-20	1.30-1.50	2.0-6.0	0.12-0.20	4.5-6.0	Low----------	0.24	5	.5-3
Altavista	12-35	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.24		
	35-62	---	---	---	---	---	----------	----		
Ag----------	0-5	10-20	1.35-1.60	0.6-2.0	0.15-0.22	4.5-6.0	Low----------	0.24	4	.5-2
Augusta	5-49	20-35	1.35-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.24		
	49-64	---	---	---	---	---	----------	----		
Ba----------	0-6	10-20	1.20-1.40	0.6-2.0	0.11-0.16	3.6-6.0	Low----------	0.28	5	1-6
Bethera	6-65	35-50	1.30-1.50	0.06-0.6	0.14-0.18	3.6-6.0	Moderate-----	0.32		
Bb----------	0-16	2-18	1.20-1.55	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.28	5	.5-2
Bibb	16-61	2-18	1.30-1.60	0.6-2.0	0.12-0.20	4.5-5.5	Low----------	0.37		
BoB, BoC-----	0-26	5-15	1.30-1.70	6.0-20	0.05-0.11	4.5-6.0	Low----------	0.15	5	.5-2
Bonneau	26-75	15-40	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
Ch----------	0-5	15-27	1.20-1.40	0.2-0.6	0.12-0.18	4.5-6.0	Moderate-----	0.32	5	2-6
Chastain	5-60	35-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-5.5	Moderate-----	0.37		
CnA----------	0-26	2-10	1.60-1.75	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.15	5	.5-2
Conetoe	26-58	10-25	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.15		
	58-74	2-10	1.60-1.70	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.10		
CrA----------	0-9	7-20	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	Low----------	0.32	5	.5-2
Craven	9-58	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
	58-67	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low----------	0.32		
CrB----------	0-6	7-20	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	Low----------	0.32	5	.5-2
Craven	6-60	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
CrC2---------	0-3	27-40	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32	5	.5-2
Craven	3-52	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
	52-60	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low----------	0.32		
Ct----------	0-18	---	0.40-0.65	0.06-6.0	0.35-0.45	<4.5	Low----------	----	---	25-60
Croatan	18-34	8-20	1.40-1.60	0.2-6.0	0.10-0.15	3.6-6.5	Low----------	----		
	34-65	10-35	1.40-1.60	0.2-2.0	0.12-0.20	3.6-6.5	Low----------	----		
Do----------	0-65	---	0.25-0.40	0.6-2.0	0.25-0.50	3.6-4.4	----------	----	---	---
Dorovan	65-95	5-20	1.40-1.65	6.0-20	0.05-0.08	4.5-5.5	Low----------	----		
Fo----------	0-10	5-12	1.20-1.40	6.0-20	0.05-0.10	4.5-6.5	Low----------	0.15	5	.5-2
Foreston	10-27	10-18	1.20-1.40	2.0-6.0	0.09-0.13	4.5-6.0	Low----------	0.10		
	27-62	4-12	1.30-1.60	6.0-20	0.03-0.10	4.5-6.0	Low----------	0.10		
	62-72	10-35	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.20		
GoA----------	0-14	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	5	.5-2
Goldsboro	14-58	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
	58-67	20-45	1.30-1.40	0.2-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
GuA:										
Goldsboro-------	0-14	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	5	.5-2
	14-58	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
	58-67	20-45	1.30-1.40	0.2-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
Urban land.										

