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
Columbus County Board
of Commissioners

Soil Survey of Columbus County, North Carolina

How To Use This Soil Survey

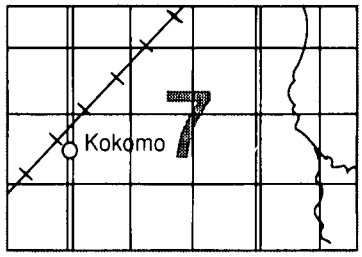
General Soil Map

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.

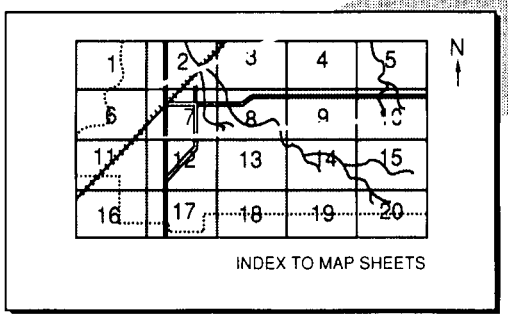
Detailed Soil Maps

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



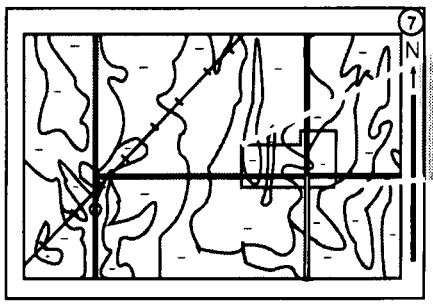
MAP SHEET

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.

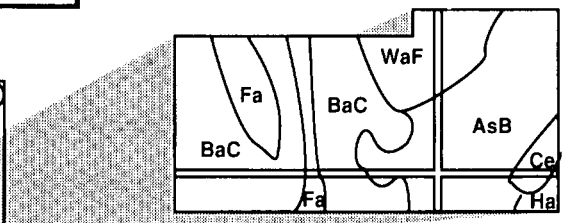


INDEX TO MAP SHEETS

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 1984. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service, North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Columbus County Board of Commissioners. It is part of the technical assistance furnished to the Columbus 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.

This soil survey updates the first soil survey of Columbus County published in 1915 and provides additional information.

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: In North Carolina, Columbus County ranks high in production of sweet potatoes. This crop is on Wagram loamy fine sand, 0 to 6 percent slopes.

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Foreword

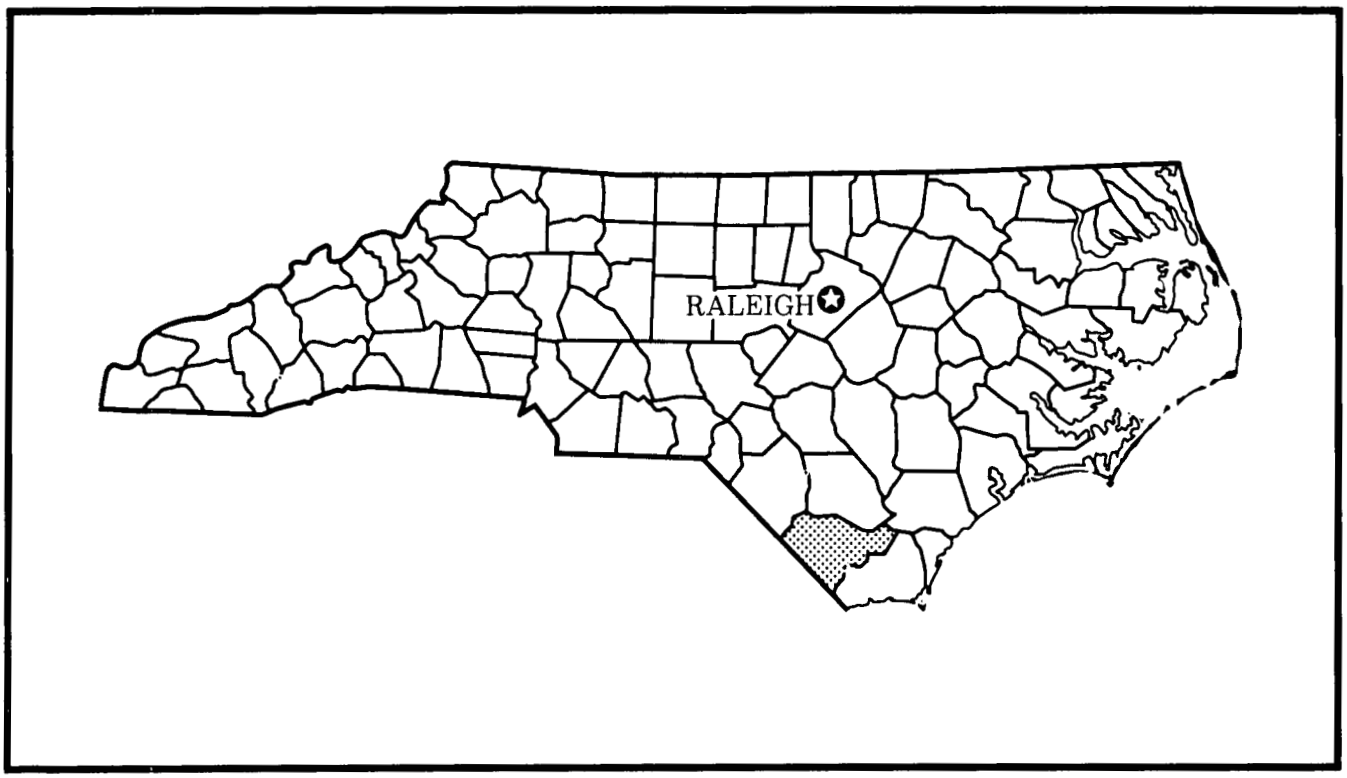
This soil survey contains information that can be used in land-planning programs in Columbus County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are 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 Columbus County in North Carolina.

Soil Survey of Columbus County, North Carolina

By Willie E. Spruill, Soil Conservation Service

Soils surveyed by Willie E. Spruill, L. Lee Mallard III, Arlin Weaver, and Edward L. O'Brien, Soil Conservation Service; and Hugh S. Hassell, North Carolina Department of Natural Resources and Community Development

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 Columbus County Board of Commissioners

COLUMBUS COUNTY is in the southeastern part of North Carolina, about 95 miles south of Raleigh, the state capital. It is bounded on the west by Robeson County, on the north by Bladen and Pender Counties, on the east by Brunswick County, and on the south by Horry County, South Carolina. The area of Columbus County is 609,882 acres, or about 953 square miles.

General Nature of the Survey Area

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

History and Economic Development

The first inhabitants in what is now Columbus County were Waccamaw Indians. By the time early settlers built a road from Elizabethtown to the present site of Whiteville, the county seat, only remnants of a previous Indian culture were left.

In 1696 the area that is now Columbus County was part of Bath County. Later, this area was included in New Hanover, Bladen, and Brunswick Counties *(6)*. In 1808 Columbus County, named for Christopher Columbus, was formed from Brunswick and Bladen Counties. Additional land from these counties was acquired from time to time until 1879.

Late in the 18th century and early in the 19th century, the abundant pine forests of the area were used for lumber, saw mills, and naval products. By 1860 the economy had diversified into cotton, corn, wheat, and wool, and after the Civil War it depended even more upon cotton and corn.

Tobacco was introduced in the county in 1895 and is now the foundation of the farming economy. In recent years income from forestry products has ranked behind tobacco. Other significant crops are soybeans, corn, sweet potatoes, small grains, peanuts, strawberries, and cabbage.

Growth of industry has diversified the economy. Many workers are employed in industries that produce apparel, plywood, lumber, mobile homes, electric baseboard and meter sockets, fertilizer, paper pulp, vents, cabinets, and weighing scales.

The population of Columbus County was 48,973 in 1960 and 46,937 in 1970. During this period the county experienced a significant outmigration of young people. By 1980 the population had increased to 51,015.

Physiography, Relief, and Drainage

Columbus County is in the Southern Coastal Plain and the Atlantic Coast Flatwoods physiographic regions. The Surry Scarp separates these regions. It has a toe elevation of about 94 feet. The Southern Coastal Plain region is west of the scarp, and the Atlantic Coast

Flatwoods region is east. The Surry scarp extends southwest from the Bladen County line near Slap Swamp to an area north of Whiteville, southwest across Beaverdam Swamp to Tabor City, and then southeast to the South Carolina State line. Elevation on the west side of the scarp (Sunderland geomorphic surface) ranges from 95 to 131 feet above sea level and on the east side (Wicomico geomorphic surface) ranges from 45 to 94 feet.

The Southern Coastal Plain region is drained by the Lumber and Waccamaw Rivers. It is characterized by broad, nearly level to gently sloping uplands that are dissected by a network of intermittent perennial streams. The soils near the drainageways are dominantly well drained and moderately well drained. Toward the center of the interstream divides, they are dominantly somewhat poorly drained to very poorly drained.

The Atlantic Coast Flatwoods region is drained by the Waccamaw and Cape Fear Rivers and their tributaries. In the Acme-Delco, Armour, and Riegelwood areas, the landscape is nearly level to gently sloping and is dissected by a network of drainageways. The landscape is broad, flat, and undissected in the Friar Swamp, Green Swamp, and Slap Swamp areas and in Bolton. Surface runoff is slow or very slow. The underlying material is slowly permeable, and internal drainage is slow. Organic material accumulates in this region. As a result, organic soils are common in Friar Swamp and Green Swamp.

Shallow, oval depressions, called Carolina bays, are on broad interstream divides. These bays are oriented northwest to southeast. They range from 1 to 2,000 acres or more. Unless artificially drained, most bays are wet throughout the year.

Marl is near the surface in the Old Dock, Lake Waccamaw, Hallsboro, and Green Swamp areas of the county, generally at a depth of 3 to 15 feet. It outcrops along the banks of Lake Waccamaw and the Cape Fear River.

Ground water supply is plentiful throughout the county. It is near the surface in most places, particularly during the wet season. Almost all of the water for domestic, industrial, and agricultural uses comes from deep wells.

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 Whiteville in the period 1951 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 45 degrees F, and the average daily minimum temperature is 33 degrees. The lowest temperature on record, which occurred at Whiteville on February 12, 1973, is 5 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 105 degrees.

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

Of the total annual precipitation, 29 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 23 inches. The heaviest 1-day rainfall during the period of record was 6 inches at Whiteville on August 26, 1958. Thunderstorms occur on about 46 days each year, and most occur in summer.

The average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 15 inches. On the average, 1 day had 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 65 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11 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, 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, depth, drainage, and other characteristics that affect management.

1. Norfolk-Lynchburg-Goldsboro

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

These soils are on broad ridges and in slight depressional areas, mostly in the central and northeastern parts of the county.

This map unit makes up about 31 percent of the county. It is about 33 percent Norfolk soils, 23 percent Lynchburg soils, 12 percent Goldsboro soils, and 32 percent soils of minor extent. The minor soils are Autryville, Blanton, Coxville, Craven, Grantham, Grifton, Gritney, Johnston, Lumbee, Meggett, Muckalee, Pantego, and Torhunta soils.

Norfolk soils are well drained. These soils are nearly level to gently sloping. Typically, the surface layer is loamy fine sand. The subsoil is sandy loam and sandy clay loam.

Lynchburg soils are somewhat poorly drained. These soils are nearly level. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

Goldsboro soils are moderately well drained. These soils are nearly level. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

The soils in this map unit are used mainly as cropland. In some areas they are used as woodland or pastureland. A seasonal high water table in the Lynchburg and Goldsboro soils is the main limitation affecting crop production, woodland management, and urban development. This limitation generally can be overcome by installing a drainage system. Erosion can be a hazard on the gently sloping Norfolk soils.

2. Rains-Lynchburg-Goldsboro

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

These soils are on broad flats, in slight depressions, and on broad ridges throughout most of the county.

This map unit makes up about 20 percent of the county. It is about 43 percent Rains soils, 20 percent Lynchburg soils, 12 percent Goldsboro soils, and 25 percent soils of minor extent. The minor soils are Bethera, Grifton, Johns, Johnston, Leon, Meggett, Muckalee, Nakina, and Torhunta soils.

Rains soils are poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy loam, sandy clay loam, and sandy clay.

Lynchburg soils are somewhat poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

Goldsboro soils are moderately well drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

The soils in this map unit are used about equally as woodland and cropland. In a few areas they are used as pastureland. A seasonal high water table affects most agricultural, urban, and recreational uses. A drainage system can help to overcome the problem of wetness; however, drainage outlets are often difficult to establish.

3. Foreston-Torhunta-Autryville

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

These soils are on broad ridges and in irregularly shaped depressions throughout the county.

This map unit makes up about 10 percent of the county. It is about 32 percent Foreston soils, 28 percent Torhunta soils, 16 percent Autryville soils, and 24 percent soils of minor extent. The minor soils are Blanton, Butters, Centenary, Echaw, Foreston, Goldsboro, Leon, Lynchburg, Murville, Norfolk, Stallings, Wagram, and Wakulla soils.

Foreston soils are moderately well drained. Typically, the surface layer is loamy fine sand. The subsoil is fine sandy loam, loamy fine sand, and fine sand.

Torhunta soils are very poorly drained. Typically, the surface layer is fine sandy loam and loamy sand. The subsoil is sandy loam and loamy sand.

Autryville soils are well drained. Typically, the surface layer is sand. The subsoil is sandy loam, loamy sand, sand, and sandy clay loam.

The soils in this map unit are used mainly as cropland or pastureland. In some areas they are used as woodland. Droughtiness and leaching of plant nutrients are the main limitations. In addition, a seasonal high water table in the Foreston and Torhunta soils affects crop production, and soil blowing is a problem on Autryville soils. The thick, sandy surface layer of Autryville soils and wetness and seepage in Foreston and Torhunta soils are limitations affecting some recreational and urban uses.

4. Pantego-Rains-Croatan

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

These soils are on broad flats and in oval and irregularly shaped depressions, mostly in the eastern and northwestern parts of the county.

This map unit makes up about 6 percent of the county. It is about 41 percent Pantego soils, 39 percent Rains soils, 10 percent Croatan soils, and 10 percent soils of minor extent. The minor soils are Bethera, Coxville, Grantham, Grifton, Leon, Lumbee, Lynchburg, Meggett, Murville, Nahunta, Stallings, and Torhunta soils.

Rains soils are poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy loam, sandy clay loam, and sandy clay.

Pantego soils are very poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam and sandy loam.

Croatan soils are very poorly drained. Typically, the surface layer is muck about 40 inches thick. The underlying material is sandy loam and sandy clay loam.

The soils in this map unit are used mainly as woodland. In some areas they are used as cropland or pastureland. Wetness is the main limitation affecting agricultural uses. High acidity in the Croatan soil is also a problem. High yields of corn and soybeans can be obtained in areas where these soils are drained. These soils provide good habitat for wetland wildlife. Wetness and low strength affect nearly all urban and recreational uses.

5. Nakina-Grifton-Croatan

Nearly level, very poorly drained and poorly drained soils that have a loamy surface layer and a loamy subsoil underlain by marly material or have a mucky surface layer and loamy underlying material; on uplands

These soils are on broad flats and in slight depressions, mostly in the eastern and southeastern parts of the county.

This map unit makes up about 6 percent of the county. It is about 40 percent Nakina soils, 30 percent Grifton soils, 24 percent Croatan soils, and 6 percent soils of minor extent. The minor soils are Brookman, Foreston, Kureb, Meggett, Murville, Stallings, and Torhunta soils.

Nakina soils are very poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is fine sandy loam, sandy clay loam, and sandy loam.

Grifton soils are poorly drained. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

Croatan soils are very poorly drained. Typically, the surface layer is muck that is about 40 inches thick. The underlying material is sandy loam and sandy clay loam.

The soils in this map unit are used mainly as woodland. In some areas they are used as cropland or pastureland. These soils provide good habitat for wetland wildlife. Wetness and low strength affect nearly all agricultural, woodland, urban, and recreational uses.

6. Johnston-Meggett-Muckalee

Nearly level, very poorly drained and poorly drained soils that have a loamy surface layer and loamy and sandy

underlying material or have a loamy surface layer and a loamy and clayey subsoil; on flood plains and low terraces

These soils are along major rivers and creeks throughout most of the county.

This map unit makes up about 9 percent of the county. It is about 40 percent Johnston soils, 30 percent Meggett soils, 20 percent Muckalee soils, and 10 percent soils of minor extent. The minor soils are Croatan, Dorovan, Echaw, Grifton, Johns, Leon, Lumbee, Murville, Nakina, and Torhunta soils.

Johnston soils are very poorly drained. These soils are on flood plains. Typically, the surface layer is loam. The underlying material is sandy loam and loamy sand.

Meggett soils are poorly drained. These soils are on flood plains and low stream terraces. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay, clay, and sandy clay loam.

Muckalee soils are poorly drained. They are on flood plains. Typically, the surface layer is sandy loam. The underlying material is sandy loam and loamy sand.

The soils in this map unit are used mainly as woodland. In some areas they are used as pastureland or cropland. These soils provide good habitat for wetland wildlife. Wetness and the hazard of flooding are the main limitations affecting woodland management and agricultural uses. Some areas of Meggett soils that are on low terraces have been drained and are used for corn and soybeans. Wetness, flooding, low strength, high shrink-swell potential, and slow permeability affect urban and recreational uses.

7. Dorovan-Croatan-Wilbanks

Nearly level, very poorly drained soils that have a thick mucky surface layer and loamy underlying material or have a loamy surface layer and mucky and clayey underlying material; on flood plains

These soils are on broad flood plains of Bogue Swamp, Red Hill Swamp, White Marsh Swamp, and Friar Swamp.

This map unit makes up about 6 percent of the county. It is about 60 percent Dorovan soils, 20 percent Croatan soils, 10 percent Wilbanks soils, and 10 percent soils of minor extent. The minor soils are Grifton, Johnston, Muckalee, Murville, and Torhunta soils.

Dorovan soils are very poorly drained. Typically, the surface layer is muck about 70 inches thick. The underlying material is sandy loam.

Croatan soils are very poorly drained. Typically, the surface layer is muck about 40 inches thick. The underlying material is sandy loam and sandy clay loam.

Wilbanks soils are very poorly drained. Typically, the surface layer is silt loam and silty clay. The underlying material is muck in the upper part and dark clay in the lower part.

Nearly all of the soils in this map unit are used as woodland. In a few areas they are used as cropland or pastureland. These soils provide good habitat for wetland wildlife. Flooding, wetness, high acidity, and low strength affect nearly all agricultural, woodland, urban, and recreational uses.

8. Pender-Grifton-Meggett

Nearly level, moderately well drained to poorly drained soils that have a loamy surface layer and a loamy or loamy and clayey subsoil underlain by marly material; on uplands, terraces, and flood plains

These soils are on ridges, in irregularly shaped depressions, and on broad flats, mostly in the northeastern and southeastern parts of the county.

This map unit makes up about 6 percent of the county. It is about 43 percent Pender soils, 39 percent Grifton soils, 10 percent Meggett soils, and 8 percent soils of minor extent. The minor soils are Echaw, Foreston, Goldsboro, Leon, Muckalee, Murville, Nakina, and Norfolk soils.

Pender soils are moderately well drained or somewhat poorly drained. They are on uplands and terraces. Typically, the surface layer is fine sandy loam. The subsoil is sandy loam and sandy clay loam.

Grifton soils are poorly drained. They are on uplands and terraces. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay loam.

Meggett soils are poorly drained. They are on flood plains and low terraces. Typically, the surface layer is fine sandy loam. The subsoil is sandy clay, clay, and sandy clay loam.

The soils in this map unit are used mainly as woodland. In some areas they are used as cropland and to a small extent as pastureland. Wetness and flooding affect woodland management and crop production. If drained, these soils are highly productive; however, drainage outlets are often difficult to establish. Wetness, flooding, high shrink-swell potential, and slow permeability affect urban and recreational uses.

9. Murville-Echaw-Leon

Nearly level to gently sloping, very poorly drained, moderately well drained, and poorly drained soils that

have a sandy surface layer and a sandy subsoil; on uplands and terraces

These soils are in large irregularly shaped depressional areas, in Carolina bays and associated sandy rims, and on broad to narrow sandy ridges between Carolina bays throughout the county.

This map unit makes up about 4 percent of the county. It is about 30 percent Murville soils, 25 percent Echaw soils, 20 percent Leon soils, and 25 percent soils of minor extent. The minor soils are Autryville, Blanton, Centenary, Croatan, Foreston, Goldsboro, Grifton, Johnston, Kureb, Lumbee, Lynchburg, Muckalee, Pantego, Pender, Rains, Stallings, Torhunta, Wagram, and Wakulla soils.

Murville soils are very poorly drained. Typically, the surface layer and subsoil are fine sand.

Echaw soils are moderately well drained. Typically, the surface layer and subsurface layer are loamy sand. The subsoil is sand.

Leon soils are poorly drained. Typically, the surface layer, subsurface layer, and subsoil are sand.

The soils in this map unit are used mainly as woodland. In some areas they are used as cropland and to a small extent as pasture. Wetness in Murville and Leon soils affect woodland management and crop production. Droughtiness, soil blowing, and leaching of plant nutrients affect crop production on the Echaw soils. Wetness and the thick sandy layers affect most urban and recreational uses.

10. Nahunta-Exum-Grantham

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

These soils are on broad flats, in slight depressions, and on broad ridges in the northern and southern parts of the county.

This map unit makes up about 3 percent of the county. It is about 34 percent Nahunta soils, 31 percent Exum soils, 26 percent Grantham soils, and 9 percent soils of minor extent. The minor soils are Butters, Grifton, Meggett, Muckalee, Norfolk, Pantego, Torhunta, and Wagram soils.

Nahunta soils are somewhat poorly drained. Typically, the surface layer is very fine sandy loam. The subsoil is loam and clay loam.

Exum soils are moderately well drained. Typically, the surface layer is very fine sandy loam. The subsoil is loam.

Grantham soils are poorly drained. Typically, the surface layer and subsurface layer are very fine sandy loam. The subsoil is loam.