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Le	0-8	6-20	1.30-1.50	0.6-2.0	0.14-0.18	3.6-6.0	Low	0.37	5	2-4
Lenoir	8-61	35-60	1.20-1.35	0.06-0.2	0.13-0.15	3.6-5.5	Moderate	0.32		
Ly	0-14	5-20	1.30-1.60	2.0-6.0	0.09-0.13	3.6-6.0	Low	0.20	5	.5-5
Lynchburg	14-63	18-35	1.30-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.20		
NoA, NoB	0-6	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.0	Low	0.17	5	.5-2
Norfolk	6-17	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	Low	0.24		
	17-62	20-43	1.10-1.40	0.06-2.0	0.10-0.15	4.5-5.5	Low	0.24		
NuB:										
Norfolk	0-6	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.0	Low	0.17	5	.5-2
	6-17	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	Low	0.24		
	17-62	20-43	1.10-1.40	0.06-2.0	0.10-0.15	4.5-5.5	Low	0.24		
Urban land.										
Pn	0-18	5-15	1.40-1.60	2.0-6.0	0.10-0.20	3.6-5.5	Low	0.15	5	4-10
Pantego	18-76	20-40	1.25-1.40	0.6-2.0	0.15-0.20	3.6-5.5	Low	0.28		
Ra	0-12	5-20	1.30-1.60	2.0-6.0	0.10-0.14	3.6-6.5	Low	0.20	5	1-6
Rains	12-64	20-35	1.30-1.50	0.6-2.0	0.11-0.15	3.6-5.5	Low	0.24		
Ro	0-7	10-27	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	Low	0.37	4	.5-2
Roanoke	7-14	27-35	1.20-1.50	0.2-0.6	0.16-0.19	3.6-5.5	Moderate	0.24		
	14-54	35-60	1.35-1.65	0.06-0.2	0.10-0.19	3.6-5.5	Moderate	0.24		
	54-69	5-50	1.20-1.50	0.06-20	0.04-0.14	3.6-6.5	Moderate	0.24		
RuA	0-15	2-12	1.25-1.45	>6.0	0.06-0.10	3.6-6.0	Low	0.17	4	.5-1
Rumford	15-30	8-18	1.25-1.45	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.17		
	30-74	2-18	1.25-1.50	>2.0	0.04-0.10	3.6-6.5	Low	0.17		
Se	0-10	2-10	1.30-1.60	6.0-20	0.05-0.11	4.5-6.5	Low	0.10	5	.5-2
Seabrook	10-65	2-12	1.30-1.60	6.0-20	0.02-0.09	4.5-6.5	Low	0.10		
St	0-12	2-10	1.50-1.60	6.0-20	0.06-0.11	3.6-6.0	Low	0.10	5	1-4
Stallings	12-47	5-18	1.40-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.17		
	47-75	2-18	1.50-1.60	2.0-20	0.06-0.15	3.6-5.5	Low	0.17		
TaB	0-7	3-12	1.60-1.75	6.0-20	0.05-0.09	4.5-6.5	Low	0.10	5	.5-1
Tarboro	7-62	2-7	1.60-1.75	6.0-20	0.04-0.07	4.5-6.5	Low	0.10		
Ud. Udorthents										
Ur. Urban land										
WkB	0-12	8-15	1.45-1.65	2.0-6.0	0.11-0.16	4.5-6.0	Low	0.24	5	.5-2
Wickham	12-36	18-30	1.30-1.40	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.24		
	36-61	---	---	---	---	---	---	---		
WnD, WnF	0-6	7-20	1.30-1.40	2.0-6.0	0.12-0.20	4.5-6.0	Low	0.20	4	.5-3
Winton	6-45	18-35	1.30-1.50	0.2-2.0	0.12-0.20	4.5-6.0	Low	0.24		
	45-61	---	---	---	---	---	---	---		
Wo	0-10	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20	5	2-4
Woodington	10-65	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Depth to bedrock	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft			In		
AaA---------- Altavista	C	Occasional	Very brief.	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	Moderate	Moderate.
Ag---------- Augusta	C	Occasional	Brief----	Jan-May	1.0-2.0	Apparent	Jan-May	>60	High------	Moderate.
Ba---------- Bethera	D	None--------	---	---	+1-1.5	Apparent	Dec-Apr	>60	High------	High.
Bb---------- Bibb	C	Frequent----	Brief----	Dec-May	0.5-1.5	Apparent	Dec-Apr	>60	High------	Moderate.
BoB, BoC-------- Bonneau	A	None--------	---	---	3.5-5.0	Apparent	Dec-Mar	>60	Low-------	High.
Ch---------- Chastain	D	Frequent----	Very long	Dec-Apr	0-1.0	Apparent	Nov-May	>60	High------	High.
CnA---------- Conetoe	A	None--------	---	---	>6.0	---	---	>60	Low-------	High.
CrA, CrB, CrC2-- Craven	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	High------	High.
Ct---------- Croatan	D	Rare--------	---	---	0-1.0	Apparent	Dec-May	>60	High------	High.
Do---------- Dorovan	D	Frequent----	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	>60	High------	High.
Fo---------- Foreston	C	None--------	---	---	2.0-3.5	Apparent	Dec-Apr	>60	Moderate	High.
GoA---------- Goldsboro	B	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	Moderate	High.
GuA: Goldsboro------ Urban land.	B	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	>60	Moderate	High.
Le---------- Lenoir	D	None--------	---	---	1.0-2.5	Apparent	Dec-May	>60	High------	High.
Ly---------- Lynchburg	C	None--------	---	---	0.5-1.5	Apparent	Nov-Apr	>60	High------	High.
NoA, NoB-------- Norfolk	B	None--------	---	---	4.0-6.0	Apparent	Jan-Mar	>60	Moderate	High.
NuB: Norfolk-------- Urban land.	B	None--------	---	---	4.0-6.0	Apparent	Jan-Mar	>60	Moderate	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Depth to bedrock	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft			In		
Pn---------- Pantego	B/D	None--------	---	---	0-1.5	Apparent	Dec-May	>60	High------	High.
Ra---------- Rains	B/D	None--------	---	---	0-1.0	Apparent	Nov-Apr	>60	High------	High.
Ro---------- Roanoke	D	Frequent----	Brief----	Nov-Jun	0-1.0	Apparent	Nov-May	>60	High------	High.
RuA---------- Rumford	B	None--------	---	---	>6.0	---	---	>60	Low-------	High.
Se---------- Seabrook	C	Rare--------	---	---	2.0-4.0	Apparent	Dec-Mar	>60	Low-------	Moderate.
St---------- Stallings	C	None--------	---	---	1.0-2.5	Apparent	Dec-Apr	>60	High------	High.
TaB---------- Tarboro	A	None--------	---	---	>6.0	---	---	>60	Low-------	Moderate.
Ud. Udorthents										
Ur. Urban land										
WkB---------- Wickham	B	Rare--------	---	---	>6.0	---	---	>60	Moderate	High.
WnD, WnF-------- Winton	C	None--------	---	---	2.0-4.0	Perched	Dec-May	>60	Moderate	Moderate.
Wo---------- Woodington	B/D	None--------	---	---	0.5-1.0	Apparent	Dec-May	>60	High------	High.

TABLE 17.--ENGINEERING INDEX TEST DATA

[NP means nonplastic. The location of each sample site is the same as that listed for each soil in the section "Soil Series and Their Morphology"]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM
										Pct		lb/ft^3	Pct
Bethera loam: (S82-NC117-1-3)													
A---------- 0-6	A-4(7)	ML	100	100	99	71	37	15	9	33	6	91.2	22.4
Btg2---------- 11-45	A-7-6(13)	CL	100	100	100	83	59	44	38	42	22	99.7	14.8
Btg3---------- 45-65	A-6(11)	CL	100	100	100	72	43	35	31	38	20	109.3	15.9
Foreston loamy fine sand: (S82-NC117-7-9)													
Ap---------- 0-10	A-2-4(0)	SM	100	100	97	18	11	7	5	17	NP	111.9	11.6
Bt1---------- 10-20	A-2-4(0)	SM	100	100	98	28	23	18	15	18	NP	121.4	11.4
BC1---------- 27-37	A-2-4(0)	SM	100	100	97	20	16	14	12	19	NP	118.4	11.4
Stallings loamy sand: (S82-NC117-4-6)													
Ap---------- 0-9	A-2-4(0)	SM	100	100	98	22	16	9	5	20	NP	105.4	14.3
Btg1---------- 16-36	A-2-4(0)	SM	100	100	98	30	25	18	15	16	NP	123.8	10.6
BC1---------- 47-60	A-2-4(0)	SM	100	100	98	17	14	11	9	17	NP	115.4	11.0

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Augusta	Fine-loamy, mixed, thermic Aeric Ochraquults
Bethera	Clayey, mixed, thermic Typic Paleaquults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Bonneau	Loamy, siliceous, thermic Arenic Paleudults
Chastain	Fine, mixed, acid, thermic Typic Fluvaquents
Conetoe	Loamy, mixed, thermic Arenic Hapludults
Craven	Clayey, mixed, thermic Aquic Hapludults
Croatan	Loamy, siliceous, dysic, thermic Terric Medisaprists
Dorovan	Dysic, thermic Typic Medisaprists
Foreston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Lenoir	Clayey, mixed, thermic Aeric Paleaquults
Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Rumford	Coarse-loamy, siliceous, thermic Typic Hapludults
Seabrook	Mixed, thermic Aquic Udipsamments
Stallings	Coarse-loamy, siliceous, thermic Aeric Paleaquults
Tarboro	Mixed, thermic Typic Udipsamments
Wickham	Fine-loamy, siliceous, thermic Typic Hapludults
Winton	Fine-loamy, mixed, thermic Typic Hapludults
Woodington	Coarse-loamy, siliceous, thermic Typic Paleaquults

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