The soils in this map unit are used mainly as woodland or cropland. In a few areas they are used as pastureland. Wetness is the main limitation affecting woodland management, cropland production, and urban and recreational development. If drained, these soils are highly productive woodland and cropland; however, drainage outlets are often difficult to establish.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Norfolk loamy fine sand, 0 to 2 percent slopes, is one of several phases in the Norfolk series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Rains-Urban land complex is an example.

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

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. In this soil survey, Urban land is not mapped separately. It is mapped in complexes with Norfolk, Pender, or Rains soils.

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 and capabilities for many uses. The Glossary defines many of the terms used in describing the soils.

AuB—Autryville sand, 0 to 3 percent slopes. This well drained soil is on broad, smooth flats on uplands. It is most extensive in the northwestern and southwestern parts of the county. Some of the larger areas are west of Evergreen and northeast of Iron Hill. Individual areas of this soil are irregular in shape and generally are about 45 acres.

Typically, the surface layer is brown sand about 10 inches thick. The subsurface layer to a depth of about 23 inches is very pale brown sand. The subsoil to a depth of about 43 inches is yellowish brown sandy loam in the upper part and brownish yellow loamy sand in the

lower part. Another soil sequence begins at a depth of 43 inches. It is very pale brown sand to a depth of about 55 inches. The next layer to a depth of about 74 inches is yellow sandy loam that has light gray and strong brown mottles. That layer is underlain to a depth of 85 inches by light gray sandy clay loam that has mottles in shades of red and yellow.

Permeability is moderately rapid in the upper part of the subsoil, rapid in the middle part, and moderate in the lower part. The available water capacity is low. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at a depth of 4 to 6 feet.

Included with this soil in mapping are small areas of Blanton, Wakulla, Norfolk, Butters, and Wagram soils. Compared to Autryville soil, the sandy surface and subsurface layers are thicker in the Blanton and Wakulla soils and thinner in the Norfolk and Butters soils. Wagram soils are loamy throughout the subsoil. The included soils are along the edge of delineations or they are scattered throughout the map unit. Typically, only two or three of the included soils are in any one delineation. The included soils make up less that 20 percent of this map unit.

Most areas of this Autryville soil are in cultivated crops. The rest is mainly woodland or pastureland.

The main crops are corn, soybeans, tobacco, peanuts, sweet potatoes, and small grains. Leaching of plant nutrients, soil blowing, and low available water capacity are the main limitations. Blowing sand can damage young plants. Winter cover crops, conservation tillage, and crop residue management help to maintain organic matter content and to conserve moisture. Conservation practices, such as no-tillage planting and windbreaks, and crop rotations that include close-growing crops also help to conserve soil and water. Fertilizer, particularly nitrogen, should be added in split applications.

The use of this soil for hay and pasture is effective in conserving soil and water. Coastal bermudagrass is commonly grown.

The dominant trees are longleaf pine, loblolly pine, blackjack oak, southern red oak, white oak, post oak, and hickory. The main understory includes sassafras, flowering dogwood, and turkey oak. The thick, sandy surface and subsurface layers affect equipment use and seedling mortality.

This soil is commonly used for urban development, but it is limited for some uses. Lawns and shrubs may be difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Ditchbanks and trench walls cave easily, and seepage often occurs. Seasonal wetness is a limitation affecting septic tank absorption fields and dwellings without basements. The thick, sandy surface layer is a limitation affecting some recreational uses.

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

AyB—Aycock very fine sandy loam, 1 to 4 percent slopes. This well drained soil is on broad, smooth to slightly rounded uplands. It is most extensive in the north central part of the county near the Bladen County line. Individual areas of this soil are irregular in shape and generally are about 40 acres.

Typically, the surface layer is grayish brown very fine sandy loam about 5 inches thick. The subsurface layer to a depth of about 11 inches is light yellowish brown very fine sandy loam. The subsoil is loam to a depth of 75 inches. It is, in sequence downward, brownish yellow, strong brown, strong brown with red mottles, brownish yellow with light gray and red mottles, and yellowish red, yellowish brown, and light gray.

Permeability is moderate or moderately slow, and the available water capacity is high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at a depth of 4 to 6 feet.

Included with this soil in mapping are small areas of Gritney, Exum, Norfolk, and Goldsboro soils. Exum and Goldsboro soils are moderately well drained and are in slightly lower positions on the landscape than Aycock soil. Norfolk soils have a lower silt content and are scattered throughout the map unit. Gritney soils have a higher clay content and are on side slopes. The included soils make up less than 20 percent of this map unit.

Most areas of this Aycock soil are in cultivated crops. The rest is mainly woodland or pastureland.

The main cultivated crops are corn, soybeans, small grains, and tobacco. Winter cover crops, conservation tillage, and crop residue management help to control erosion and maintain tilth. Field borders and crop rotations that include close-growing crops also help to conserve soil and water. This soil is good pastureland and hayland.

The dominant trees are loblolly pine, longleaf pine, southern red oak, white oak, and hickory. The main understory includes flowering dogwood, American holly, sourwood, and sassafras. This soil has few limitations affecting woodland use and management.

This soil is limited for some urban uses because of wetness, moderately slow permeability, and low

strength. Limitations for recreational uses are not major.

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

Be—Bethera loam. This poorly drained soil is on broad, smooth flats and in shallow depressions on uplands. It is most extensive in the southern part of the county. Slopes range from 0 to 2 percent. Areas of this soil generally are oval or irregular in shape and are about 300 acres.

Typically, the surface layer is black loam about 6 inches thick. The subsoil extends to a depth of about 68 inches. The upper part is gray clay loam that has brownish yellow mottles, the middle part is gray clay that has red and yellowish brown mottles, and the lower part is light gray clay loam that has red and yellow mottles. The underlying material to a depth of 72 inches is gray sandy clay loam that has brownish yellow mottles.

Permeability is moderately slow to slow, and the available water capacity is high. Shrink-swell potential is moderate. This soil is extremely acid to moderately acid except where lime has been added. The seasonal high water table is at or near the surface from winter to early in spring. In depressions, this soil may by ponded for brief periods after heavy rains.

Included with this soil in mapping are small areas of Rains, Grantham, Nahunta, and Lynchburg soils. Also included are some areas of clayey soils that are better drained than the Bethera soil. Nahunta and Lynchburg soils are somewhat poorly drained and are in slightly higher positions on the landscape than Bethera soil. Rains and Grantham soils have less clay in the subsoil and are scattered throughout the map unit. The included soils make up less than 20 percent of this map unit.

Most areas of this Bethera soil are woodland. The rest is mainly in row crops or pasture.

If this soil is drained, corn and soybeans can be grown. Parallel, open ditches are commonly used to remove excess water. Even if this soil is drained, tillage can be delayed in the spring because of wetness. Conservation tillage, cover crops, and grasses and legumes in the cropping system help to maintain tilth.

The dominant trees are loblolly pine, sweetgum, water oak, and red maple. The understory includes sweetbay, switchcane, waxmyrtle, and blackberry. Wetness is the main limitation affecting woodland use and management.

This soil is limited for most urban and recreational uses because of wetness, slow permeability, and low strength.

This Bethera soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 8W.

BnB—Blanton sand, 0 to 6 percent slopes. This well drained soil is in broad areas and, to a lesser extent, on rounded side slopes on uplands. It is most extensive in the Acme-Delco area. Individual areas are irregular in shape and generally are about 45 acres.

Typically, the surface layer is dark gray sand about 7 inches thick. The subsurface layer to a depth of about 57 inches is sand. The upper part is very pale brown with white mottles, the middle part is very pale brown with yellow mottles, and the lower part is white. The subsoil to a depth of 80 inches is sandy clay loam. The upper part is yellowish brown, the middle part is brownish yellow with yellowish red mottles, and the lower part is mottled light gray, brownish yellow, and yellowish brown.

Permeability is moderate, and the available water capacity is very low to low. Shrink-swell potential is low. This soil is very strongly acid to moderately acid in the surface and subsurface layers and very strongly acid or strongly acid in the subsoil. The seasonal high water table is 5 to 6 feet below the surface.

Included with this soil in mapping are small areas of Norfolk, Wagram, Autryville, and Wakulla soils. Norfolk, Wagram, and Autryville soils have a sandy surface layer and subsurface layer that are not as thick as in Blanton soil. Wakulla soils are sandy throughout. The included soils are scattered throughout the map unit. Typically, no more than two or three of the included soils are in any one delineation. The included soils make up less than 20 percent of this map unit.

Most areas of this Blanton soil are woodland. The rest is mainly pastureland or cropland.

Corn, soybeans, peanuts, tobacco, and small grains are the main cultivated crops. The main limitations are low available water capacity and susceptibility to soil blowing. Conservation tillage, crop residue management, windbreaks, and close-growing grasses and legumes in the cropping system help to control soil blowing, reduce leaching, and conserve moisture. Coastal bermudagrass is grown for hay and pasture.

The dominant trees are loblolly pine and longleaf pine. The main understory is blackjack oak and turkey oak. The thick, sandy surface layer and low available water capacity are the main limitations affecting woodland use and management.

This soil is limited for some urban and recreational uses because of seasonal wetness and the thick sandy layers. Lawns and shrubs may be difficult to establish

and maintain because of leaching of plant nutrients and droughtiness. Ditchbanks and trench walls can cave, and seepage can occur.

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

Br—Brookman loam, frequently flooded. This very poorly drained soil is in depressions on low stream terraces and on flood plains. It is most extensive southeast of Lake Waccamaw in Green Swamp. Slopes are less than 1 percent. Individual areas of this soil are long and irregular in shape and generally are about 250 acres.

Typically, the surface layer is very dark gray loam about 11 inches thick. The subsoil extends to a depth of about 60 inches. It is, in sequence downward, dark grayish brown clay loam that has very dark gray mottles, dark gray sandy clay that has yellowish red and light brownish gray mottles, dark gray clay that has yellowish red and dark gray mottles, and mottled greenish gray, olive gray, gray, strong brown, and olive yellow sandy clay. The underlying material to a depth of 72 inches is greenish gray sandy clay loam that has olive yellow and light gray mottles.

Permeability is moderate in the subsoil and slow in the underlying material. The available water capacity is high. Shrink-swell potential is moderate. This soil is strongly acid to slightly acid in the surface layer except where lime has been added. It is strongly acid to mildly alkaline in the subsoil and slightly acid to moderately alkaline in the underlying material. The seasonal high water table is at or near the surface from winter to early in spring.

Included with this soil in mapping are small areas of Meggett, Grifton, and Nakina soils. Meggett and Grifton soils are poorly drained and are around the edge of delinations or in slightly higher positions on the landscape than Brookman soil. Nakina soils have less clay in the subsoil and are scattered throughout the map unit. The included soils make up less than 20 percent of this map unit.

Nearly all of this Brookman soil is woodland.

This soil is seldom used for cultivated crops because of wetness and flooding; however, if this soil is drained and protected from flooding, corn and soybeans can be grown. Suitable drainage outlets are difficult to establish because this soil is in low positions on the landscape. Open ditches are the most commonly used drainage method.

Grasses and legumes can be grown for hay and pasture, but drainage is necessary for maximum production. If this soil is used for pasture, proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition. Grazing when the soil is too wet can cause surface compaction and poor tilth.

The dominant trees are baldcypress, swamp tupelo, yellow poplar, sweetgum, blackgum, and water oak. The main understory includes ironwood, greenbrier, and American holly. Wetness and the hazard of flooding are the main limitations affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of wetness, flooding, slow permeability, and low strength.

This Brookman soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 5W.

BuB—Butters loamy fine sand, 0 to 3 percent slopes. This well drained soil is on uplands, mainly in the Iron Hill and Sidney area. Individual areas of this soil are irregular in shape and generally are about 30 acres.

Typically, the surface layer is brown loamy fine sand about 9 inches thick. The subsurface layer to a depth of about 13 inches is very pale brown loamy fine sand. The subsoil to a depth of about 27 inches is brownish yellow sandy loam that has yellowish red mottles. To a depth of about 35 inches it is brownish yellow loamy sand. Another sequence begins at a depth of 35 inches. To a depth of about 58 inches it is loamy sand that is white with very pale brown and yellow mottles in the upper part and mottled strong brown, light yellowish brown, and white in the lower part. Below that layer is mottled strong brown, brownish yellow, and light gray sandy loam to a depth of about 68 inches and mottled reddish yellow, brownish yellow, and light gray sandy clay loam to a depth of about 75 inches. The lower part of this sequence to a depth of 82 inches is light gray sandy clay loam that has yellow and yellowish red mottles.

Permeability is moderately rapid in the upper part of the subsoil, rapid in the middle part, and moderate in the lower part. The available water capacity is low. Shrink-swell potential is low. This soil is strongly acid or very strongly acid except where lime has been added. The seasonal high water table is at a depth of 4 to 5 feet.

Included with this soil in mapping are a few areas of Wagram, Wakulla, Autryville, Norfolk, and Foreston soils. Also included in scattered areas throughout the

map unit are soils that are not a bisequum. In some of these soils the subsoil does not extend to a depth of 60 inches. Wagram, Wakulla, and Autryville soils are in higher positions on the landscape than Butters soil and are sandier. Norfolk soils are intermixed with Butters soil and are less sandy. Foreston soils are on the edge of delineations or in slight depressions and are wetter. Typically, only two or three of the included soils are in any one delineation. The included soils make up less than 20 percent of this map unit.

Most areas of this Butters soil are in cultivated crops. The rest is woodland or pastureland.

Corn, soybeans, tobacco, sweet potatoes, and small grains are the main crops grown. Leaching of plant nutrients, low available water capacity, and susceptibility to soil blowing are the main limitations. Conservation tillage, crop residue management, and winter cover crops reduce leaching of plant nutrients and help to conserve soil and water.

The dominant trees are loblolly pine, longleaf pine, white oak, and southern red oak. The understory includes flowering dogwood, American holly, and sourwood. Limitations affecting woodland use and management are insignificant.

This soil is limited for some urban uses because of wetness and seepage, which is a result of rapid permeability. This soil is too sandy for some recreational uses.

This Butters soil is in capability subclass IIs. The woodland ordination symbol is 9A.

Ce—Centenary fine sand. This moderately well drained soil is on broad, smooth flats on uplands and on stream terraces. It is most extensive in the north-central part of the county. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 30 acres.

Typically, the surface layer is grayish brown fine sand about 9 inches thick. The subsurface layer extends to a depth of about 68 inches. It is, in sequence downward, yellow and brownish yellow fine sand, yellow fine sand that has reddish yellow and light gray mottles, light gray fine sand that has yellow mottles, and light brownish gray sand that has yellow and brown mottles. The subsoil is dark brown loamy sand to a depth of 74 inches and dark reddish brown sand to a depth of 90 inches.

Permeability is rapid in the subsurface layer and moderately rapid in the subsoil. The available water capacity is low. Shrink-swell potential is low. This soil is very strongly acid to moderately acid except where lime has been added. The seasonal high water table is 3.5 to 5.0 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Echaw, Foreston, Kureb, Wakulla, and Leon soils. Kureb soils are excessively drained, and Wakulla soils are somewhat excessively drained. They are in higher positions on the landscape than Centenary soil. Leon soils are poorly drained and are in lower positions. Foreston soils have a loamy subsoil. Echaw soils have a dark colored subsoil within 50 inches of the surface. Foreston and Echaw soils are scattered throughout the map unit. The included soils make up less than 30 percent of this map unit.

Most areas of this Centenary soil are woodland. A few areas are in crops or pasture.

Corn, soybeans, small grains, and tobacco are the main crops grown. The main limitations are low available water capacity and susceptibility to soil blowing. Conservation tillage, crop residue management, windbreaks, and close-growing grasses and legumes in the cropping system help to conserve moisture, reduce leaching, and control soil blowing.

Using this soil for pasture or hayland is a good way to conserve soil and water. Pasture generally consists of such forages as coastal bermudagrass and bahiagrass.

The dominant trees are loblolly pine, longleaf pine, blackjack oak, turkey oak, and post oak. The main understory includes waxmyrtle and switchgrass. The deep sandy layers can restrict the use of equipment and result in seedling mortality.

This soil is limited for urban and recreational uses because of the deep sandy layers, seepage, and wetness.

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

Ch—Chastain and Chenneby soils, frequently flooded. These poorly drained and somewhat poorly drained soils are on flood plains along the Cape Fear River and its tributaries. Slopes range from 0 to 2 percent. These soils were not mapped separately because they react similarly to most uses and management. They do not occur in a predictable pattern. Some areas contain only Chastain or Chenneby soil, but most contain both soils in varying percentages. Chastain soil is poorly drained and is in lower parts of the map unit in troughs and depressions. Chenneby soil is somewhat poorly drained and is on narrow, higher terraces and ridges of the flood plain. Individual areas of these soils are long and broad and range from 25 to 900 acres or more.

Typically, this Chastain soil has a dark gray silty clay loam surface layer about 4 inches thick. The subsoil extends to a depth of about 62 inches. It is gray silty clay loam in the upper part and gray silty clay in the lower part.

Permeability is slow, and the available water capacity is high. Shrink-swell potential is moderate. This soil generally is very strongly acid or strongly acid. It can be moderately acid below a depth of 40 inches. The seasonal high water table is at or near the surface from winter to early in spring of most years. Flooding is for very long periods.

Typically, this Chenneby soil has a dark yellowish brown silty clay loam surface layer about 12 inches thick. The subsoil to a depth of about 60 inches is dark brown and yellowish brown silty clay loam. The upper part has dark yellowish brown, yellowish brown, and gray mottles; and the lower part has dark yellowish brown and light brownish gray mottles.

Permeability is moderate, and the available water capacity is high. This soil is very strongly acid to moderately acid. Shrink-swell potential is low. The seasonal high water table is 1.0 to 2.5 feet below the surface during winter and spring of most years. Flooding is for very brief periods.

Included with these soils in mapping are small areas of very poorly drained Dorovan soils in lower positions on the landscape. Also included are some areas of moderately well drained soils in higher positions adjacent to the river. The included soils make up about 10 percent of this map unit.

Nearly all areas of the Chastain and Chenneby soils are woodland.

These soils have generally not been used as cropland or pastureland because the Cape Fear River floods frequently and flood protection has not been feasible.

The dominant trees are water tupelo, sweetgum, water oak, loblolly pine, yellow poplar, baldcypress, and American sycamore. The understory includes blackgum, river birch, American hornbeam, hackberry, and winged elm. Wetness and the hazard of frequent flooding are the main limitations affecting woodland use and management.

These soils are severely limited for any kind of urban and recreational uses because of wetness and flooding.

Chastain soil is in capability subclass VIw, and the woodland ordination symbol is 8W. Chenneby soil is in capability subclass IVw, and the woodland ordination symbol is 9W.

Co—Coxville loam. This poorly drained soil is on broad, smooth flats and in shallow depressions on uplands. It is most extensive in the vicinity of Chadbourn. Slopes are less than 2 percent. Individual areas of this soil are oval or irregular in shape and generally are about 30 acres.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsurface layer to a depth of about 14 inches is grayish brown loam. The subsoil extends to a depth of 62 inches. The upper part is gray clay loam that has yellowish brown mottles. The middle part is gray clay that has yellowish brown and red mottles. The lower part is gray clay loam that has brownish yellow and yellowish red mottles. The underlying material to a depth of 72 inches is mottled light gray, gray, and yellowish brown clay.

Permeability is moderately slow, and the available water capacity is high. Shrink-swell potential is moderate. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at or near the surface from winter to early in spring.

Included with this soil in mapping are small areas of Lynchburg, Rains, and Pantego soils. Lynchburg soils are somewhat poorly drained and are in slightly higher positions on the landscape than Coxville soil. Pantego soils are very poorly drained and are in slightly lower positions. Rains soils have less clay in the subsoil and are scattered throughout the map unit. Small areas of soils that have sandy underlying material at a depth of less than 60 inches are also included. The included soils make up less than 20 percent of this map unit.

Most areas of this Coxville soil are woodland. The rest is mainly in row crops or pasture.

If this soil is drained, corn and soybeans can be grown. Common drainage practices include parallel open ditches and land grading. Even if this soil is drained, tillage can be delayed in the spring because of wetness. Conservation tillage, cover crops, and grasses and legumes in the conservation cropping system help to maintain tilth.

The dominant trees are longleaf pine, sweetgum, water oak, and red maple. The understory includes American holly, switchcane, gallberry, and greenbrier. Wetness is the main limitation affecting woodland use and management.

This soil is limited for most urban and recreational uses because of wetness, moderately slow permeability, and low strength.

This Coxville soil is in capability subclass IVw

(undrained) or IIIw (drained). The woodland ordination symbol is 9W.

CrB—Craven fine sandy loam, 1 to 4 percent slopes. This moderately well drained soil is on uplands and on side slopes next to drainageways. It is most extensive in the southern part of the county. Individual areas of this soil are irregular in shape and generally are about 25 acres.

Typically, the surface layer is brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 55 inches. The upper part is yellowish brown clay loam and clay that has red and yellowish red mottles. The middle part is mottled red, strong brown, yellow, and light brownish gray clay. The lower part is gray sandy clay that has red and strong brown mottles. The underlying material to a depth of 67 inches is brownish yellow and gray sandy clay loam that has mottles of red and brownish yellow and pockets of sandy loam.

Permeability is slow, and the available water capacity is moderate. Shrink-swell potential is moderate. This soil is strongly acid or very strongly acid except where lime has been added. The seasonal high water table is within a depth of 2 to 3 feet from winter to early in spring.

Included with this soil in mapping are small areas of Exum, Goldsboro, Lynchburg, Nahunta, and Norfolk soils. Small areas of Craven soils that are eroded and have a clay loam surface layer are also included. Lynchburg and Nahunta soils are well drained and are in slightly lower positions on the landscape than Craven soil. Norfolk soils are well drained and are in slightly higher positions. Exum and Goldsboro soils have less clay in the subsoil and are scattered throughout the map unit. The included soils make up less than 20 percent of this map unit.

Most areas of this Craven soil are in cultivated crops. The rest is woodland or pastureland.

The main crops are corn, soybeans, small grains, and tobacco. Artificial drainage is needed in some areas for optimum growth of tobacco. Surface water runoff, slow permeability, and susceptibility to erosion are the main limitations. Cover crops, conservation tillage, stripcropping, field borders, crop residue management, grassed waterways, contour farming, and crop rotations that include close-growing crops help to conserve soil and water.

This soil is good pastureland. Proper stocking, pasture rotation, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are sweetgum, loblolly pine, longleaf pine, white oak, southern red oak, willow oak, yellow poplar, blackgum, and water oak. The main understory includes gallberry, American holly, sourwood, and southern bayberry. The high clay content of the soil can restrict the use of equipment.

This soil is limited for most urban uses because of wetness, slow permeability, and moderate shrink-swell potential. If this soil is not properly drained, wetness and permeability affect the performance of septic tank absorption fields. Wetness and slow permeability are also slight limitations affecting recreational uses.

This Craven soil is in capability subclass IIIe. The woodland ordination symbol is 8C.

Ct—Croatan muck. This very poorly drained soil generally is on broad, smooth flats between widely spaced natural drainageways and in oval depressions on uplands. In some areas, it is on stream terraces and flood plains. This soil is most extensive in the Green Swamp area. Slopes are less than 2 percent. Individual areas of this soil are irregular in shape and generally are about 600 acres.

Typically, this soil has a layer of black muck about 40 inches thick. The underlying material is dark grayish brown sandy loam in the upper part and grayish brown sandy clay loam in the middle part. The lower part to a depth of 74 inches is gray sandy clay loam.

Permeability is slow to moderately rapid in the organic layers and moderately slow to moderately rapid in the underlying mineral layers. The available water capacity is very high. Shrink-swell potential is low. The organic layers are extremely acid except where lime has been added to the soil. The underlying material is extremely acid to slightly acid. Unless this soil has been drained, a seasonal high water table is at or near the surface.

Included with this soil in mapping are small areas of Johnston, Torhunta, and Leon soils, which are mineral soils. These soils typically are on the outer edge of oval-shaped delineations; however, they are also in slightly elevated areas of the map unit. Also included are small areas of soils that have organic layers less than 16 inches thick. These soils are randomly intermingled with the Croatan soil. The included soils make up less than 20 percent of this map unit.

Most areas of this Croatan soil are woodland. A few areas have been cleared and are used for corn and soybeans.

Wetness and high acidity are the main limitations affecting cultivated crops. If this soil is drained, corn and soybeans can be grown; however, suitable drainage outlets generally are unavailable. Annual soil testing is needed to maintain the delicate chemical

balance required for production of crops. Once proper applications of lime and fertilizer have been made, the lime and fertilizer must be worked deep into the root zone because little or no leaching occurs in this soil.

Wetness and high acidity also limit the use of this soil for pasture or hay. Even if this soil is properly drained, grazing probably would be difficult during very wet periods.

The dominant trees are pond pine, water tupelo, baldcypress, swamp tupelo, loblolly pine, sweetgum, and Atlantic white cedar. The understory includes huckleberry, redbay, sweetbay, greenbrier, switchcane, and gallberry. Wetness and high acidity, which result in poor productivity, are limitations affecting woodland use and management. In its natural state this soil provides good habitat for wetland wildlife.

This soil is severely limited for urban and recreational uses because of wetness, low strength, and possible flooding.

This Croatan soil is in capability subclass VIIw (undrained) or IVw (drained). The woodland ordination symbol is 2W.

Do—Dorovan muck, frequently flooded. This very poorly drained soil is on flood plains along major drainageways that drain into Lake Waccamaw and the Waccamaw River. Slopes are less than 1 percent. Areas of this soil are long and irregular in shape and generally are about 600 acres.

Typically, this soil has a layer of black and dark reddish brown muck about 70 inches thick. The underlying material to a depth of 75 inches is grayish brown sandy loam.

Permeability is moderate in the organic layers and rapid in the mineral layers. The available water capacity is very high. Shrink-swell potential is low. This soil is extremely acid in the organic layers and very strongly acid or strongly acid in the underlying mineral layer. The seasonal high water table is near or above the surface throughout the year.

Included with this soil in mapping are small areas of Johnston, Torhunta, and Murville soils, which are mineral soils. These soils are around the outer edge of delineations or in slightly higher positions on the landscape than Dorovan soil. Also included throughout the map unit are small areas of Croatan soils that have thinner organic layers. The included soils make up about 20 percent of this map unit.

Nearly all areas of this Dorovan soil are woodland.

This soil is seldom used for cultivated crops, hay, or pasture because of wetness, high acidity, and flooding. If this soil is drained, corn and soybeans can be grown; however, because this soil is in the lowest position on the landscape, drainage and flood control are difficult. Even if this soil is properly drained, crop and hay production and grazing probably would be restricted during very wet periods because of the low load-bearing strength of the organic layers.

The dominant trees are pond pine, water tupelo, baldcypress, sweetgum, redbay, loblollybay, and sweetbay. The understory includes fetterbush, greenbrier, and gallberry. Wetness, high acidity, the hazard of flooding, and low strength are the main limitations affecting woodland use and management. Because this soil is poorly suited to other uses, many areas probably will remain in native woodland for some time. In its natural undrained state, this soil provides good habitat for wetland wildlife.

This soil is severely limited for urban and recreational uses because of wetness, flooding, and low strength.

This Dorovan soil is in capability subclass VIIw. The woodland ordination symbol is 5W.

Ec—Echaw loamy sand. This moderately well drained soil is on ridges between depressional areas and Carolina bays on uplands and on stream terraces. Some of the larger areas are south of Fair Bluff and west of Guideway. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 35 acres.

Typically, the surface layer is very dark grayish brown loamy sand about 8 inches thick. The subsurface layer to a depth of about 42 inches is loamy sand. It is brownish yellow and yellow in the upper part. The lower part is very pale brown with mottles in shades of white, yellow, and brown. The subsoil to a depth of at least 85 inches is dark reddish brown and black sand that has black mottles and mottles in shades of brown.

Permeability is moderately rapid to rapid, and the available water capacity is low. Shrink-swell potential is low. This soil is very strongly acid to moderately acid except where lime has been added. The seasonal high water table is at a depth of 2.5 to 5.0 feet from winter to early spring.

Included with this soil in mapping are small areas of Wakulla, Foreston, Centenary, and Leon soils. Wakulla soils are somewhat excessively drained and are in higher positions on the landscape than Echaw soil. Centenary soils have a dark colored subsoil at a depth of more than 50 inches, and Foreston soils have a loamy subsoil. These soils are in positions similar to those of the Echaw soil. Also included are small areas of similar soils that have a thin organic-stained layer at a depth of less than 30 inches. The included soils make

up less than 30 percent of this map unit.

About half the acreage of this Echaw soil is cropland. The rest is woodland or pastureland.

Corn, soybeans, small grains, and tobacco are the main crops grown. The main limitations are low available water capacity, leaching of plant nutrients, and susceptibility to soil blowing. Conservation tillage, crop residue management, windbreaks, and close-growing grasses and legumes in the cropping system help to conserve moisture, reduce leaching, and control soil blowing.

Using this soil for pasture or hay is a good way to conserve soil and water. Pasture generally consists of such forages as coastal bermudagrass and bahiagrass.

The dominant trees are loblolly pine, longleaf pine, blackjack oak, turkey oak, and post oak. The main understory includes waxmyrtle and switchgrass. The deep sandy layers, droughtiness, and poor productivity are the main limitations affecting woodland use and management.

This soil is limited for urban and recreational uses because of the deep sandy layers, seepage, and wetness.

This Echaw soil is in capability subclass IIIs. The woodland ordination symbol is 5S.

ExA—Exum very fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is on broad flats on uplands. It is most extensive in the northern part of the county near the Bladen County line and in the southern part of the county. Individual areas of this soil are irregular in shape and generally are about 25 acres.

Typically, the surface layer is brown very fine sandy loam about 6 inches thick. The subsoil to a depth of 70 inches or more is loam. The upper part is brownish yellow and yellowish brown with mottles in shades of yellow, gray, strong brown, and red; the middle part is mottled brownish yellow, light brownish gray, and red; and the lower part is gray with mottles in shades of brown and red.

Permeability is moderately slow, and the available water capacity is high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is within 2 to 3 feet of the surface from winter to early spring.

Included with this soil in mapping are small areas of Norfolk, Aycock, Goldsboro, Craven, Nahunta, Lynchburg, and Gritney soils. Norfolk and Aycock soils are well drained and are in slightly higher positions on the landscape than Exum soil. Nahunta and Lynchburg soils are somewhat poorly drained and are in lower positions. Goldsboro soils have less silt in the subsoil than Exum soil. Gritney and Craven soils have more clay in the subsoil. Also included are small areas of soils that have layers of loamy sand or sandy loam at a depth of less than 60 inches. The included soils make up less than 20 percent of this map unit.

Most areas of this Exum soil are in cultivated crops. The rest is woodland or pastureland.

The main cultivated crops are corn, soybeans, tobacco, small grains, and peanuts. Artificial drainage is needed in some areas for optimum growth of tobacco and other crops that require good drainage.

This soil is good pastureland. Proper stocking, pasture rotation, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, yellow poplar, white oak, southern red oak, sweetgum, and red maple. The understory includes American holly and sourwood. Limitations for woodland use and management are insignificant.

This soil is limited for some urban and recreational uses because of wetness and low strength. Drainage may be necessary in many areas to insure proper functioning of septic tank absorption fields.

This Exum soil is in capability subclass IIw. The woodland symbol is 8A.

Fo—Foreston loamy fine sand. This moderately well drained soil is on smooth uplands and Carolina bay rims in the northwestern and southwestern parts of the county. Some of the larger areas are north of Evergreen and east of Tabor City. These areas are flat to slightly convex. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 28 acres.

Typically, the surface layer is very dark gray loamy fine sand about 9 inches thick. The subsoil extends to a depth of about 60 inches. The upper part is brownish yellow fine sandy loam that has yellowish brown and light yellowish brown mottles. The middle part is mottled strong brown, pale brown, and light gray loamy fine sand. The lower part is mottled yellow, brown, and light brownish gray fine sand. The underlying material to a depth of 70 inches is light gray sand.

Permeability is moderately rapid in the upper part of the subsoil and rapid in the middle and lower parts and in the underlying material. The available water capacity is moderate. Shrink-swell potential is slow. This soil is very strongly acid to moderately acid except where lime has been added. The seasonal high water table is at a depth of 2.0 to 3.5 feet during winter and spring.

Included with this soil in mapping are small areas of soils in which the subsoil does not extend to a depth of 60 inches, some of which have organically stained horizons at a depth of more than 40 inches. Small areas of Butters, Stallings, Autryville, and Goldsboro soils are also included. Butters and Autryville soils are well drained and are in higher positions on the landscape than Foreston soil. Stallings soils are somewhat poorly drained and are in lower positions. These soils are wetter than Foreston soil. Goldsboro soils are intermixed with Foreston soil. The included soils make up less than 20 percent of this map unit.

Most areas of this Foreston soil are in cultivated crops. The rest is woodland or pastureland.

The main crops are peanuts, tobacco, soybeans, small grains, and corn. Wetness is the main limitation. Artificial drainage is needed for optimum production of tobacco and other crops that require good drainage. Cover crops, conservation tillage, field borders, and crop residue management help conserve soil and water.

The dominant trees are loblolly pine, longleaf pine, water oak, turkey oak, blackjack oak, and sweetgum. The main understory includes American holly, bitter gallberry, honeysuckle, blueberry, and greenbier. Limitations affecting woodland use and management are insignificant.

This soil is limited for most urban uses because of wetness and seepage. The poor filtering capacity limits onsite sewage disposal. Limitations affecting recreational uses are not major.

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

GoA—Goldsboro fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is on smooth uplands in the southern, western, and northeastern parts of the county. It is most extensive south of Cerro Gordo. The areas of this soil are flat to slightly convex and are irregular in shape. Individual areas generally are about 20 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 10 inches thick. The subsoil to a depth of about 78 inches is sandy clay loam. It is, in sequence downward, brownish yellow; brownish yellow with mottles in shades of brown, gray, and red; mottled light gray, brownish yellow, strong brown, and red; reddish yellow with light gray and red mottles; and brownish yellow with light gray and weak red mottles. The underlying material to a depth of 85 inches is light gray sandy clay that has red and reddish yellow mottles.

Permeability is moderate, and the available water capacity is moderate to high. Shrink-swell capacity is low. This soil is strongly acid or very strongly acid except where lime has been added. Depth to a seasonal high water table is 2 to 3 feet.

Included with this soil in mapping are small areas of soils in which the subsoil does not extend to a depth of 60 inches and small areas of soils in which the subsurface layer has thin, brittle, organically stained layers that break into marble-size pebbles when the soil is cultivated. Small areas of Norfolk, Gritney, Exum, Foreston, Lynchburg, and Rains soils are also included. Norfolk soils are well drained and are in higher positions on the landscape than Goldsboro soil. Lynchburg soils are somewhat poorly drained, and Rains soils are poorly drained. These soils are in lower positions. Gritney soils have more clay in the subsoil than Goldsboro soil, Foreston soils have less clay, and Exum soils have more silt in the subsoil. These soils are in positions similar to those of the Goldsboro soil. The included soils make up about 20 percent of this map unit.

This Goldsboro soil is used primarily as cropland. Some areas are in forest or pasture.

The major crops are corn, soybeans, peanuts, tobacco, and small grains. Artificial drainage is needed for optimum production of tobacco and other crops that require good drainage. Cover crops, conservation tillage, field borders, and crop residue management help conserve soil and water (fig. 1).

The dominant trees are loblolly pine, longleaf pine, sweetgum, southern red oak, water oak, and white oak. The main understory includes American holly, bitter gallberry, honeysuckle, blueberry, and greenbrier. Limitations affecting woodland use and management are insignificant.

This soil is moderately to severely limited for most urban and recreational uses because of wetness.

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

Gr—Grantham very fine sandy loam. This poorly drained soil is on broad, smooth flats and in slight depressions on uplands. It is most extensive in the southern part of the county. Some of the larger areas are north of Reeves. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 50 acres.

Typically, the surface layer is black very fine sandy loam about 7 inches thick. The subsurface layer to a depth of about 10 inches is light gray very fine sandy loam. The subsoil to a depth of 75 inches is loam. The upper part is light brownish gray with mottles in shades

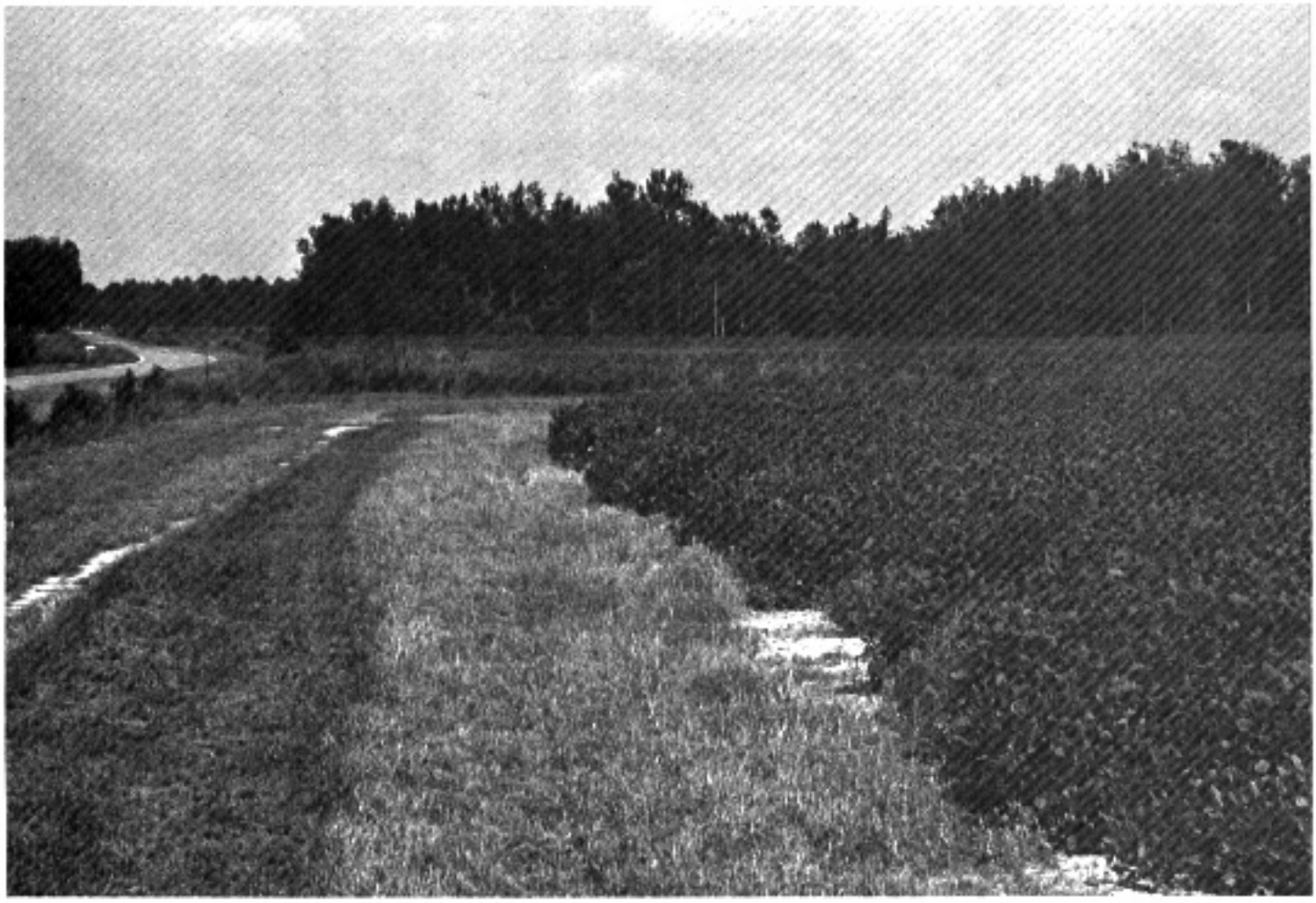


Figure 1.—Field borders slow runoff and erosion and improve water quality on Goldsboro fine sandy loam, 0 to 2 percent slopes.

of brown, red, and yellow; the middle part is gray with mottles in shades of brown and yellow; and the lower part is light gray with mottles in shades of yellow and brown.

Permeability is moderately slow, and the available water capacity is high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at or near the surface during winter and spring.

Included with this soil in mapping are small areas of Bethera and Rains soils and some soils that have a dark surface layer more than 10 inches thick. These soils are in positions similar to those of Grantham soil. Bethera soils have more clay in the subsoil than Grantham soil, and Rains soils have less silt. Also included are small areas of Lynchburg and Nahunta soils. These soils are somewhat poorly drained and are in slightly higher positions on the landscape than Grantham soil. The included soils make up less than 20 percent of this map unit.

Most areas of this Grantham soil are woodland. The rest is cropland or pastureland.

The main cultivated crops are corn, soybeans, and small grains. Wetness is a limitation, and artificial drainage is needed for optimum production. Conservation tillage, crop residue management, bedding, and cover crops are suitable management practices for this soil.

This soil is good pastureland and hayland. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, water oak, willow oak, sweetgum, and red maple. If this soil is drained, hardwoods, such as southern red oak and white oak, will grow. The main understory includes greenbrier, American holly, sweetbay, sourwood, sassafras, and giant cane. Wetness is the main limitation affecting woodland use and management.

This soil is severely limited for nearly all urban and recreational uses because of wetness, moderately slow permeability, and low strength.

This Grantham soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 9W.

Gt—Grifton fine sandy loam. This poorly drained soil is in broad interstream areas, on fringes of flood plains, and in shallow depressions around the head of drainageways. It is most extensive in the northeastern and southeastern parts of the county. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are 50 acres or more.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsurface layer to a depth of about 10 inches is grayish brown fine sandy loam. The subsoil to a depth of about 58 inches is sandy clay loam. The upper and middle parts are gray and have pockets of sandy loam, loamy fine sand, and loamy sand and mottles in shades of brown, yellow, and gray. The lower part is light gray and has pockets of sandy loam. The underlying material to a depth of 65 inches is mottled light gray, yellow, and greenish gray sandy loam that has pockets of sandy clay loam.

Permeability is moderate, and the available water capacity is moderate. Shrink-swell potential is low. This soil is strongly acid or moderately acid in the surface and subsurface layers and moderately acid to moderately alkaline in the subsoil and underlying material. The seasonal high water table is 0.5 to 1.5 feet below the surface during winter and spring.

Included with this soil in mapping are small areas of Meggett, Muckalee, Nakina, and Pender soils. Pender soils are moderately well drained to somewhat poorly drained and are in higher positions on the landscape than Grifton soil. Meggett soils have more clay in the subsoil, Muckalee soils have less clay, and Nakina soils are very poorly drained. These soils are scattered throughout the map unit. Also included in a few small areas adjacent to flood plains are Grifton soils that are subject to rare flooding. The included soils make up about 20 percent of this map unit.

Most areas of this Grifton soil are forested, but some areas are in cultivated crops, hay, or pasture.

The main cultivated crops are corn, soybeans, and small grains. Artificial drainage is needed for optimum production.

Grasses and legumes for hay and pasture are also grown. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, willow oak, swamp chestnut oak, sweetgum, water oak, red maple, and longleaf pine. Harvested areas are often drained or bedded and planted to loblolly pine. The main understory includes American holly, greenbrier, switchcane, inkberry, and sourwood. Wetness from December to May can restrict the use of equipment and damage seedlings.

This soil is limited for nearly all urban and recreational uses because of wetness.

This Grifton soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 9W.

GyB—Gritney loamy fine sand, 2 to 7 percent slopes. This moderately well drained soil is on gently sloping uplands and on side slopes next to drainageways. It is most extensive in the northern part of the county near Red Hill Swamp. Individual areas of this soil are irregular in shape and generally are about 10 acres.

Typically, the surface layer is dark brown loamy fine sand about 5 inches thick. The subsurface layer to a depth of about 10 inches is brownish yellow loamy fine sand. The subsoil extends to a depth of about 55 inches. It is, in sequence downward, strong brown sandy clay loam; strong brown clay that has light gray, yellowish red, and olive yellow mottles; mottled strong brown, brownish yellow, pinkish gray, and light brownish gray clay; and brownish yellow clay loam that has pockets of sandy clay loam and mottles of gray. The underlying material to a depth of 75 inches is gray clay loam that has brownish yellow and white mottles.

Permeability is slow, and the available water capacity is moderate. Shrink-swell potential is moderate. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is 1.5 to 3.0 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Norfolk, Meggett, and Muckalee soils. Norfolk soils are well drained, have less clay in the subsoil than Gritney soil, and are on nearly level to gently sloping parts of the landscape. Meggett and Muckalee soils are poorly

drained and are on flood plains adjacent to side slopes. The included soils make up less than 30 percent of this map unit.

About half of the acreage of this Gritney soil is in cultivated crops or pasture. The rest is woodland.

The main crops are corn, soybeans, and small grains. Surface water runoff, slow permeability, wetness, and the hazard of erosion are the main limitations. Cover crops, conservation tillage, stripcropping, field borders, grassed waterways, contour farming, crop residue management, and crop rotations that include close-growing crops help to conserve soil and water.

Using this soil for hay or pasture is a good conservation alternative. Grasses and legumes grow well.

The dominant trees are loblolly pine, longleaf pine, sweetgum, yellow poplar, red oak, and white oak. The main understory includes American holly, sourwood, sparkleberry, red maple, and flowering dogwood. Limitations affecting woodland use and management are insignificant.

This soil is limited for most urban uses and some recreational uses because of the steepness of slope, moderate shrink-swell potential, wetness, and slow permeability. Erosion can be a problem in sloping areas if disturbed sites are not revegetated promptly.

This Gritney soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

Jo—Johns fine sandy loam. This moderately well drained to somewhat poorly drained soil is on stream terraces along the Waccamaw and Lumber Rivers and along White Marsh Swamp south of Hallsboro. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 15 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer to a depth of about 10 inches is pale brown sandy loam. The subsoil extends to a depth of 38 inches. It is light yellowish brown sandy clay loam to a depth of about 15 inches. The next layer to a depth of about 26 inches is light yellowish brown sandy clay loam that has yellowish brown and gray mottles. Below that depth the subsoil is mottled white, yellowish brown, and yellowish gray sandy loam. The underlying material to a depth of 70 inches is light gray sand that has yellow mottles and white sand that has dark grayish brown mottles.

Permeability is moderate in the subsoil and rapid in the underlying material. The available water capacity is low to moderate. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at a depth of 1.5 to 3.0 feet. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of soils that are sandy throughout and small areas of Lumbee soils. The sandy soils are scattered throughout the map unit. Lumbee soils are poorly drained and are in slightly lower positions on the landscape than Johns soil. The included soils make up less than 15 percent of this map unit.

Most areas of this Johns soil are woodland. The rest is in cultivated crops or pasture.

The main cultivated crops are corn, soybeans, tobacco, and small grains. Artificial drainage is needed in some areas for optimum growth of tobacco and other crops that require good drainage. Conservation tillage, cover crops, crop residue management, and grasses and legumes in the cropping system are good management practices.

This soil has no major limitations affecting use as pasture; however, overgrazing can cause surface compaction and poor tilth. Proper stocking and pasture rotation help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, white oak, southern red oak, yellow poplar, willow oak, water oak, and sweetgum. The main understory includes American holly, flowering dogwood, persimmon, and sassafras. Limitations affecting woodland use and management are insignificant.

This soil is limited for most urban and recreational uses because of wetness, seepage, and possible flooding. Drainage can improve the suitability for some uses.

This Johns soil is in capability subclass IIw. The woodland ordination symbol is 9A.

Js—Johnston loam, frequently flooded. This very poorly drained soil is along major drainageways on flood plains throughout the county. Slopes are less than 1 percent. Individual areas of this soil are long and irregular in shape and generally are about 300 acres.

Typically, the surface layer is about 40 inches thick. It is black loam in the upper part and very dark grayish brown sandy loam in the lower part. The underlying material is dark grayish brown loamy sand in the upper part. The lower part is dark grayish brown sandy loam to a depth of 62 inches.

Permeability is moderately rapid in the surface layer and rapid in the underlying material. The available water capacity is moderate. This soil is very strongly

Figure 2.—Flooding is a severe hazard affecting local roads and streets on Johnston loam, frequently flooded.

acid or strongly acid. The seasonal high water table is near or above the surface from early in winter to late in spring.

Included with this soil in mapping are small areas of soils that have a mucky loam surface layer and areas of Dorovan soils. Also included are small areas of Muckalee and Lumbee soils. These soils are poorly drained and are in slightly higher positions on the landscape than Johnston soil. The included soils make up less than 30 percent of this map unit.

Most areas of this Johnston soil are woodland. The rest is cropland or pastureland.

Wetness and flooding are the main limitations affecting cultivated crops and pasture. Where this soil is drained, corn, soybeans, grasses, and legumes are grown. If this soil is used for pasture, proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

Water tupelo and baldcypress can be grown on this soil without artificial drainage, and yellow poplar and loblolly pine can be grown if the soil is properly drained. Other common trees are swamp tupelo, water oak, and pond pine. The understory includes greenbrier, switchcane, and red maple. Wetness and the hazard of flooding are the main limitations affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of wetness, flooding, ponding, and low strength (fig. 2).

This Johnston soil is in capability subclass VIIw (undrained) or IVw (drained). The woodland ordination symbol is 12W.

KuB—Kureb sand, 1 to 8 percent slopes. This excessively drained soil is on long and narrow undulating ridges, Carolina bay rims, and stream terraces of the Lumber River. It is most extensive on the southeastern end of large Carolina bays. Individual areas of this soil are irregular or crescent in shape and generally are about 15 acres.

Typically, the surface layer is gray sand about 5 inches thick. The subsurface layer to a depth of about 20 inches is light gray sand. The underlying material to a depth of 80 inches is sand. It is yellowish brown in the upper part and yellow in the lower part. The upper part has streaks and bands of dark reddish brown coated sand.

Permeability is rapid, and the available water capacity is very low. Shrink-swell potential is low. This soil is very strongly acid to neutral.

Included with this soil in mapping are small areas of Wakulla, Centenary, Echaw, and Leon soils. Also included are small intermingled areas of soils that have a continuous organically stained horizon in the subsoil. Wakulla soils are in positions similar to those of the Kureb soil and do not have dark reddish brown streaks and bands in the upper part of the underlying material. Centenary and Echaw soils are moderately well drained, and Leon soils are poorly drained. These soils are in lower positions on the landscape than Kureb soil. The included soils make up less than 20 percent of this map unit.

Nearly all areas of this Kureb soil are woodland.

Kureb soils are seldom used for crop production because of droughtiness, leaching of plant nutrients, and susceptibility to soil blowing. If this soil is used for crops, conservation tillage and close-growing cover crops help to control wind erosion and reduce leaching.

A few areas of this soil are used for hay or pasture, although the very low available water capacity is a limitation. Bahiagrass and coastal or common bermudagrass are the most suitable pasture plants.

The dominant trees are longleaf pine, southern red oak, live oak, blackgum, hickory, and turkey oak. The understory is very sparse, consisting largely of clumps of threeawn and some lichens. The thick sandy layers can limit equipment use and contribute to high seedling mortality because of droughtiness.

This soil is limited for most urban uses. The poor filtering capacity limits onsite sewage disposal, and grasses and shrubs for landscaping are difficult to establish because of droughtiness and leaching of plant nutrients. The thick sandy layers limit recreational activities.

This Kureb soil is in capability subclass VIIs. The woodland ordination symbol is 3S.

LnB—Leon sand, 1 to 4 percent slopes. This poorly drained soil is on stream terraces and around the outer rim of Carolina bays throughout the county. Individual areas of this soil are oval or irregular in shape and generally are about 25 acres.

Typically, the surface layer is black sand about 6 inches thick. The subsurface layer to a depth of about 11 inches is light brownish gray sand. The subsoil to a depth of 80 inches or more is dark reddish brown, dark brown, and brown sand. It is weakly cemented in the upper part.

Permeability is rapid in the surface layer and moderate to moderately rapid in the subsoil. The available water capacity is very low. Shrink-swell potential is low. This soil is extremely acid to strongly acid. The seasonal high water table is at or near the surface from winter to early in spring; however, because this soil is sandy throughout, it may be droughty during summer months when the water table is low.

Included with this soil in mapping are small areas of Murville, Torhunta, Echaw, Centenary, and Kureb soils. Murville and Torhunta soils are very poorly drained, are wetter than Leon soil, and are in slightly lower positions on the landscape. Echaw and Centenary soils are moderately well drained and are in higher positions. Kureb soils are excessively drained and are on ridges. Typically, only two or three of these soils are in any one delineation. The included soils make up less than 20 percent of this map unit.

Most areas of this Leon soil are woodland. The rest is in blueberry production, pasture, or other crops.

The main cultivated crops are corn and soybeans, and some varieties of blueberries are grown. The high water table can limit planting operations in the spring, and the very low available water capacity limits the growth of most crops during the dry summer months. Leaching of plant nutrients is also a problem.

Grasses and legumes can be grown for hay and pasture, although wetness can limit grazing in winter and early in spring. Droughtiness during dry summer months can make an adequate stand of grass difficult to maintain.

The dominant trees are loblolly pine, turkey oak, and longleaf pine. The understory includes waxmyrtle, gallberry, fetterbush, huckleberry, greenbrier, and threeawn. Droughtiness during summer and fall and wetness during winter and spring are the major limitations affecting woodland use and management.

This soil is severely limited for most urban and recreational uses because of wetness during winter and spring or after extended periods of rain and because the poor filtering capacity limits onsite sewage disposal. Because of droughtiness during the summer, frequent irrigation is needed for proper lawn maintenance. Lawns may also require frequent applications of fertilizer. Wetness and the thick sandy layers are the main limitations affecting recreational uses.

This Leon soil is in capability subclass IVw. The woodland ordination symbol is 5W.

Lu—Lumbee fine sandy loam. This poorly drained soil is on smooth flats and in shallow depressions on stream terraces of the Waccamaw and Lumber Rivers. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 40 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer to a depth of about 11 inches is light brownish gray fine sandy loam that has mottles in shades of yellow and brown. The subsoil to a depth of 36 inches is fine sandy loam. The upper part is gray with mottles in shades of brown and red, and the lower part is light brownish gray with mottles in shades of yellow and red. Pockets of gray fine sand are in the lower part of the subsoil. The underlying material to a depth of 72 inches is light gray fine sand that has grayish brown mottles.

Permeability is moderate in the subsoil and rapid in the underlying material. The available water capacity is low to moderate. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at or near the surface. Flooding is rare.

Included with this soil in mapping are a few small areas of Muckalee and Johns soils. Also included are areas of wetter soils that have a sandy clay loam subsoil and soils in which the subsoil extends to a depth of more than 40 inches. Johns soils are moderately well drained to somewhat poorly drained and are in slightly higher positions on the landscape than Lumbee soil. Muckalee soils are in lower positions and are subject to frequent flooding. The other included soils are scattered throughout the map unit. The included soils make up less than 20 percent of this map unit.

Nearly all of the acreage of this Lumbee soil is woodland. The rest is pastureland or cropland.

If this soil is drained, corn, soybeans, and small grains can be grown. Open ditches generally are used to drain this soil; however, lack of suitable outlets is a problem in installation of drainage systems. Conservation tillage, crop residue management, and grasses and legumes in the cropping system help to maintain tilth and production.

Grasses and legumes for pasture or hay can be grown. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, pond pine, water tupelo, sweetgum, red maple, and white oak. The main understory includes American holly, sweetbay, switchcane, and blueberry. Wetness is the main limitation affecting woodland use and management.

This soil is severely limited for urban and recreational uses because of wetness and flooding.

This Lumbee soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 9W.

Ly—Lynchburg fine sandy loam. This somewhat poorly drained soil is on broad, smooth flats on uplands. It is extensive throughout the county. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 30 acres.

Typically, the surface layer is very dark gray fine sandy loam about 8 inches thick. The subsoil to a depth of 80 inches or more is sandy clay loam. It is, in sequence downward, light yellowish brown with light brownish gray mottles; gray with brownish yellow and red mottles; light gray with mottles in shades of yellow, brown, and red; and light gray with brownish yellow and strong brown mottles and pockets of sandy loam.

Permeability is moderate, and the available water capacity is moderate to high. Shrink-swell potential is low. This soil is extremely acid to strongly acid except where lime has been added. The seasonal high water table is 0.5 to 1.5 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Goldsboro, Stallings, Nahunta, Rains, and Coxville soils. Goldsboro soils are moderately well drained and are in higher positions on the landscape than Lynchburg soil. Stallings soils have less clay in the subsoil, and Nahunta soils have more silt. These soils are randomly intermingled with the Lynchburg soil. Rains and Coxville soils are poorly drained and are in shallow depressions. The included soils make up less than 20 percent of this map unit.

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

The main cultivated crops are soybeans and small grains. Wetness is a limitation for production of tobacco and other crops that require good drainage. Wetness can be reduced by a drainage system that includes landgrading and tile or open ditches. Conservation tillage, cover crops, and grasses and legumes in the cropping system are needed.

Grasses and legumes for hay and pasture can be grown. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are red maple, sweetgum, blackgum, loblolly pine, yellow poplar, willow oak, and water oak. The main understory includes switchcane, American holly, sourwood, and greenbrier. Wetness is a moderate limitation affecting equipment use during timber planting and harvesting.

This soil is limited for most urban and recreational uses because of wetness.

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

Me—Meggett fine sandy loam, frequently flooded. This poorly drained soil is on flood plains and low stream terraces throughout the county. Slopes are less than 2 percent. Individual areas of this soil generally are long and narrow and are about 350 acres.

Typically, the surface layer is very dark gray fine sandy loam about 5 inches thick. The subsoil extends to a depth of 72 inches or more. It is, in sequence downward, grayish brown sandy clay that has strong brown and white mottles, gray clay that has yellowish red mottles, gray sandy clay that has brownish yellow mottles, and light gray sandy clay loam that has brownish yellow mottles.

Permeability is slow, and the available water capacity is high. Shrink-swell potential is high. This soil is very strongly acid to slightly acid in the surface layer except where lime has been added. It is strongly acid to moderately alkaline in the upper part of the subsoil and slightly acid to moderately alkaline in the lower part. The seasonal high water table is within 1 foot of the surface from winter to early in spring.

Included with this soil in mapping are small areas of Muckalee, Grifton, Brookman, Wilbanks, and Johnston soils. Muckalee soils have less clay throughout than the Meggett soil, and Grifton soils have less clay in the subsoil and are not subject to flooding. Brookman soils are very poorly drained and are in low spots. These soils are scattered throughout the map unit. Wilbanks and Johnston soils are very poorly drained and are along the edge of delineations and in small depressions. The included soils make up about 25 percent of this map unit.

Most areas of this Meggett soil are woodland. The rest is pastureland or cropland.

Corn and soybeans can be grown if this soil is artificially drained; however, suitable drainage outlets are sometimes difficult to establish.

Grasses and legumes for hay and pasture can be grown, although wetness is a limitation and artificial drainage is necessary for optimum production. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are red maple, water oak, white oak, swamp chestnut oak, willow oak, green ash, swamp tupelo, blackgum, sweetgum, and loblolly pine. The main understory is American holly, ironwood, switchcane, and greenbrier. Wetness and the hazard of flooding are the main limitations affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of wetness, flooding, slow permeability, and high shrink-swell potential.

This Meggett soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 11W.

Mk—Muckalee sandy loam, frequently flooded. This poorly drained soil is on flood plains of shallow meandering streams. It is extensive throughout the county. Slopes are less than 2 percent. Individual areas of this soil are long and narrow and generally are about 300 acres.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The underlying material extends to a depth of 62 inches or more. It is, in sequence downward, grayish brown sandy loam, light gray loamy sand that has grayish brown mottles, grayish brown sandy loam that has strong brown and light yellowish brown mottles, and light gray and dark grayish brown loamy sand.

Permeability is moderate, and the available water capacity is low to moderate. Shrink-swell potential is low. This soil is strongly acid to neutral in the surface layer except where lime has been added. It is moderately acid to moderately alkaline in the underlying material. The seasonal high water table is 0.5 to 1.5 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Meggett, Grifton, Lumbee, and Johnston soils. Also

included are small intermingled areas of some better drained soils and some soils that are acid throughout. Meggett soils have more clay throughout the soil than Muckalee soil, and Johnston soils are very poorly drained. These soils are in slightly lower positions on the landscape than Muckalee soil. Lumbee and Grifton soils are in higher positions along the outer edge of delineations. The included soils make up less than 30 percent of this map unit.

Nearly all areas of this Muckalee soil are woodland. A small acreage is in cultivated crops or pasture.

Wetness and the hazard of flooding are the main limitations affecting crops and pasture. Drainage for pasture or cultivated crops is difficult because suitable outlets generally are not available. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are swamp chestnut oak, loblolly pine, green ash, sweetgum, water oak, and eastern cottonwood. The understory includes American holly, greenbrier, ironwood, and inkberry. Wetness and the hazard of flooding are the major limitations affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreation uses because of flooding and wetness.

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

Mu—Murville fine sand. This very poorly drained soil is on low flats and in Carolina bays. It is most extensive in the vicinity of Nakina and Evergreen. Slopes range from 0 to 2 percent. Individual areas of this soil are oval or irregular in shape and generally are about 25 acres or more.

Typically, this soil has a layer about 3 inches thick of partly decomposed leaves, moss, and twigs on the surface. The surface layer is black fine sand about 7 inches thick. The subsoil to a depth of about 40 inches is weakly cemented fine sand. The upper part is black, and the lower part is dark reddish brown. The underlying material to a depth of 70 inches is light brownish gray and light gray fine sand.

Permeability is moderately rapid in the subsoil and rapid in the underlying material. The available water capacity is low. Shrink-swell potential is low. This soil is strongly acid to extremely acid. The seasonal high water table is at or near the surface from late in fall to late in spring of most years. Ponding can occur in some areas.

Included with this soil in mapping are small areas of Torhunta, Croatan, and Leon soils. Also included are soils similar to Murville soil except they have a light gray subsurface layer. Torhunta soils are loamy in the upper part of the subsoil, and Croatan soils have a thick muck surface layer. These soils occur toward the center of the map unit. The other included soils are on the outer edge of delineations or they are in slightly higher positions on the landscape than Murville soil. Also included in low-lying areas near streams are some soils that are subject to rare flooding. The included soils make up less than 20 percent of this map unit.

Most areas of this Murville soil are woodland. The rest is pasture or cultivated crops.

Wetness and leaching of plant nutrients are the main limitations affecting cultivated crops and pasture. If this soil is drained, corn, soybeans, and blueberries can be grown. This soil is droughty during dry periods in summer.

The dominant trees are pond pine and loblolly pine. The understory includes sweetbay, redbay, inkberry, swamp cyrilla, switchcane, and greenbrier. Wetness is the main limitation affecting woodland use and management. This soil provides fair habitat for wetland wildlife.

This soil is severely limited for nearly all urban and recreational uses because of wetness. Suitable outlets for drainage systems are difficult to establish.

This Murville soil is in capability subclass Vw. The woodland ordination symbol is 6W.

Na—Nahunta very fine sandy loam. This somewhat poorly drained soil is on broad, smooth flats and in slight depressions on uplands. It is most extensive in the southern part of the county. Individual areas of this soil are irregular in shape and generally are about 50 acres.

Typically, the surface layer is very dark gray very fine sandy loam about 8 inches thick. The subsoil extends to a depth of at least 72 inches. It is, in sequence downward, light yellowish brown loam that has brownish yellow and reddish yellow mottles, light yellowish brown clay loam that has light gray and brownish yellow mottles, light brownish gray clay loam that has yellowish brown and red mottles, and gray clay loam that has mottles in shades of red, yellow, and brown.

Permeability is moderately slow, and the available water capacity is high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is at a depth of 1.0 to 2.5 feet during winter and spring.

Included with this soil in mapping are small areas of Exum, Goldsboro, Lynchburg, Grantham, Rains, and Bethera soils. Exum and Goldsboro soils are moderately well drained and are in slightly higher positions on the landscape than Nahunta soil. Grantham, Rains, and Bethera soils are poorly drained and are in lower positions. Lynchburg soils have more sand and less silt in the subsoil than Nahunta soil and are in similar positions on the landscape. Typically, no more than two or three of the included soils are in any one delineation. The included soils make up less than 20 percent of this map unit.

About half the acreage of this Nahunta soil is in cultivated crops. The rest is woodland or pastureland.

The main cultivated crops are corn, soybeans, and small grains. Artificial drainage is needed for optimum production of tobacco and other crops that require good drainage. Conservation tillage, cover crops, and grasses and legumes in the cropping system are needed.

Grasses and legumes can be grown for hay and pasture. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, water oak, sweetgum, yellow poplar, southern red oak, white oak, and red maple. The main understory includes greenbrier, American holly, sweetbay, sourwood, flowering dogwood, and switchcane. Wetness is the main limitation affecting woodland use and management.

This soil is limited for most urban and recreational uses because of wetness and low strength.

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

Nk—Nakina fine sandy loam. This very poorly drained soil is in slight depressions on uplands, on terraces, and in shallow drainageways. It is most extensive northeast of Nakina and southeast of Lake Waccamaw in the Green Swamp area. Slopes are less than 2 percent. Individual areas of this soil are long and irregular in shape and generally are about 300 acres or more.

Typically, the surface layer is black fine sandy loam about 14 inches thick. The subsoil extends to a depth of about 49 inches. It is, in sequence downward, dark grayish brown fine sandy loam that has grayish brown mottles, very dark gray fine sandy loam that has thin bands of loamy sand and strong brown mottles, dark grayish brown sandy clay loam that has grayish brown and strong brown mottles, and dark gray sandy loam that has lenses of loamy sand and strong brown and light gray mottles. The upper part of the underlying material is greenish gray sand that has lenses of sandy loam. The lower part to a depth of 80 inches is grayish green sandy clay loam.

Permeability is moderate to moderately rapid, and the available water capacity is moderate to high. Shrink-swell potential is low. This soil is strongly acid to slightly acid in the surface layer and very strongly acid to moderately alkaline in the subsoil and underlying material. The seasonal high water table is at a depth of 1 foot or less from November to April. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Brookman, Croatan, Grifton, and Meggett soils. Also included are scattered areas of coarser textured soils. Meggett and Grifton soils are poorly drained and are in higher positions on the landscape than Nakina soil. Brookman soils are very poorly drained, have more clay in the subsoil, and are in lower positions. Croatan soils are very poorly drained, have a thick muck surface layer, and are on the outer edge of delineations. The included soils make up less than 20 percent of this map unit.

Most areas of this Nakina soil are woodland. The rest is cropland or pastureland.

Cultivated crops, such as corn, soybeans, and small grains, can be grown if this soil is adequately drained. The seasonal high water table is the main limitation. Artificial drainage is needed for optimum production.

Grasses and legumes can be grown for hay and pasture, but artificial drainage is needed. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, sweetgum, blackgum, pond pine, red maple, baldcypress, and water oak. The main understory includes waxmyrtle, greenbrier, switchcane, and other perennial forbs and shrubs. Wetness and the hazard of rare flooding are the main limitations affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of wetness and rare flooding.

This Nakina soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 9W.

NoA—Norfolk loamy fine sand, 0 to 2 percent slopes. This well drained soil is on broad, smooth flats

Figure 3.—Well drained soils, such as Norfolk loamy fine sand, 0 to 2 percent slopes, are used mainly for tobacco and other cultivated crops.

on uplands. It is most extensive in the west, central, and northeast parts of the county. Individual areas of this soil are irregular in shape and generally are about 45 acres.

Typically, the surface layer is brown loamy fine sand about 9 inches thick. The subsoil extends to a depth of at least 76 inches. It is, in sequence downward, brownish yellow sandy loam; yellowish brown sandy clay loam; yellowish brown sandy clay loam that has mottles in shades of red, yellow, and brown; strong brown sandy clay loam that has mottles in shades of red, yellow, and gray; and reddish yellow sandy clay loam that has light gray and red mottles.

Permeability is moderate, and the available water capacity is moderate to high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is 4 to 6 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Goldsboro, Aycock, Wagram, and Butters soils. Also included are small intermingled areas of soils that have a loamy subsoil extending to a depth of less than 60 inches. Goldsboro soils are moderately well drained and are in lower positions on the landscape than Norfolk soil. Aycock soils have more silt and less sand in the

subsoil, Butters soils have less clay and more sand in the subsoil, and Wagram soils have thick, sandy surface and subsurface layers. These soils are scattered throughout the map unit. The included soils make up less than 20 percent of this map unit.

Most areas of this Norfolk soil are in cultivated crops. A few small areas are woodland, pastureland, or sites for urban development.

The main cultivated crops are corn, soybeans, small grains, tobacco, peanuts, and sweet potatoes (fig. 3). Limitations affecting crop production are insignificant; however, conservation practices, such as conservation tillage, cover crops, and close-growing grasses and legumes in the cropping system, help to maintain tilth and conserve moisture.

Limitations affecting production of grasses and legumes for pasture or hayland are insignificant; however, pasture rotation and prevention of overgrazing help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, white oak, southern red oak, yellow poplar, and hickory. The main understory includes American holly, flowering dogwood, and sassafras. Limitations affecting woodland use and management are insignificant.

This soil has only slight limitations for most urban and recreational uses. Wetness can be a limitation in some areas if excavation for a basement is planned or if septic tank absorption fields are used.

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 well drained soil is on convex ridges and smooth side slopes on uplands. It is most extensive in the northwest and central parts of the county. Individual areas of this soil are irregular in shape and generally are about 50 acres.

Typically, the surface layer is brown loamy fine sand about 9 inches thick. The subsoil extends to a depth of 76 inches. It is, in sequence downward, brownish yellow sandy loam; yellowish brown sandy clay loam; yellowish brown sandy clay loam that has mottles in shades of red, yellow, and brown; strong brown sandy clay loam that has mottles in shades of red, yellow, and gray; and reddish yellow sandy clay loam that has light gray and red mottles.

Permeability is moderate, and the available water capacity is moderate to high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is 4 to 6 feet below the surface from winter to early in spring.

Included with this soil in mapping are small areas of Aycock, Gritney, and Wagram soils and some soils that have slopes of less than 2 percent. Also included are soils that have a loamy subsoil that does not extend to a depth of 60 inches. The soils that have slopes of less that 2 percent are on the smooth parts of the landscape. Aycock soils have more silt in the subsoil than Norfolk soil, Gritney soils have more clay in the subsoil, and Wagram soils have thick, sandy surface and subsurface layers. These soils are scattered throughout the map unit. The included soils make up less than 30 percent of this map unit.

Most areas of this Norfolk soil are in cultivated crops. A few areas are woodland, pastureland, or sites for urban development.

The main crops are corn, soybeans, tobacco, small grains, peanuts, and sweet potatoes. Susceptibility to wind and water erosion is the main limitation. Conservation tillage, cover crops, stripcropping, field borders, crop residue management, grassed waterways, and contour farming help to control erosion (fig. 4).

Using this soil as pastureland or hayland is effective in controlling erosion. Pasture rotation and prevention of overgrazing help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, white oak, southern red oak, yellow poplar, and hickory. The main understory includes American holly, flowering dogwood, and sassafras. Limitations affecting woodland use and management are insignificant.

This soil has only slight limitations for most urban and recreational uses. Wetness can be a limitation in some areas if excavation for a basement is planned or if septic tank absorption fields are used.

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 map unit consists of intermingled areas of well drained Norfolk soil and Urban land, primarily in Whiteville, Chadbourn, Tabor City, Evergreen, and Riegelwood. The complex is about 45 percent Norfolk soil and about 35 percent Urban land. The remaining soils have been mapped as inclusions. The Norfolk soil and Urban land could not be mapped separately at the selected scale.

Typically, the Norfolk soil has a brown loamy fine sand surface layer about 9 inches thick. The subsoil extends to a depth of at least 76 inches. It is, in sequence downward, brownish yellow sandy loam; yellowish brown sandy clay loam; yellowish brown sandy clay loam that has mottles in shades of red,

Figure 4.—Grassed waterways provide safe removal of runoff on Norfolk loamy fine sand, 2 to 6 percent slopes.

yellow, and brown; strong brown sandy clay loam that has mottles in shades of red, yellow, and gray; and reddish yellow sandy clay loam that has light gray and red mottles.

Permeability is moderate, and the available water capacity is moderate to high. Shrink-swell potential is low. This soil is very strongly acid or strongly acid except where lime has been added. The seasonal high water table is 4 to 6 feet below the surface from winter to early in spring.

Urban land consists of areas where the original soil is covered with impervious material, such as shopping centers, factories, municipal buildings, apartment complexes, houses, parking lots, and roads. Slope generally is modified to fit the needs. The extent of site modification varies greatly; some areas have had little disturbance, while others have been reshaped through extensive cutting, grading, and landfilling.

Included in mapping are small areas of Autryville, Aycock, Goldsboro, Foreston, Butters, and Wagram soils. Wagram and Autryville soils have thick, sandy surface and subsurface layers. Goldsboro and Forester soils are moderately well drained. Aycock soils have more silt in the subsoil than Norfolk soil, and Butters soils have less clay in the subsoil. Also included are areas that have been graded and reshaped. The included soils make up about 20 percent of this map unit.

Norfolk soil has only a few limitations for most urban uses. Wetness, however, may be a problem for septic tank absorption fields or dwellings with basements. Surface runoff from the Urban land part of this map unit is much greater than it is for Norfolk loamy fine sand. Recommendations for use and management generally require onsite investigation.

Neither a capability subclass nor a woodland ordination symbol has been assigned to this map unit.

Pa—Pantego fine sandy loam. This very poorly drained soil is in depressions on uplands. It is most extensive in the eastern and southeastern parts of the county. Slopes are less than 2 percent. Individual areas of this soil are mostly irregular in shape, but some are oval. They generally are about 200 acres.

Typically, the surface layer is black fine sandy loam about 20 inches thick. The subsoil extends to a depth of 80 inches. The upper part is grayish brown sandy clay loam that has mottles in shades of brown, yellow, and red. The lower part is grayish brown sandy loam that has pockets of sandy clay loam and mottles of yellow, strong brown, and dark red.

Permeability is moderate, and the available water capacity is high. Shrink-swell potential is low. This soil is extremely acid to strongly acid except where lime has been added. The seasonal high water table is within 1.5 feet of the surface from December to May.

Included with this soil in mapping are small areas of Croatan, Torhunta, Grantham, and Rains soils. Croatan soils have a thick muck surface layer and are in lower positions on the landscape than Pantego soil. Grantham and Rains soils are poorly drained and are in higher positions. Torhunta soils have less clay in the subsoil than Pantego soil. The included soils make up about 20 percent of this map unit.

Nearly all areas of this Pantego soil are woodland. The rest is cropland or pastureland.

Cultivated crops, such as corn, soybeans, and small grains, can be grown if this soil is adequately drained. The seasonal high water table is the main limitation; however, wetness can be reduced by installing a drainage system that includes landgrading and tile or open ditches.

Grasses and legumes are grown for hay and pasture, but artificial drainage is needed. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, pond pine, water tupelo, yellow poplar, red maple, willow oak, water oak, baldcypress, sweetgum, and American sycamore. The main understory includes greenbrier, red maple, sweetbay, inkberry, and switchcane. Wetness is the main limitation affecting woodland use and management. In its natural condition, this soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of wetness.

This Pantego soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 10W.

Pe—Pender fine sandy loam. This moderately well drained to somewhat poorly drained soil is on broad, smooth uplands and stream terraces. It is most extensive north of Lake Waccamaw and Wannish. Slopes range from 0 to 3 percent. Individual areas of this soil are irregular in shape and generally are about 100 acres or more.

Typically, the surface layer is dark gray fine sandy loam about 5 inches thick. The subsurface layer to a depth of about 12 inches is very pale brown fine sandy loam. The subsoil extends to a depth of 58 inches. It is, in sequence downward, brownish yellow sandy loam; brownish yellow sandy clay loam that has reddish yellow mottles; mottled strong brown, light brownish gray, and red sandy clay loam; mottled strong brown, yellowish red, and light gray sandy clay loam; and mottled strong brown, light gray, and dark red sandy clay loam that has pockets of sandy loam. The underlying material to a depth of 72 inches is light gray sandy clay that has pockets of sandy loam and mottles of red, strong brown, and yellow.

Permeability is moderate, and the available water capacity is moderate. Shrink-swell potential is moderate. This soil is very strongly acid to slightly acid in the surface layer, subsurface layer, and upper part of the subsoil except where lime has been added. It is moderately acid to mildly alkaline in the lower part of the subsoil and in the underlying material. The seasonal high water table is 1.5 to 2.5 feet below the surface from winter to early in spring of most years.

Included with this soil in mapping are small areas of Grifton soils and small areas of soils that are similar to Pender soil except they are well drained. Grifton soils are in lower positions on the landscape than Pender soil. The well drained soils are in higher positions. The included soils make up less than 20 percent of this map unit.

About half the acreage of this Pender soil is woodland. The rest is in cultivated crops or pasture.

The main cultivated crops are corn, tobacco, soybeans, and small grains. Artificial drainage is needed for optimum production of tobacco and other crops that require good drainage. Conservation tillage, cover crops, and grasses and legumes in the cropping system are needed.

Grasses and legumes can be grown for hay and pasture. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, longleaf pine, yellow poplar, and sweetgum. The main understory includes American holly, flowering dogwood, greenbrier, inkberry, and common persimmon. Limitations affecting woodland use and management are insignificant.

This soil is limited for most urban and recreational uses because of wetness.

This Pender soil is in capability subclass IIw. The woodland ordination symbol is 10A.

Pu—Pender-Urban land complex. This map unit consists of intermingled areas of Pender soil and Urban land in the towns of Lake Waccamaw and Hallsboro. Slopes range from 0 to 3 percent. The complex is about 45 percent Pender soil and about 30 percent Urban land. The remaining soils have been mapped as inclusions. The Pender soil is moderately well drained to somewhat poorly drained and is in open, relatively undisturbed parts of the map unit. The Pender soil and Urban land could not be mapped separately at the selected scale.

Typically, the Pender soil has a dark gray fine sandy loam surface layer about 5 inches thick. The subsurface layer to a depth of about 12 inches is very pale brown fine sandy loam. The subsoil extends to a depth of about 58 inches. It is, in sequence downward, brownish yellow sandy loam; brownish yellow sandy clay loam that has reddish yellow mottles; mottled strong brown, light brownish gray, and red sandy clay loam; mottled strong brown, yellowish red, and light gray sandy clay loam; and mottled strong brown, light gray, and dark red sandy clay loam that has pockets of sandy loam. The underlying material to a depth of about 72 inches is light gray sandy clay that has pockets of sandy loam and mottles of red, strong brown, and yellow.

Permeability is moderate, and the available water capacity is moderate. Shrink-swell potential is moderate. This soil is very strongly acid to slightly acid in the surface layer, subsurface layer, and upper part of the subsoil unless lime has been added. It is moderately acid to mildly alkaline in the lower part of the subsoil and in the underlying material. The seasonal high water table is 1.5 to 2.5 feet below the surface from winter to early in spring of most years.

Urban land consists of areas where the original soil is covered with impervious material, such as shopping centers, factories, municipal buildings, apartment complexes, schools, houses, parking lots, and roads. The extent of site modification varies greatly; some areas have had little disturbance, while others have been reshaped through extensive cutting, grading, and landfilling.

Included in mapping are small areas of well drained soils in higher positions on the landscape and poorly drained Grifton soils in lower positions. Also included are areas that have been graded and reshaped. The included soils and other areas make up about 20 percent of this map unit.

Wetness is the main limitation affecting most urban uses. Surface runoff from the Urban land part of this map unit is much greater than it is for Pender fine sandy loam. Recommendations for use and management generally require onsite investigation.

Neither a capability subclass nor a woodland ordination symbol has been assigned.

Ra—Rains fine sandy loam. This poorly drained soil is on broad, smooth flats and in shallow depressions on uplands. It is most extensive in the Chadbourn vicinity. Slopes are less than 2 percent. Individual areas of this soil are oval or irregular in shape and generally are about 50 acres or more.

Typically, the surface layer is very dark gray fine sandy loam about 7 inches thick. The subsoil extends to a depth of at least 75 inches. It is, in sequence downward, light brownish gray sandy loam; gray sandy clay loam that has mottles in shades of brown and red; and light gray sandy clay that has pockets of sandy loam and mottles in shades of brown and yellow.

Permeability is moderate, and the available water capacity is moderate to high. This soil is strongly acid or very strongly acid except where lime has been added. The seasonal high water table is at or near the surface from winter to early in spring. Areas of this soil in Carolina bays may be ponded for brief periods following heavy rains.

Included with this soil in mapping are small areas of Coxville, Grantham, Pantego, Lynchburg, and Grifton soils. Also included are small areas of soils that are similar to Rains soil but are less than 60 inches thick over sandy stratified layers. Coxville soils have more clay in the subsoil than Rains soil, and Grantham soils have more silt. Pantego soils are very poorly drained and are in lower positions on the landscape. Lynchburg soils are somewhat poorly drained and are in higher positions. Grifton soils are less acid in the subsoil. Typically, only two or three of the included soils are in any one delineation. The included soils make up less than 20 percent of this map unit.

Most areas of this Rains soil are woodland. The rest is in cultivated crops or pasture.

Cultivated crops, such as corn and soybeans, can be grown; however, artificial drainage is needed for optimum production. Common drainage practices include open ditches, tile, and landgrading (fig. 5).

Grasses and legumes can be grown for hay and pasture, although wetness is the main limitation. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the

Figure 5.—Open ditches with surface inlet pipes are used to remove excess water from Rains fine sandy loam.

pasture and soil in good condition.

The dominant trees are red maple, sweetgum, loblolly pine, willow oak, and water oak. The main understory includes switchcane, American holly, large gallberry, and greenbrier. Wetness is the main limitation affecting woodland use and management. This soil provides good habitat for wetland wildlife.

This soil is limited for nearly all urban and recreational uses because of wetness. Suitable drainage outlets generally are not available.

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

Ru—Rains-Urban land complex. This map unit consists of intermingled areas of poorly drained Rains soil and Urban land in Chadbourn, Tabor City, Whiteville, and Bolton. Slopes are less than 2 percent. About 45 percent of the acreage is undisturbed Rains soil and about 35 percent is Urban land. The remaining soils have been mapped as inclusions. The Rains soil

and Urban land could not be mapped separately at the selected scale.

Typically, the Rains soil has a very dark gray fine sandy loam surface layer about 7 inches thick. The subsoil extends to a depth of at least 75 inches. It is, in sequence downward, light brownish gray sandy loam, gray sandy clay loam that has mottles in shades of brown and red, and light gray sandy clay that has pockets of sandy loam and mottles in shades of brown and yellow.

Permeability is moderate, and the available water capacity is moderate to high. This soil is strongly acid or very strongly acid except where lime has been added. The seasonal high water table is at or near the surface from winter to early in spring. Areas of this soil in Carolina bays may be ponded for brief periods following heavy rains.

Urban land consists of areas where the original soil is covered by concrete, asphalt, buildings, or other impervious material. Slope is modified to fit the site needs, but commonly ranges from 0 to 2 percent.

Included in mapping are small areas of Goldsboro, Lynchburg, Stallings, Grantham, Pantego, and Coxville soils. Goldsboro soils are moderately well drained, and Lynchburg and Stallings soils are somewhat poorly drained. Grantham soils have more silt in the subsoil than Rains soil, and Coxville soils have more clay. The included soils make up about 20 percent of this map unit.

Rains soil is limited for urban uses because of wetness, but some undeveloped areas are being converted to urban uses because better drained soils are not in the vicinity. This soil is also limited for recreational uses because of wetness. Artificial drainage can improve the suitability of the soil if an outlet can be established.

Neither a capability subclass nor a woodland ordination symbol has been assigned to this map unit.

St—Stallings sandy loam. This somewhat poorly drained soil is on broad, smooth flats on uplands. It is most extensive west of Clarendon in the Big Bay area. Slopes range from 0 to 2 percent. Individual areas of this soil are irregular in shape and generally are about 50 acres or more.

Typically, the surface layer is very dark gray sandy loam about 7 inches thick. The subsoil to a depth of 75 inches is sandy loam. It is, in sequence downward, pale brown with yellowish brown and grayish brown mottles, pale brown with yellowish brown and light brownish gray mottles, light brownish gray with red and strong brown mottles, and mottled brownish yellow, strong brown, and gray. Pockets of sandy clay loam are in the lower part of the subsoil.

Permeability is moderately rapid, and the available water capacity is moderate. Shrink-swell potential is low. This soil is extremely acid to strongly acid except where lime has been added. The seasonal high water table is 1.0 to 2.5 feet below the surface during winter and spring.

Included with this soil in mapping are small areas of Foreston, Lynchburg, and Rains soils. Foreston soils are moderately well drained and are in higher positions on the landscape than Stallings soil. Lynchburg soils have more clay in the subsoil than Stallings soil and are scattered throughout the map unit. Rains soils are poorly drained and are in lower positions. The included soils make up less than 20 percent of this map unit.

About half the acreage of this Stallings soil is woodland. The rest is in cultivated crops or pasture.

The main cultivated crops are corn, soybeans, and tobacco. Artificial drainage is needed for optimum production of tobacco and other crops that require good drainage. Conservation tillage, cover crops, and grasses and legumes in the cropping system help to maintain tilth and productivity.

Grasses and legumes are grown for hay and pasture. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, sweetgum, longleaf pine, yellow poplar, water oak, red maple, and blackgum. The main understory includes flowering dogwood, American holly, switchcane, greenbrier, and inkberry. Wetness is a moderate limitation affecting equipment use during planting and harvesting.

This soil is limited for most urban and recreational uses because of wetness.

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

To—Torhunta fine sandy loam. This very poorly drained soil is in slight depressions and on broad flats on stream terraces and uplands. Slopes are less than 2 percent. Individual areas of this soil are oval or irregular in shape and generally are about 100 acres.

Typically, the surface layer is about 15 inches thick. It is black fine sandy loam to a depth of about 11 inches and very dark gray loamy sand below that depth. The subsoil extends to a depth of about 45 inches. It is dark grayish brown sandy loam in the upper part and dark grayish brown loamy sand in the lower part. The underlying material to a depth of 60 inches is dark grayish brown sand.

Permeability is moderately rapid in the subsoil and rapid in the underlying material. The available water capacity is low to moderate. Shrink-swell potential is low. This soil is extremely acid to strongly acid except where lime has been added. The seasonal high water table is 0.5 to 1.5 feet below the surface from late in fall through spring. Ponding can occur in some areas. In some low-lying areas near streams, this soil is subject to rare flooding for brief periods.

Included with this soil in mapping are small areas of Pantego, Murville, and Croatan soils. Pantego soils have more clay in the subsoil than Torhunta soil. Murville soils are sandy throughout. Croatan soils have a thick, muck surface layer. The included soils are scattered throughout the delineations and make up less than 30 percent of this map unit.

Most of the acreage of this Torhunta soil is used for cultivated crops. The rest is used as pastureland or woodland.

This Torhunta soil is used for cultivated crops, such as corn, soybeans, and small grains. Artificial drainage is needed for optimum production; however, suitable drainage outlets are not available in some areas. Parallel ditches generally are used for drainage.

This soil is also used for grasses and legumes for hay and pasture. Artificial drainage is needed. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are loblolly pine, sweetgum, water tupelo, blackgum, red maple, and sweetbay. The understory includes swamp cyrilla, waxmyrtle, switchcane, and greenbrier. Wetness is the main limitation affecting woodland use and management. This soil provides good habitat for wetland wildlife.

This soil is severely limited for nearly all urban and recreational uses because of wetness. Suitable drainage outlets generally are difficult to establish, and cutbanks on ditches cave.

This Torhunta soil is in capability subclass VIw (undrained) or IIIw (drained). The woodland ordination symbol is 9W.

Ud—Udorthents, loamy. This map unit consists of areas where most or all of the natural soil has been altered by digging, grading, or filling. They are borrow areas, fill areas, and landfill areas.

Borrow areas.—In these excavated areas the soil material has been removed for use as fill for construction (fig. 6). The cuts are 3 to 10 feet or more deep. The base slope is level to gently sloping. Most cuts have two or more short, nearly vertical side slopes. The exposed surface layer consists mainly of dense loamy marine and fluvial deposits. Some of these areas contain standing water at times. Borrow areas generally are about 10 acres. Areas of less than 3 acres are shown by a special symbol on the soil map.

Some borrow areas have been reclaimed and seeded to grass. A few areas are naturally reseeded to wild grasses, weeds, and loblolly pine. Borrow areas commonly have poor physical properties for plant growth. The available water capacity, soil fertility, and organic matter content are low. Reseeded areas can be used as wildlife habitat.

Fill areas.—In these areas poorly drained and very poorly drained soils have been covered with fill material to a depth of 1 to 4 feet in order to raise the soil's surface above the seasonal high water table. Most of the fill areas are adjacent to Lake Waccamaw.

These areas are allowed to stabilize for some time. They are then developed for residential or recreational uses as the need arises. Some areas have been planted to loblolly pine, and others have naturally reseeded to wild grasses, weeds, and loblolly pine. The properties of this filled soil material, such as water capacity, soil fertility, and organic matter content, vary greatly; therefore, a soil test is important in determining lime and fertilizer needs for establishing lawns when converting these areas to urban or recreational uses. Slopes are nearly level to gently sloping. Individual areas generally are more than 100 acres.

Landfill areas.—In these nearly level to gently sloping areas, the natural soil has been altered by landfill operations. These excavated areas consist of graded trenches that are backfilled with alternate layers of solid refuse and soil material. A final cover of about 2 feet of soil is on the surface. These areas generally are reseeded to grass, and permanent plant cover is maintained.

The characteristics of the soil material varies to such a degree that interpretive statements cannot be made. Recommendations for use and management generally require onsite investigation.

Neither a capability subclass nor a woodland ordination symbol has been assigned to this map unit.

Ut—Udults, steep. This excessively drained to moderately well drained soil is on steep bluffs above the Cape Fear River and its entrenched tributaries. This soil consists of sandy, loamy, and clayey stratified Coastal Plain sediments of three geologic ages. These sediments vary in texture, both vertically and laterally over short distances. Areas of this soil are in the northeastern part of the county near Riegelwood and

Figure 6.—Sand has been removed for use as roadfill in this area of Udorthents, loamy.

Acme Delco. Slopes range from 8 to 70 percent, but are dominantly about 30 percent. Individual areas of this soil are long and narrow and range from 15 to 150 acres or more.

The soil is mostly loamy, but it is clayey in some areas. Permeability is moderate to slow, and the available water capacity generally is moderate. This soil is extremely acid to strongly acid except where the soil formed in marl. Surface water runoff is rapid. Erosion is a severe hazard. Slopes are unstable, and mass slumping occurs in some places.

Included with this soil in mapping are soils that are sandy throughout, soils that have exposed layers of iron indurated sandstone, more clayey soils, and soils that have marly layers. The included soils are intermingled throughout the delineations and make up about 20 percent of this map unit.

Except for very small areas that are cleared for pipelines and power lines, all areas of this soil are woodland.

Common trees are American beech, yellow poplar, American sycamore, hickory, loblolly pine, sweetgum, and southern red oak. Common understory includes American holly, American hornbeam, eastern hophornbeam, pawpaw, and serviceberry. Although trees grow well on this soil, harvesting timber is difficult because of steep slopes. Harvesting on steep slopes can also result in severe erosion.

Agricultural, urban, and recreational uses of this soil generally are not practical because of the highly erodible, steep, unstable slopes. Most areas of this soil will probably remain undisturbed scenic woodland for watershed protection.

Neither a capability subclass nor a woodland

ordination symbol has been assigned to this map unit.

WaB—Wagram loamy fine sand, 0 to 6 percent slopes. This well drained soil is on broad, smooth flats and side slopes on uplands. Individual areas of this soil are scattered throughout the county. They are irregular in shape and generally are about 25 acres.

Typically, the surface layer is brown loamy fine sand about 7 inches thick. The subsurface layer to a depth of about 23 inches is very pale brown loamy fine sand. The subsoil to a depth of 77 inches or more is sandy clay loam. It is, in sequence downward, yellowish brown, yellowish brown with red mottles, strong brown with red and yellowish brown mottles, and yellowish brown with yellowish red mottles.

Permeability is moderate, and the available water capacity is low to moderate. Shrink-swell potential is low. This soil is very strongly acid to moderately acid except where lime has been added. Wind erosion is a hazard.

Included with this soil in mapping are small areas of Autryville, Blanton, Norfolk, and Gritney soils. Also included are small areas of soils that have gray mottles between depths of 40 and 60 inches. Autryville soils are sandy in the middle part of the subsoil. When compared to Wagram soil, Blanton soils have thicker surface and subsurface layers and Norfolk soils have a thinner surface layer. Gritney soils have a clayey subsoil. Except for Gritney soils, which are in the more sloping areas of the map unit, the included soils are randomly mixed with Wagram soil on the landscape. Typically, only two or three of the included soils are in any one delineation. The included soils make up less than 15 percent of this map unit.

Most of the acreage of this Wagram soil is cropland. The rest is woodland or pastureland.

The main crops are corn, soybeans, tobacco, peanuts, sweet potatoes, and small grains. Leaching of plant nutrients, soil blowing, and low to moderate available water capacity are the main limitations. Blowing sand can damage young plants. Winter cover crops, conservation tillage, and crop residue management help to maintain organic matter content and to conserve moisture. Conservation practices, such as no-tillage planting and windbreaks, and crop rotations that include close-growing crops also help to conserve soil and water. Fertilizer, particularly nitrogen, should be added in split applications.

Using this soil as hayland and pastureland is effective in conserving soil and water. Coastal bermudagrass is commonly grown.

The dominant trees are loblolly pine, longleaf pine, white oak, southern red oak, and hickory. The main understory includes flowering dogwood, sassafras, and waxmyrtle. The thick, sandy surface and subsurface layers affect equipment use and seedling mortality.

The thick, sandy surface layer is a slight limitation affecting some urban uses. Because of droughtiness, landscape management commonly includes frequent applications of fertilizer and irrigation during long dry periods. The thick, sandy surface layer also limits some recreational uses.

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

WkB—Wakulla coarse sand, 0 to 6 percent slopes. This somewhat excessively drained soil is on broad upland ridges, stream terraces, and Carolina bay rims. This soil is scattered throughout the survey area; however, it is most extensive in the western part of the county near the Lumber River and its tributaries. Individual areas of this soil are irregular in shape and generally are about 25 acres or more.

Typically, the surface layer is dark grayish brown coarse sand about 6 inches thick. The subsurface layer to a depth of about 30 inches is brownish yellow coarse sand. The subsoil to a depth of about 43 inches is strong brown loamy coarse sand. The underlying material to a depth of 90 inches is coarse sand. The upper part is brownish yellow with yellowish red mottles, and the lower part is very pale brown.

Permeability is rapid, and the available water capacity is low. Shrink-swell potential is low. This soil is very strongly acid to moderately acid except where lime has been added.

Included with this soil in mapping are small areas of soils similar to Wakulla soil except the subsoil is sand. Also included are small areas of Blanton, Autryville, and Echaw soils. Blanton and Autryville soils have a loamy subsoil and are scattered throughout the map unit. Echaw soils are moderately well drained and are in lower positions on the landscape than Wakulla soil. The included soils make up less than 20 percent of this map unit.

About half the acreage of this Wakulla soil is woodland. The rest is pastureland or cropland.

The main cultivated crops are corn, soybeans, and tobacco. Droughtiness, leaching of plant nutrients and the hazard of wind erosion are limitations. Conservation tillage and close-growing crops help to control wind erosion, reduce leaching of nutrients, and conserve moisture.

Figure 7.—Coastal bermudagrass is grown for hay on Wakulla coarse sand, 0 to 6 percent slopes.

Coastal bermudagrass is grown for hay and pasture (fig. 7), although droughtiness is a limitation. The use of this soil as hayland and pastureland is effective in conserving soil and moisture.

The dominant trees are loblolly pine, longleaf pine, and post oak. The understory includes turkey oak, flowering dogwood, and sassafras. Droughtiness is the main limitation affecting woodland use and management, but the loose sandy surface layer can limit equipment use.

The thick, sandy layers are a limitation for most urban and recreational uses. Lawns and shrubs require irrigation and frequent applications of lime and fertilizer. This soil is a poor filter for onsite sewage disposal systems.

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

Wn—Wilbanks silt loam, frequently flooded. This very poorly drained soil is on flood plains and low-lying terraces along Red Hill Swamp and the southern end of Lake Waccamaw. Slopes are less than 2 percent. Individual areas of this soil are irregular in shape or long and narrow and generally are about 600 acres.

Typically, the surface layer is about 45 inches thick. It is dark gray silt loam in the upper part and black silty clay in the lower part. The next layer to a depth of about 65 inches is very dusky red muck. The underlying material to a depth of 80 inches is dark gray clay.

Permeability is slow, and the available water capacity is high. Shrink-swell potential is moderate. This soil is extremely acid to strongly acid in the surface layer and the muck layer. It is very strongly acid to neutral in the underlying material. The seasonal high water table is at or near the surface for several months each year. Flooding is only for brief periods.

Included with this soil in mapping are small areas of Johnston, Meggett, and Grifton soils. Johnston soils have more sand and less clay in the subsoil than

Wilbanks soil, and they are scattered throughout the map unit. Meggett and Grifton soils are poorly drained and are along the edge of delineations or in slightly higher positions on the landscape than Wilbanks soil. The included soils make up less than 20 percent of this map unit.

Nearly all areas of this Wilbanks soil are woodland. A small acreage is in cultivated crops or pasture.

If this soil is adequately drained, cultivated crops, such as corn, soybeans, and small grains can be grown. Drainage outlets can be hard to establish however, because this soil generally is on the lowest part of the landscape. Wetness and the hazard of flooding are the main limitations.

Grasses and legumes can be grown for hay and pasture, although wetness and the hazard of flooding are limitations. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

The dominant trees are water oak, sweetgum, baldcypress, water tupelo, swamp chestnut oak, red maple, overcup oak, and willow oak. If this soil is adequately drained, loblolly pine can be grown. The main understory includes greenbrier, sourwood, and switchcane. Wetness and the hazard of flooding are the main limitations affecting woodland use and management. This soil provides good habitat for wetland wildlife.

This soil is severely limited for all urban and recreational uses because of flooding and wetness.

This Wilbanks soil is in capability subclass VIw (undrained) or IVw (drained). The woodland ordination symbol is 7W.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Columbus County are listed.

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.

About 303,167 acres, or nearly 50 percent of Columbus County, is prime farmland. The prime farmland is mostly in the central, northwestern, southwestern, and northeastern parts of the county. The largest areas are in map units 1, 2, 3, 4, and 10 on the general soil map. Many scattered areas of prime farmland are in the other map units. Corn, soybeans, and tobacco are the main crops grown.

A recent trend in land use in some parts of the county has been the conversion of some prime farmland to urban, commercial, and industrial uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are wet, droughty, or less productive than prime farmland.

The following map units, or soils, make up prime farmland in Columbus 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.

Soils that have limitations, such as a high water table, may qualify as prime farmland if these limitations are overcome by such measures as drainage. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

AyB	Aycock very fine sandy loam, 1 to 4 percent slopes
BuB	Butters loamy fine sand, 0 to 3 percent slopes
CrB	Craven fine sandy loam, 1 to 4 percent slopes

ExA	Exum very fine sandy loam, 0 to 2 percent slopes
Fo	Foreston loamy fine sand
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes
Gr	Grantham very fine sandy loam (where drained)
Gt	Grifton fine sandy loam (where drained)
GyB	Gritney loamy fine sand, 2 to 7 percent slopes
Jo	Johns fine sandy loam (where drained)
Lu	Lumbee fine sandy loam (where drained)
Ly	Lynchburg fine sandy loam (where drained)
Na	Nahunta very fine sandy loam (where drained)
Nk	Nakina fine sandy loam (where drained)
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes
Pa	Pantego fine sandy loam (where drained)
Pe	Pender fine sandy loam
Ra	Rains fine sandy loam (where drained)
St	Stallings sandy loam (where drained)
To	Torhunta fine sandy loam (where drained)

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 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, 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

Joe M. Kenyon, Jr., district conservationist, and Bobby G. Brock, conservation agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, 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.

According to the 1983 North Carolina Agricultural Statistics, Columbus County had 120,890 acres of row crops in 1982. The main row crops grown in the county are tobacco, soybeans, and corn. About 6,950 acres of close-grown crops was produced in 1982. These crops included wheat, oats, and hay. About 10,500 acres was in unimproved pasture.

The soils and climate in Columbus County are well suited to most crops that are grown in the area. The county ranks high among North Carolina counties in total production of such crops as corn, soybeans, tobacco, and sweet potatoes.

Total acreage in crops and pasture has gradually increased as more woodland is cleared. Cropland acreage is slowly decreasing around the perimeters of the local municipalities as urban expansion takes place.

The well drained and moderately well drained soils, such as Norfolk, Aycock, Wagram, and Goldsboro soils, are used mostly for tobacco, corn, peanuts, soybeans, and sweet potatoes. The somewhat poorly drained to very poorly drained soils, such as Lynchburg, Nahunta, Rains, Coxville, and Pantego soils, are used mostly for corn and soybeans.

Small grains are planted as a winter cover crop and for grain. If wheat is grown for grain, soybeans generally follow in the spring or early in summer.

Dominant pasture plants are tall fescue, white clover, bermudagrass, bahiagrass, ryegrass, and rye. Tall fescue and white clover are planted on somewhat

poorly drained to very poorly drained soils, such as Rains, Lynchburg, Torhunta, and Grifton soils. Bermudagrass is planted on excessively drained to moderately well drained sandy and loamy soils, such as Autryville, Blanton, Echaw, and Wakulla soils.

About 13 percent of the cropland in Columbus County is in capability class I. This cropland has no major soil management problems, and it is capable of producing sustained high yields year after year without damaging the soil. Other areas of cropland are affected by wetness, the hazard of erosion, droughtiness, or some combination of these.

Soil erosion is the major problem on about 17 percent of the cropland in Columbus County. Erosion is a moderate hazard if slope generally is more than 2 percent, as in some areas of Norfolk, Aycock, Craven, and Wagram soils.

Loss of the surface layer through erosion is damaging. Tilth is affected as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils, such as Gritney and Craven, that have a fairly high clay content in the subsoil.

Soil erosion on farmland also results in sedimentation of streams. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In some sloping fields, tilling or preparing a good seedbed is difficult because the original friable surface layer of the soil has been eroded away, leaving clayey or hardpan spots. Such spots are common in moderately eroded areas of Norfolk, Aycock, Craven, and Gritney soils.

Erosion control through resource management systems provides protective surface cover, reduces surface water runoff, and increases infiltration. A cropping system that keeps plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soil. Legume and grass forage crops in the cropping system reduce erosion and improve tilth for the following crop.

Slopes are so short and irregular that contour tillage or terracing is not practical in most areas of the steeper Norfolk and Gritney soils. On these soils, a cropping system that provides substantial plant cover is required to control erosion unless conservation tillage is practiced. Minimizing tillage, using cover crops, and leaving crop residue on the surface increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in Columbus County.

Conservation tillage, which includes such practices as no-tillage, strip tillage, stubble mulching, and chiseling, is increasing in Columbus County. It is very effective in reducing erosion on sloping soils, such as Aycock, Craven, Gritney, Norfolk, and Wagram soils.

Diversions and terraces reduce the length of slope, which helps to control runoff and erosion. Contour farming is a very effective erosion control practice. It is better adapted to soils that have smooth, uniform slopes, including most areas of the gently sloping Aycock, Craven, Gritney, and Norfolk soils. Grassed waterways and field borders are part of the erosion control systems on many sloping fields.

Wind erosion is a hazard on about 20 percent of the cropland. Soils that have a sandy surface layer, such as Autryville, Blanton, Butters, Echaw, Centenary, Wagram, and Wakulla soils, are susceptible to wind erosion. Leaving a cover of crop residue on the surface or keeping a cover crop on the surface until planting time helps to control wind erosion, conserve moisture, and reduce nutrient leaching. Windbreaks of loblolly pine and red cedar planted at field edges can form effective barriers to reduce soil blowing in open fields. Planting rye or other small grains in the middle of every fifth row effectively controls wind erosion in sandy fields that have no protective cover.

Information for the design of erosion control systems for each kind of soil is available in the local office of the Soil Conservation Service.

Soil drainage is a major management concern on about 50 percent of the cropland and pastureland in Columbus County. Wetness is a problem on Rains, Lumbee, Bethera, Murville, Pantego, and Nakina soils. Flooding and wetness are problems on Muckalee, Meggett, and Chastain soils.

The design of surface and subsurface drainage systems varies with the kind of soil. Excess water is removed by surface ditches, tile drainage, drainage land grading, or by a combination of these practices, on poorly drained and very poorly drained soils, such as Rains, Pantego, and Torhunta soils. Somewhat poorly drained soils, such as Lynchburg, Nahunta, and Stallings soils, respond well to tile drainage. Drains must be more closely spaced in slowly permeable soils than in soils that have more rapid permeability.

The moderately well drained Exum, Goldsboro, Foreston and Echaw soils have good natural drainage most of the year, but they tend to dry slowly after rainfall. These soils need only limited drainage.

Information and recommendations for soil drainage for each kind of soil is available in the local office of the Soil Conservation Service.

Soil Fertility

The soils in Columbus County generally are low in natural fertility and are naturally acid. They require lime and fertilizer to make them usable for most crops.

Lime 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, which counteracts the adverse effects that high levels of aluminum have on many crops, and 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 fertilizer 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 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 fertilizer 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 Columbus 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 14 shows a general range of organic matter content. The surface texture is shown in table 13 in the USDA texture column.

In some cases, the content of organic matter may be outside the range shown in table 14. It may be higher in soils that have received high amounts of animal or manmade waste. Soils that recently have been brought into cultivation can have a higher content of organic matter in the surface layer then similar soils that have been in cultivation for a long time. Conservation tillage increases the 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 the 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 insures the smallest 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. If the yield potential is only 100 bushel per acre, then rates of 100 to 120 pounds of nitrogen per acre should be used. Application of nitrogen in excess 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. There are no class VIII soils in Columbus County.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, or *s*, 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); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

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* or *s*.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 5.

Woodland Management and Productivity

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

Forest managers are faced with the challenge of producing greater yields from smaller areas of forest land. Meeting this challenge requires a greater intensity of management and applied silvicultural practices. Many of the silvicultural techniques now used in forestry resemble those used for years in agriculture. These techniques include establishing, weeding, and thinning a desirable young stand; propagating more productive species and genetic varieties; planning for shorter rotations and more complete fiber utilization; controlling insects, diseases, and weeds; and increasing growth by fertilization and drainage. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture—to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 416,274 acres *(11)* or about 69 percent of the land area of Columbus County. Commercial forest land is land that is producing or is capable of producing crops of industrial wood and is not withdrawn from timber utilization. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the

highest average sale value per acre, and is easy to establish and manage.

Hardwoods will replace pines unless prompt and adequate regeneration of pine stands follows harvesting. Foresters advise landowners to emphasize pines over hardwoods on suitable sites because quality pine timber can be produced more rapidly, in greater volume, and with greater assurance than quality hardwood timber. Clearing additional land for agriculture and other forest withdrawals will continue to reduce the commercial forest acreage.

Commercial forest types identified in Columbus County *(7, 11)* are:

Loblolly pine. This forest type covers 174,637 acres and is made up of more than 50 percent loblolly pine. It also includes red oak, white oak, sweetgum, hickory, and yellow poplar.

Oak-pine. This forest type covers 29,585 acres. Hardwoods make up more than 50 percent of the stand, but pines make up 25 to 50 percent in association with upland oaks, sweetgum, hickory, and yellow poplar.

Oak-hickory. This forest type covers 36,981 acres. Upland oaks and hickory make up more than 50 percent of the stand. It also includes elm, maple, yellow poplar, and black walnut.

Elm-ash-cottonwood. This forest type covers 7,341 acres. Elm, ash, or cottonwood make up more than 50 percent of the stand. It also includes willow, sycamore, beech, and red maple.

Longleaf pine. This forest type covers 29,737 acres. Longleaf pine makes up more than 50 percent of the pine species. The stand also includes oak, hickory, and sweetgum.

Oak-gum-cypress. This forest type covers 137,993 acres. It is bottom-land forests in which tupelo, blackgum, sweetgum, oak, or southern cypress, singly or in combination, make up more than 50 percent of the stand.

One of the first steps in planning intensive forest land management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valuable tree species are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning future expenses and profits associated with intensive forest management, land acquisition, or industrial investments.

The potential productivity of forest lands depends on physiography, soil properties, climate, and the effects of past management. Soil properties, such as texture, structure, soil depth, and depth to the water table, and site characteristics affect forest productivity primarily by influencing available water capacity, aeration, and root development. The interaction of the soil properties and site characteristics determines 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 6 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 6 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 *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the soil. 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: W, C, 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 wetness or susceptibility of the surface layer to compaction. 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 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.

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 or clayey 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 soils that generally are used to produce timber have the yield predicted in cubic feet and board feet. The yield is predicted at the point where mean annual increment culminates. The productivity of the soils in this survey is mainly based on loblolly pine *(5)*, longleaf pine *(10)*, sweetgum *(3)*, and water oak *(4)*.

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 meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 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 7, 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 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

Figure 8.—Limitations affecting golf fairways are only slight on Norfolk loamy fine sand, 2 to 6 percent slopes.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have 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.

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, and are not subject to flooding during the period of use.

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.

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 (fig. 8). The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Columbus County provides a great diversity of habitat for fish and wildlife. An abundance of farmland provides good habitat for large and small game species,

large tracts of undisturbed "bog" type habitat, and high quality wetland habitat.

Openland wildlife habitat is quite variable in the county and ranges from areas of small farms that have an abundance of edge habitat to large farms that have very little edge habitat. Land clearing is accelerating, with the highest activity taking place in the Big Bay area. The newly cleared lands are mostly large tracts that have large fields and a minimum of edge habitat. While these areas have value to some species, such as mourning dove, careful planning is needed to maintain high habitat value to edge species, such as quail and rabbits.

The Green Swamp and Lake Waccamaw areas provide habitat for numerous threatened or endangered fish and wildlife species. These species are mostly endemic to the site and are highly sensitive to changes in habitat.

Wetland wildlife habitat is primarily associated with the Waccamaw, Lumber, and Cape Fear River systems. Bog wetlands are associated with the Green Swamp and Big Bay areas.

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

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, bahiagrass, 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 depth of the root zone, 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 bluestem, goldenrod, partridge pea, beggarweed, pokeweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, sweetgum, dogwood, hickory, blackberry, blueberry, sweetbay, redbay, and titi. 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, cedar, and juniper.

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, and slope. Examples of wetland plants are smartweed, wild millet, cutgrass, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are 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 dove, many species of songbirds, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include 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, egret, muskrat, 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 a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: 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 9 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 soil texture and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to the high 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 a high 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 a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, and 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 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and 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 a high 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 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. Animal waste lagoons, commonly used in farming operations, are generally deeper and rely on anaerobic bacteria to decompose the waste material. They are not considered in these ratings.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high 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. Slope 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 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high 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 11 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 a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand.

They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of less than 15 percent. 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. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 or a high shrink-swell potential. 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 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand 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 or a layer of 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 a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope and depth to a 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, or soils that have only 20 to 40 inches of suitable material. 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, 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 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil. Excessive slope can affect the storage capacity of the reservoir area.

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

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth 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 a high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and

subsurface water from the soil. How easily and effectively the soil is drained depends on the permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

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

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.

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

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

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

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

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

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

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

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. The 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. The 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 or high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet

and rill erosion. 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 14, 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 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Some soils listed in table 15 are assigned to a dual hydrologic group (B/D or A/D). The first letter is the group that the soil is in if artificially drained. The second letter is the group the soil is assigned to in the natural undrained condition.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. 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 15 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). There are no soils with occasional frequency of flooding in Columbus County. *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-April, for example, means that flooding can occur during the period November through April. 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 is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific

than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 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 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. 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.

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.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(9)*. 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 16 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 Ultisol.

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 Udult (*Ud*, meaning of humid climate, plus *ult*, from Ultisol).

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 Paleudult (*Pale*, meaning an old, well developed soil, plus *udult*, the suborder of the Ultisols that occurs in a humid climate).

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 Paleudults.

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

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. For example, the Norfolk series is in the fine-loamy, siliceous, thermic Typic Paleudults family.

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (8)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (9)*. 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."

Autryville Series

The Autryville series consists of well drained soils that formed in sandy and loamy marine sediments. These soils are on uplands. Slope ranges from 0 to 3 percent.

Typical pedon of Autryville sand, 0 to 3 percent slopes; 0.2 mile west of Williams Crossroads on secondary road 1504, 0.3 mile southwest on a farm lane to farm house, about 100 feet west of the farm house, in a field (221,500N; 2,021,500E):

Ap—0 to 10 inches; brown (10YR 5/3) sand; single grained; loose; many fine roots; moderately acid; abrupt smooth boundary.

E—10 to 23 inches; very pale brown (10YR 7/4) sand; single grained; loose; common fine roots; strongly acid; clear smooth boundary.

Bt—23 to 34 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few faint clay bridges between coated sand grains; strongly acid; clear wavy boundary.

BC—34 to 43 inches; brownish yellow (10YR 6/6) loamy sand; weak medium granular structure; very friable; very strongly acid; clear smooth boundary.

E′—43 to 55 inches; very pale brown (10YR 7/4) sand; few medium faint brownish yellow (10YR 6/6) mottles and few medium distinct white (10YR 8/2) mottles; single grained; loose; very strongly acid; clear wavy boundary.

B′t—55 to 62 inches; yellow (10YR 7/6) sandy loam; few medium distinct light gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; very friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg—62 to 74 inches; light gray (10YR 7/2) sandy clay loam; few medium distinct brownish yellow (10YR 6/6) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

B″t—74 to 85 inches; mottled light gray (10YR 7/2), brownish yellow (10YR 6/6), reddish yellow (7.5YR 6/8), and yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very 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 Ap or A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3. The E horizon has hue of 10YR, value of 5 to 7, and chroma of 3 or 4, or hue of 2.5Y, value of 6 or 7, and chroma of 4. The texture of the E horizon is sand or loamy sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The texture is fine sandy loam, sandy loam, or sandy clay loam.

The E′ horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 to 4. The texture is sand, loamy sand, or loamy fine sand.

The B′t horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 8. The texture is sandy clay loam, fine sandy loam, or sandy loam.

Aycock Series

The Aycock series consists of well drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 1 to 4 percent.

Typical pedon of Aycock very fine sandy loam, 1 to 4 percent slopes; 11.1 miles north of Whiteville, 0.4 mile northwest of the intersection of U.S. Highway 701 and secondary road 1542 near the Columbus-Bladen County line; 160 feet south of road, in a field (261,000N; 2,097,000E):

Ap—0 to 5 inches; grayish brown (10YR 5/2) very fine sandy loam; weak medium granular structure; very friable; common fine and few medium roots; very strongly acid; clear wavy boundary.

E—5 to 11 inches; light yellowish brown (10YR 6/4) very fine sandy loam; weak medium granular structure; very friable; common fine and few medium roots; very strongly acid; clear wavy boundary.

Bt1—11 to 14 inches; brownish yellow (10YR 6/6) loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; clear smooth boundary.

Bt2—14 to 30 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—30 to 44 inches; strong brown (7.5YR 5/8) loam; few fine prominent red (10R 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt4—44 to 59 inches; brownish yellow (10YR 6/8) loam;

few fine distinct light gray (10YR 7/2) mottles and few fine prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BC—59 to 75 inches; mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/8), and light gray (10YR 7/1) loam; massive; friable; very 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 or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. In some pedons, the lower part of the Bt horizon has a gray matrix or is mottled in shades of red, brown, yellow, and gray. The texture is silty clay loam, clay loam, loam, or silt loam. The BC horizon is similar in color and texture to the Bt horizon. Some pedons do not have a BC horizon.

Bethera Series

The Bethera series consists of poorly drained soils that formed in loamy and clayey marine sediments. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Bethera loam; 3 miles south of Pireway on North Carolina Highway 905, 1 mile west on a dirt road, 0.6 mile southwest on a dirt road, 0.3 mile west on a dirt road, 100 ft. south of road, in a wooded area (86,000N; 2,095,000E):

A—0 to 6 inches; black (10YR 2/1) loam; weak medium subangular blocky structure; friable; many fine and medium and few coarse roots; extremely acid, clear smooth boundary.

Btg1—6 to 16 inches; gray (10YR 5/1) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; common faint clay skins on faces of peds; extremely acid; gradual wavy boundary.

Btg2—16 to 25 inches; gray (10YR 5/1) clay; common coarse distinct brownish yellow (10YR 6/8) mottles and common medium distinct dark gray (10YR 4/1) mottles; weak medium subangular blocky structure; firm; common faint clay skins on faces of peds; extremely acid; gradual wavy boundary.

Btg3—25 to 60 inches; gray (10YR 5/1) clay; common medium prominent red (2.5YR 4/8) mottles and common medium distinct brownish yellow (10YR 6/6) and dark gray (10YR 4/1) mottles; weak medium subangular blocky structure; firm; common faint clay skins on faces of peds; extremely acid; gradual wavy boundary.

BCg—60 to 68 inches; light gray (10YR 6/1) clay loam; few medium distinct yellow (10YR 7/8) mottles and few fine prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; firm; extremely acid; gradual wavy boundary.

Cg—68 to 72 inches; gray (10YR 6/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; massive; friable; very strongly acid.

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

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2; or it is neutral and has value of 2 to 4. Some pedons have an E horizon that has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. The texture is commonly clay loam, sandy clay, or clay, but it ranges to silty clay loam.

The BCg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 to 7. The texture is sandy clay loam, clay loam, sandy clay, or clay. Some pedons do not have a BCg horizon.

The Cg horizon is similar in color and texture to the BCg horizon.

Blanton Series

The Blanton series consists of well drained soils that formed in sandy and loamy marine sediments. These soils are on uplands. Slope ranges from 0 to 6 percent.

Typical pedon of the Blanton sand, 0 to 6 percent slopes; 2.1 miles north of the Kaiser Chemical Plant at Acme on secondary road 1818, 0.5 mile north of secondary road 1818 on a dirt road; 25 feet west of road, in a wooded area (218,000N; 2,248,000E)

A—0 to 7 inches; dark gray (10YR 4/1) sand; weak fine granular structure; very friable; common fine and medium roots; moderately acid; clear wavy boundary.

E1—7 to 40 inches; very pale brown (10YR 7/4) sand; few fine distinct white (10YR 8/2) mottles; single grained; loose; moderately acid; gradual wavy boundary.

E2—40 to 50 inches; very pale brown (10YR 7/3) sand;

few fine faint yellow mottles; single grained; loose; moderately acid; gradual wavy boundary.

E3—50 to 57 inches; white (10YR 8/2) sand; single grained; loose; sand grains uncoated; strongly acid; gradual wavy boundary.

Bt1—57 to 64 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

Bt2—64 to 74 inches; brownish yellow (10YR 6/6) sandy clay loam; few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

Bt3—74 to 80 inches; mottled light gray (10YR 7/2), brownish yellow (10YR 6/6), and yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay bridges between coated sand grains; very strongly acid.

The solum is more than 60 inches thick. Reaction is very strongly acid to moderately acid in the A and E horizons and very strongly acid or strongly acid in the Bt horizon.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 3. The E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 8.

The Bt horizon has hue of 2.5Y to 7.5YR, value of 5 to 7, and chroma of 3 to 8; or it is mottled in varying shades of brown, yellow, and gray. The texture is sandy loam, fine sandy loam, or sandy clay loam.

Brookman Series

The Brookman series consists of very poorly drained soils that formed in loamy and clayey marine sediments. These soils are on flood plains and low stream terraces. Slope is less than 1 percent.

Typical pedon of Brookman loam, frequently flooded; 2.6 miles west-northwest of Old Dock on a logging road off of North Carolina Highway 130, 0.5 mile south on logging road, 50 feet east of road, in a wooded area (161,000N; 2,116,000E):

A—0 to 11 inches; very dark gray (10YR 3/1) loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

BA—11 to 14 inches; dark grayish brown (10YR 4/2) clay loam; few medium distinct very dark gray (10YR 3/1) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; strongly acid; gradual wavy boundary.

Btg1—14 to 33 inches; dark gray (10YR 4/1) sandy clay; few fine prominent yellowish red (5YR 4/6) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; common faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Btg2—33 to 54 inches; dark gray (10YR 4/1) clay; few medium prominent yellowish red (5YR 4/6) mottles and few medium distinct gray (10YR 6/1) mottles; weak medium subangular blocky structure; firm; few fine roots; common faint clay skins on faces of peds; moderately acid; gradual wavy boundary.

BCg—54 to 60 inches; mottled greenish gray (5G 6/1), olive gray (5Y 4/2), gray (5Y 6/1), strong brown (7.5YR 5/6), and olive yellow (2.5Y 6/6) sandy clay; weak medium angular blocky structure; sticky and plastic; few fine roots; mildly alkaline; gradual wavy boundary.

Cg—60 to 72 inches; greenish gray (5BG 6/1) sandy clay loam; common medium prominent olive yellow (2.5Y 6/6) mottles and few medium distinct light gray (N 7/0) mottles; massive; sticky and slightly plastic; few weathered shell fragments and calcium carbonate flakes; moderately alkaline.

The solum is 50 to 90 inches thick over marly marine sediment. Reaction is strongly acid to slightly acid in the A horizon except where lime has been added to the soil. It is strongly acid to mildly alkaline in the B horizon and slightly acid to moderately alkaline in the C horizon.

The A or Ap horizon has hue of 10YR and 7.5YR, value of 2 or 3, and chroma of 1 or 2.

The BA horizon has hue of 10YR, value of 4, and chroma of 1 or 2. The texture is loam, sandy clay loam, or clay loam. Some pedons do not have a BA horizon. The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1. In some pedons, the lower part of the Btg horizon and the BCg horizon are mottled in hue of 5YR to 5G, value of 3 to 7, and chroma of 0 to 8. The texture is clay or sandy clay in the Btg horizon and sandy clay, sandy clay loam, or clay in the BCg horizon. Some pedons do not have a BCg horizon.

The C horizon is mottled in the same colors as the BCg horizon. The texture is loamy sand, sandy loam, or sandy clay loam. Shell fragments and small flakes and nodules of calcium carbonate range from few to many.

Butters Series

The Butters series consists of well drained soils that formed in sandy and loamy marine sediments. These soils are on uplands. Slope ranges from 0 to 3 percent.

Typical pedon of Butters loamy fine sand, 0 to 3 percent slopes; 1.2 miles south of Sidney, 400 feet east of the intersection of secondary roads 1005 and 1117, 275 feet north of secondary road 1117 (155,000N; 2,065,500E):

Ap—0 to 9 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

E—9 to 13 inches; very pale brown (10YR 7/4) loamy fine sand; weak fine granular structure; very friable; common fine roots; strongly acid; clear wavy boundary.

Bt—13 to 27 inches; brownish yellow (10YR 6/8) sandy loam; few medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

BE—27 to 35 inches; brownish yellow (10YR 6/8) loamy sand; weak medium granular structure; very friable; few fine roots; very strongly acid; gradual wavy boundary.

E'—35 to 48 inches; white (10YR 8/2) loamy sand; common medium faint very pale brown (10YR 7/3) mottles and common medium distinct yellow (10YR 7/6) mottles; weak fine granular structure; very friable; very strongly acid; clear wavy boundary.

BE'—48 to 58 inches; mottled strong brown (7.5YR 5/8), light yellowish brown (10YR 6/4), and white (10YR 8/2) loamy sand; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

B't1—58 to 68 inches; mottled strong brown (7.5YR 5/8), brownish yellow (10YR 6/8), and light gray (10YR 7/1) sandy loam; weak medium subangular blocky structure; very friable; few faint clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

B't2—68 to 75 inches; mottled reddish yellow (7.5YR 6/8), brownish yellow (10YR 6/8), and light gray (10YR 7/1) sandy clay loam; 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—75 to 82 inches; light gray (10YR 7/1) sandy clay loam; common medium distinct yellow (10YR 7/8) mottles and few fine prominent 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.

The solum is more than 60 inches thick. This soil is strongly acid or very strongly acid except where lime has been added to the soil. This soil consists of two sequences of horizons.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 3. The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 3 to 6.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. Mottles in shades of brown, yellow, and red are in some pedons. The texture is fine sandy loam or sandy loam. The BE horizon is similar in color to the Bt horizon. Pockets and lenses of clean sand are in some pedons. The texture of the BE horizon is loamy fine sand or loamy sand.

The E' horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 2 to 8. Mottles in shades of gray, brown, and yellow or red are in some pedons. The texture is sand, loamy fine sand, or loamy sand.

The BE' horizon is similar in color to the underlying Bt horizon. The texture is fine sand, sand, loamy fine sand, or loamy sand. Some pedons have an E/B horizon that has pockets and lenses of sandy loam within a sandy matrix.

The B't1 and B't2 horizons are mottled in shades of gray, brown, yellow, and red; or they have hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 3 to 8. Gray mottles are in most pedons. The texture is sandy loam, fine sandy loam, or sandy clay loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. The texture is sandy loam or sandy clay loam.

Centenary Series

The Centenary series consists of moderately well drained soils that formed in sandy marine sediment. These soils are on upland ridges. Slope ranges from 0 to 2 percent.

Typical pedon of Centenary fine sand; 3.2 miles north of Hallsboro on secondary road 1001, 0.3 mile northeast of the junction of secondary roads 1001 and 1713, 250 feet north of the road, in a field (227,000N; 2,118,600E):

Ap—0 to 9 inches; grayish brown (10YR 5/2) fine sand;

single grained; loose; common fine roots; few clean sand grains; strongly acid; abrupt smooth boundary.

E1—9 to 23 inches; yellow (10YR 7/6) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

E2—23 to 31 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few fine roots; strongly acid; gradual wavy boundary.

E3—31 to 38 inches; yellow (10YR 7/6) fine sand; common medium distinct reddish yellow (7.5YR 6/8) mottles and few fine distinct light gray (10YR 7/2) mottles; single grained; loose; strongly acid; gradual wavy boundary.

E4—38 to 46 inches; light gray (10YR 7/1) fine sand; few fine distinct yellow (10YR 7/6) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

E5—46 to 68 inches; light brownish gray (10YR 6/2) sand; few fine distinct yellow (10YR 7/6) mottles and common medium distinct brown (10YR 5/3) mottles; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.

Bh1—68 to 74 inches; dark brown (7.5YR 4/2) loamy sand; weak fine granular structure; very friable; very strongly acid; gradual wavy boundary.

Bh2—74 to 90 inches; dark reddish brown (5YR 3/2) sand; massive; very friable; most sand grains coated with organic matter; very strongly acid.

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

The A or Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 1 or 2. The upper part of the E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. The texture is sand or fine sand. The lower part of the E horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 4. The texture is sand or loamy sand.

The Bh horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. The texture is sand, fine sand, or loamy sand. Mottles of higher chroma are in some pedons.

Some pedons have a C horizon that has hue of 10YR, value of 4 to 7, and chroma of 1 to 6. The texture is sand or loamy sand.

Chastain Series

The Chastain series consists of poorly drained soils that formed in clayey sediment. These soils are on flood plains. Slope ranges from 0 to 2 percent.

Typical pedon of Chastain silty clay loam, from an area of Chastain and Chenneby soils, frequently flooded; 0.25 mile north of Cape Fear Church on secondary road 1818, 0.6 mile north on a farm road, 0.25 mile west of the farm road, in a wooded area (220,000N; 2,248,000E):

A—0 to 4 inches; dark gray (10YR 4/1) silty clay loam; moderate medium granular structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

BA—4 to 10 inches; gray (10YR 5/1) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; gradual wavy boundary.

Bg—10 to 62 inches; gray (10YR 5/1) silty clay; moderate medium blocky structure; firm, plastic and sticky; strongly acid; gradual wavy boundary.

The solum is at least 60 inches thick over stratified Coastal Plain sediment. Reaction is strongly acid or very strongly acid in the 10- to 40-inch control section except where lime has been added to the soil. Some pedons are moderately acid below a depth of 40 inches.

The A or Ap horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Mottles in shades of brown and yellow are few to common in some pedons. The texture is silty clay loam, silty clay, or clay. Brown and black concretions are few to common in some pedons.

Chenneby Series

The Chenneby series consists of somewhat poorly drained soils that formed in loamy sediment. These soils are on flood plains. Slope is less than 2 percent.

Typical pedon of Chenneby silty clay loam, from an area of Chastain and Chenneby soils, frequently flooded; 1 mile east of North Carolina Highway 11 on a paper company road, 400 feet northeast of Black Rock Spur Road (233,500N; 2,226,500E):

A—0 to 12 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; many fine mica flakes; strongly acid; clear smooth boundary.

Bw1—12 to 20 inches; dark brown (10YR 4/3) silty clay loam; few medium distinct gray (10YR 6/1) mottles and few fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many fine mica flakes; very strongly acid; clear wavy boundary.

Bw2—20 to 30 inches; yellowish brown (10YR 5/4) silty clay loam; many medium faint dark yellowish brown (10YR 4/4) mottles and few medium distinct gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; many fine mica flakes; very strongly acid; gradual wavy boundary.

Bw3—30 to 42 inches; dark brown (10YR 4/3) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; many fine mica flakes; very strongly acid; gradual wavy boundary.

Bw4—42 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint dark yellowish brown (10YR 4/4) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine mica flakes; very strongly acid.

The solum is 40 to at least 60 inches thick. Reaction is very strongly acid to moderately acid.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma 2 to 4.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. The texture is silt loam or silty clay loam.

Some pedons have a Cg horizon that has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of brown and olive. The texture ranges from sandy loam to silty clay loam. Some pedons have stratified sand, silt, and gravel at a depth of 60 inches or more.

Coxville Series

The Coxville series consists of poorly drained soils that formed in loamy and clayey marine sediments. These soils are on uplands. Slope is less than 2 percent.

Typical pedon of Coxville loam; 1.8 miles southwest of Chadbourn on secondary road 1422, 50 feet west of a canal, in a wooded area (203,500N; 2,047,000E):

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; friable; moderately acid; clear smooth boundary.

Eg—6 to 14 inches; grayish brown (10YR 5/2) loam; weak fine and medium granular structure; friable; strongly acid; clear smooth boundary.

Btg1—14 to 28 inches; gray (10YR 5/1) clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; firm; few faint clay skins on root channels; common faint clay skins on faces of peds; very strongly acid; clear smooth boundary.

Btg2—28 to 50 inches; gray (10YR 5/1) clay; many medium distinct yellowish brown (10YR 5/6) mottles and common medium prominent red (2.5YR 4/8) mottles; weak medium and coarse angular blocky structure; firm; few faint clay skins on faces of peds; very strongly acid; gradual smooth boundary.

Btg3—50 to 62 inches; gray (10YR 5/1) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles and common medium prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual smooth boundary.

Cg—62 to 72 inches; mottled gray (10YR 5/1), light gray (10YR 7/1), and yellowish brown (10YR 5/8) clay; massive; very firm; very 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 or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2; or it is neutral and has value of 2 to 5. The E horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 to 7.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. Yellow, brown, and red mottles are few to common. The texture is sandy clay, clay loam, or clay.

The Cg horizon is similar in color to the Btg horizon, or it is mottled. The texture generally is clay. Some pedons are stratified sandy, silty, or clayey sediment.

Craven Series

The Craven series consists of moderately well drained soils that formed in loamy and clayey marine sediments. These soils are on uplands. Slope ranges from 1 to 4 percent.

Typical pedon of Craven fine sandy loam, 1 to 4 percent slopes; 1 mile west of Bug Hill on secondary road 1112, 70 feet north of the road, in a field (123,000N; 2,103,000E):

Ap—0 to 7 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.

Bt1—7 to 15 inches; yellowish brown (10YR 5/8) clay

loam; few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—15 to 31 inches; yellowish brown (10YR 5/8) clay; few medium prominent red (2.5YR 4/8) mottles and few coarse distinct yellowish red (5YR 5/8) mottles; weak fine angular blocky structure; very firm, sticky and very plastic; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—31 to 42 inches; mottled red (2.5YR 4/8), strong brown (7.5YR 5/8), yellow (10YR 7/8), and light brownish gray (10YR 6/2) clay; weak fine angular blocky structure; very firm, sticky and very plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—42 to 55 inches; gray (10YR 6/1) sandy clay; few medium prominent red (10R 4/8) mottles and few medium distinct strong brown (7.5YR 5/8) mottles; weak fine angular blocky structure; firm, slightly sticky and plastic; very strongly acid; gradual wavy boundary.

Cg—55 to 67 inches; gray (5Y 6/1) sandy clay loam; pockets of sandy loam; many coarse prominent red (2.5YR 4/6) and brownish yellow (10YR 6/8) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is 50 to 60 inches thick. Reaction is very strongly acid or strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. Some pedons have an E horizon that has hue of 10YR to 5Y, value of 6 or 7, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. The texture is clay loam, silty clay loam, silty clay, or clay. The BCg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The texture is silty clay loam, clay loam, silty clay, clay, sandy clay, or sandy clay loam.

The Cg horizon is gray with mottles in shades of red, yellow, and brown. The texture is sandy clay loam or sandy loam that has pockets of coarser material.

Croatan Series

The Croatan series consists of very poorly drained soils that formed in highly decomposed organic material underlain by sandy, loamy, or clayey marine and fluvial sediments. These soils are on broad flats and in depressions on uplands, stream terraces, and flood plains. Slope is less than 2 percent.

Typical pedon of Croatan muck; in Green Swamp, 0.6 mile south of Big Ridge Road, 0.1 mile north of Dalton Russ Road on P&H Road, 50 feet west of road (186,000N; 2161,000E):

Oa1—0 to 10 inches; black (10YR 2/1) broken face and rubbed muck; about 10 percent fibers, 2 percent rubbed; weak medium granular structure; very friable; many fine roots; about 5 percent mineral content; extremely acid; gradual wavy boundary.

Oa2—10 to 25 inches; black (10YR 2/1) broken face and (N 2/0) rubbed muck; about 8 percent fibers, 2 percent rubbed; weak medium subangular blocky structure; very friable; many fine and common medium roots; about 10 percent mineral content; extremely acid; gradual wavy boundary.

Oa3—25 to 40 inches; black (N 2/0) broken face and rubbed muck; about 8 percent fibers, 2 percent rubbed; weak medium subangular blocky structure; very friable; few fine and medium roots; about 15 percent mineral content; extremely acid; gradual wavy boundary.

2Ag—40 to 50 inches; dark grayish brown (10YR 4/2) sandy loam; massive; slightly plastic and slightly sticky; slightly acid; gradual wavy boundary.

2Cg1—50 to 61 inches; grayish brown (10YR 5/2) sandy clay loam; massive; slightly plastic and slightly sticky; slightly acid; gradual wavy boundary.

2Cg2—61 to 74 inches; gray (10YR 5/1) sandy clay loam; pockets of loamy sand; massive; slightly plastic and slightly sticky; slightly acid.

The organic horizons are 16 to 51 inches thick. Reaction is extremely acid in the organic layers except where lime has been added to the soil. It is extremely acid to slightly acid in the mineral layers. Logs, stumps, and wood fragments make up as much as 10 percent of the organic layers. Fiber content is less than 25 percent unrubbed and less than 10 percent rubbed.

The Oa horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 2 or less. Typically, this horizon has weak structure, but under undrained conditions it is massive. If these soils are drained and cultivated, granular or blocky structure development increases in all parts of this horizon.

The 2Ag horizon has hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 3. The texture is sandy loam, fine sandy loam, or loam.

The 2Cg horizon has colors similar to those of the 2Ag horizon. The texture ranges from sand to clay.

Dorovan Series

The Dorovan series consists of very poorly drained soils that formed in highly decomposed organic material over sandy or loamy fluvial sediment. These soils are on flood plains. Slope is less than 1 percent.

Typical pedon of Dorovan muck, frequently flooded; 2.1 miles east of Wananish and 100 feet north of U.S. Highway 74-76 (208,500N; 2,165,000E):

Oa1—0 to 13 inches; black (5YR 2/1) broken face and rubbed muck; partly decomposed leaves, roots, moss, and twigs; about 30 percent fibers, 4 percent rubbed; massive; very friable; many fine and medium roots; about 20 percent mineral content; extremely acid; clear wavy boundary.

Oa2—13 to 52 inches; black (5YR 2/1) broken face and rubbed muck; about 15 percent fibers, 2 percent rubbed; massive; very friable; common fine and medium roots; about 15 percent mineral content; extremely acid; gradual wavy boundary.

Oa3—52 to 65 inches; dark reddish brown (5YR 2/2) broken face and rubbed muck; about 15 percent fibers, 2 percent rubbed; massive; nonsticky; common fine and medium roots; about 15 percent mineral content; extremely acid; gradual wavy boundary.

Oa4—65 to 70 inches; black (5YR 2.5/1) broken face and rubbed muck; about 15 percent fibers, 2 percent rubbed; massive; very friable; common fine and medium roots; about 10 percent mineral content; extremely acid; gradual wavy boundary.

2Cg—70 to 75 inches; grayish brown (10YR 5/2) sandy loam; massive; friable; very strongly acid.

The organic layers are more than 51 inches thick. This soil is extremely acid in the organic layers and very strongly acid or strongly acid in the underlying mineral layers.

The Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. These layers contain logs, stumps, plant fragments, and highly decomposed organic matter. They have 10 to 40 percent fiber unrubbed, less than 7 percent rubbed. Organic layers typically are massive under natural conditions. When drained and cultivated, granular or blocky structure develops after several years in all parts of the organic layers.

The 2Cg horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2; or it is neutral and has value of 3 to 5. The texture is sandy loam, loam, loamy sand, or sand.

Echaw Series

The Echaw series consists of moderately well drained soils that formed in sandy marine sediment. These soils are on uplands and stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Echaw loamy sand; 4 miles west-northwest of Old Dock, 0.6 mile south of the intersection of North Carolina Highway 130 and secondary road 1925, 2,000 feet west on a farm road, 50 feet west of road, in a field (161,000N; 2,108,000E):

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy sand; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

E1—8 to 24 inches; brownish yellow (10YR 6/6) loamy sand; weak medium granular structure; very friable; many fine and medium roots; coated sand grains; very strongly acid; clear wavy boundary.

E2—24 to 28 inches; yellow (10YR 7/6) loamy sand; common medium faint brownish yellow (10YR 6/6) mottles; weak medium granular structure; very friable; few fine roots; coated sand grains; very strongly acid; clear wavy boundary.

E3—28 to 38 inches; brownish yellow (10YR 6/6) loamy sand; few medium distinct white (10YR 8/2) mottles, common medium faint yellowish brown (10YR 5/6) mottles, and few medium prominent dark brown (7.5YR 4/4) mottles; weak medium granular structure; very friable; few fine roots; coated sand grains; very strongly acid; gradual smooth boundary.

E4—38 to 42 inches; very pale brown (10YR 7/3) loamy sand; common medium distinct light yellowish brown (10YR 6/4) mottles and common medium prominent dark reddish brown (5YR 3/2) mottles; weak medium granular structure; very friable; few fine roots; coated sand grains; very strongly acid; clear wavy boundary.

Bh1—42 to 55 inches; dark reddish brown (5YR 2/2) sand; common medium prominent brown (7.5YR 4/2) mottles; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Bh2—55 to 65 inches; black (5YR 2/1) sand; common medium faint dark reddish brown (5YR 3/2) mottles; weak medium subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

Bh3—65 to 75 inches; dark reddish brown (5YR 3/2) sand; common medium distinct black (5YR 2/1) mottles and common medium prominent brown

(7.5YR 5/2) mottles; massive; very friable; very strongly acid; gradual wavy boundary.

Bh4—75 to 85 inches; dark reddish brown (5YR 2/2) sand; common medium distinct brown (7.5YR 5/2) mottles and common medium faint black (5YR 2/1) mottles; single grained; loose; moderately acid.

The solum is 45 to at least 80 inches thick. Reaction is moderately acid to very strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 to 3; or it is neutral and has value of 2 to 5.

The upper part of the E horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 6. The lower part of the E horizon generally has the same dominant colors as the upper part. In some pedons it has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 or less. The texture of the E horizon is loamy sand, loamy fine sand, fine sand, or sand.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. In some pedons, this horizon has value of 4 or 5 and chroma of 3 or 4. The texture is loamy fine sand, loamy sand, fine sand, or sand.

Some pedons have a Cg horizon that is gray loamy fine sand, loamy sand, fine sand, or sand.

Exum Series

The Exum series consists of moderately well drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Exum very fine sandy loam, 0 to 2 percent slopes; 0.25 mile northwest of the intersection of U.S. Highway 701 and secondary road 1542 along the Bladen-Columbus County line, 250 feet south of secondary road 1542, in a field (261,000N; 2,089,000E):

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

BA—6 to 9 inches; brownish yellow (10YR 6/6) loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.

Bt1—9 to 24 inches; yellowish brown (10YR 5/8) loam; few fine faint brownish yellow mottles and common fine prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—24 to 39 inches; brownish yellow (10YR 6/6) loam; few fine distinct light gray (10YR 7/1) mottles and common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—39 to 51 inches; mottled brownish yellow (10YR 6/6), light brownish gray (10YR 6/2), and red (2.5YR 4/8) loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg—51 to 70 inches; gray (N 6/0) loam; pockets of clay; few medium prominent strong brown (7.5YR 5/6) and red (2.5YR 4/8) mottles; weak coarse subangular blocky structure; friable; very 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 Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 1 to 3. Some pedons have an E horizon that has hue of 10YR or 5Y, value of 5 to 7, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. The texture is loam, clay loam, or silty clay loam. Some pedons have silty clay or clay below a depth of 40 inches. Mottles that have chroma of 2 or less are within a depth of 30 inches.

Foreston Series

The Foreston series consists of moderately well drained soils that formed in sandy and loamy marine sediments. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Foreston loamy fine sand; 0.5 mile southeast of Guide on secondary road 1140, 50 feet north of the road, in a cultivated field (121,000N; 2,075,000E):

Ap—0 to 9 inches; very dark gray (10YR 3/1) loamy fine sand; weak medium granular structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.

Bt—9 to 26 inches; brownish yellow (10YR 6/6) fine sandy loam; few fine faint yellowish brown mottles and common medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint

clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

BC1—26 to 46 inches; mottled strong brown (7.5YR 5/8), pale brown (10YR 6/3), and light gray (10YR 7/1) loamy fine sand; pockets of clean sand grains; weak fine subangular blocky structure; very friable; very strongly acid; gradual wavy boundary.

BC2—46 to 60 inches; mottled yellow (10YR 7/8), brown (10YR 5/3), and light brownish gray (10YR 6/2) fine sand; single grained; loose; pockets of loamy sand and clean sand grains; very strongly acid; gradual wavy boundary.

Cg—60 to 70 inches; light gray (10YR 7/2) sand; single grained; loose; very strongly acid.

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

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR, value of 5 to 7, and chroma of 3 to 6.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. The texture is sandy loam or fine sandy loam that has less than 20 percent silt. The BC horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8. The texture is loamy fine sand, fine sand, loamy sand, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 2 to 4. The texture is loamy sand or sand. Pockets of sandy loam are in some pedons. Some pedons do not have a C horizon.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes; 2.2 miles south of Cherry Grove on secondary road 1314, 210 feet west of the road, in a field (172,000N; 2,014,000E):

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

Bt1—10 to 23 inches; brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—23 to 33 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles, few medium distinct light gray (10YR 7/1) mottles, and few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—33 to 50 inches; mottled brownish yellow (10YR 6/6), light gray (10YR 7/1), strong brown (7.5YR 5/8), and red (10R 4/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt4—50 to 62 inches; reddish yellow (7.5YR 6/8) sandy clay loam; common medium prominent light gray (10YR 7/1) mottles and few fine prominent red (10R 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BC—62 to 78 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium prominent light gray (10YR 7/1) and weak red (10R 4/4) mottles; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Cg—78 to 85 inches; light gray (10YR 7/1) sandy clay; many coarse prominent red (10R 4/6) and reddish yellow (7.5YR 6/8) mottles; massive; firm; pockets of sandy clay loam; very 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 or Ap horizon has hue of 10YR, value of 2 to 6, and chroma of 1 or 2; or it has hue of 2.5Y, value of 4 to 6, and chroma of 2. Where value is 3 or less, the horizon is less than 6 inches thick. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 6.

The upper part of the Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 to 8. The lower part has colors similar to those of the upper part, and in some pedons it has chroma of 1 or 2 and mottles of high contrast. The texture of the Bt horizon is sandy clay loam, sandy loam, loam, or clay loam. In some pedons, the lower part of the Bt horizon is clay.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles of high contrast are few to many. The texture ranges from sand to clay. Some pedons are stratified.

Grantham Series

The Grantham series consists of poorly drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Grantham very fine sandy loam; 2 miles south of Braswell, 0.8 mile west of the intersection of secondary roads 1525 and 1504, 325 feet north of secondary road 1504, in a wooded area (221,500N; 2,034,000E):

A—0 to 7 inches; black (10YR 2/1) very fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; abrupt smooth boundary.

Eg—7 to 10 inches; light gray (10YR 7/1) very fine sandy loam; dark gray (10YR 4/1) root channels; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; clear smooth boundary.

Btg1—10 to 34 inches; light brownish gray (10YR 6/2) loam; common medium distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles, common medium prominent strong brown (7.5YR 5/8) mottles, and few medium prominent red (2.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—34 to 60 inches; gray (10YR 6/1) loam; common medium prominent strong brown (7.5YR 5/8) mottles and common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—60 to 75 inches; light gray (10YR 7/1) loam; common medium distinct brownish yellow (10YR 6/8) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; very 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 or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma 1 or 2. The Eg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Some pedons do not have an Eg horizon.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The texture is loam or clay loam. The upper 20 inches of the Btg horizon averages 30 to 50 percent silt.

The BCg horizon is similar in color to the Btg horizon. The texture is loam or clay loam.

Grifton Series

The Grifton series consists of poorly drained soils that formed in loamy marine sediment underlain by marly material. These soils are on uplands and stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Grifton fine sandy loam; 2.9 miles northeast of Lake Waccamaw, 0.3 mile east of the intersection of secondary roads 1748 and 1735, 1,200 feet south of secondary road 1748, in a wooded area (222,500N; 2,147,400E):

A—0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; many fine and few medium roots; strongly acid; abrupt smooth boundary.

Eg—5 to 10 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and few medium roots; moderately acid; clear smooth boundary.

Btg1—10 to 20 inches; gray (10YR 6/1) sandy clay loam; pockets of loamy fine sand; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; few faint clay skins on faces of peds; neutral; gradual wavy boundary.

Btg2—20 to 52 inches; gray (10YR 6/1) sandy clay loam; pockets of sandy loam and loamy sand; common medium prominent strong brown (7.5YR 5/8) mottles, few medium prominent brownish yellow (10YR 6/8) mottles, and common medium faint gray (10YR 5/1) mottles; weak medium subangular blocky structure; friable, few medium roots; few faint clay skins on faces of peds; moderately alkaline; gradual wavy boundary.

BCg—52 to 58 inches; light gray (5Y 7/1) sandy clay loam; pockets of sandy loam; few fine prominent strong brown (7.5YR 5/8) mottles and common coarse prominent brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; moderately alkaline; gradual wavy boundary.

Cg—58 to 65 inches; mottled light gray (5Y 7/1), yellow (2.5Y 7/8), and greenish gray (5GY 5/1) sandy loam; pockets of sandy clay loam; massive; friable; moderately alkaline.

The solum is 40 to 70 inches thick. Reaction is very strongly acid to moderately acid in the surface and subsurface layers and moderately acid to moderately

alkaline in the subsoil and underlying material.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 1; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2. Where the value is 3, this horizon is 7 inches or less thick. The Eg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2. Some pedons do not have an Eg horizon.

The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2; or it has hue of 2.5Y, value of 6 to 7, and chroma of 2. The texture is sandy clay loam, sandy loam, or clay loam.

The Cg horizon has hue of 10YR to 5Y or 5GY, value of 4 to 7, and chroma of 1 or 2. The texture is sand, loamy sand, or sandy loam. Some pedons have lenses of clay.

Gritney Series

The Gritney series consists of moderately well drained soils that formed in loamy and clayey marine sediments. These soils are on uplands. Slope ranges from 2 to 7 percent.

Typical pedon of Gritney loamy fine sand, 2 to 7 percent slopes; 4.6 miles north of Whiteville, 1.2 miles north of the intersection of secondary road 1546 and U.S. Highway 701, 1,700 feet east of U.S. Highway 701 (243,000N; 2,018,000E):

A—0 to 5 inches; dark brown (10YR 4/3) loamy fine sand; weak medium granular structure; very friable; few fine and medium roots; strongly acid; abrupt smooth boundary.

EB—5 to 10 inches; brownish yellow (10YR 6/6) loamy fine sand; weak medium granular structure; very friable; few fine and medium roots; strongly acid; clear wavy boundary.

Bt1—10 to 14 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; common faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—14 to 20 inches; strong brown (7.5YR 5/8) sandy clay; moderate medium angular blocky structure; firm; few fine roots; common faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—20 to 33 inches; strong brown (7.5YR 5/8) clay; common medium distinct light gray (2.5Y 7/2), yellowish red (5YR 5/8), and olive yellow (2.5Y 6/6) mottles; moderate medium angular blocky structure; firm; common faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt4—33 to 52 inches; mottled strong brown (7.5YR 5/8), brownish yellow (10YR 6/6), pinkish gray (7.5YR 6/2), and light brownish gray (10YR 6/2) clay; moderate medium angular blocky structure; firm; very strongly acid; gradual wavy boundary.

BC—52 to 55 inches; brownish yellow (10YR 6/8) clay loam; pockets of sandy clay loam; common medium prominent gray (10YR 6/1) mottles; weak medium subangular blocky structure; firm; very strongly acid; gradual wavy boundary.

Cg—55 to 75 inches; gray (10YR 6/1) clay loam; common fine prominent brownish yellow (10YR 6/8) mottles and common coarse distinct white (10YR 8/1) mottles; massive; firm; very strongly acid.

The solum is 40 to 72 inches thick. Reaction is strongly acid or very strongly 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 4; or it has hue of 2.5Y, value of 4 or 5, and chroma of 2. The E horizon has hue of 10YR or 2.5Y, value of 6, and chroma of 3 to 6. Some pedons do not have an E horizon.

The upper part of the Bt horizon has hue of 5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. The texture is sandy clay loam, clay loam, sandy clay, or clay. The middle part has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8, and it has few to many mottles in shades of red, brown, yellow, and gray. The gray mottles are relict and increase with depth. They also occur in the upper part of the Bt horizon in some pedons. The lower part of the Bt horizon generally is mottled in hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 2 to 8; or in hue of 10YR, value of 5 to 7, and chroma of 1 to 8. The texture is sandy clay loam, clay loam, sandy clay, or clay.

The C horizon generally is mottled in hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 2 to 8; or in hue of 10YR, value of 5 to 7, and chroma of 1 to 8. The texture ranges from sandy clay loam to clay. Some pedons have lenses of sandy loam, loamy sand, or sand.

Johns Series

The Johns series consists of moderately well drained to somewhat poorly drained soils that formed in loamy sediment underlain by sandy material. These soils are on stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Johns fine sandy loam; 0.3 mile northwest of the Columbus-Brunswick County line on North Carolina Highway 130, 130 feet northeast of the

road, in a pine plantation (127,000N; 2,136,000E):

A—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.

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

Bt1—10 to 15 inches; light yellowish brown (10YR 6/4) sandy clay loam; weak medium subangular blocky structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

Bt2—15 to 26 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

BC—26 to 38 inches; mottled white (10YR 8/1), yellowish brown (10YR 5/6), and yellowish red (5YR 5/8) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

2Cg1—38 to 47 inches; light gray (10YR 7/2) sand; common medium distinct yellow (10YR 7/6) mottles; single grained; loose; strongly acid; gradual wavy boundary.

2Cg2—47 to 80 inches; white (10YR 8/1) sand; common medium distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; strongly acid.

The solum is 20 to 40 inches thick. Reaction is very strongly acid or strongly acid except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 0 to 3. The E horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. In some pedons, the lower part of this horizon has chroma of 1 or 2. The texture is sandy clay loam, clay loam, or sandy loam.

The 2C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 or 2. The texture is sand, coarse sand, or loamy sand. Some pedons have up to 5 percent gravel.

Johnston Series

The Johnston series consists of very poorly drained soils that formed in stratified loamy and sandy recent alluvium. These soils are on flood plains. Slope is less than 1 percent.

Typical pedon of Johnston loam, frequently flooded; 2.3 miles north of Evergreen, 0.6 mile northeast of the intersection of secondary roads 1506 and 1516, 150 feet northwest of secondary road 1516 (257,000N; 2,029,000E):

A1—0 to 8 inches; black (10YR 2/1) loam; weak coarse granular structure; very friable; many fine and medium roots; very strongly acid; clear wavy boundary.

A2—8 to 27 inches; black (10YR 2/1) loam; weak medium granular structure; very friable; common fine and medium roots; very strongly acid; gradual wavy boundary.

AC—27 to 40 inches; very dark grayish brown (10YR 3/2) sandy loam; massive; very friable; few fine roots; very strongly acid; gradual wavy boundary.

Cg1—40 to 50 inches; dark grayish brown (10YR 4/2) loamy sand; single grained; loose; very strongly acid; gradual wavy boundary.

Cg2—50 to 62 inches; dark grayish brown (10YR 4/2) sandy loam; massive; friable; few pockets of sand; very strongly acid.

Reaction is very strongly acid or strongly acid except where lime has been added.

The A horizon has hue of 10YR to 5Y, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. This horizon is 24 to 48 inches thick.

The Cg horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 1 or 2; or it is neutral and has value of 4 or 5. In some pedons the lower part of the Cg horizon has value of 6. The texture is loamy sand, loamy fine sand, fine sandy loam, or sandy loam. In some pedons, the lower part of the Cg horizon is stratified and the texture ranges from sandy clay loam to sand.

Kureb Series

The Kureb series consists of excessively drained soils that formed in marine, aeolian, or fluvial sand. These soils are on uplands and stream terraces. Slope ranges from 1 to 8 percent.

Typical pedon of Kureb sand, 1 to 8 percent slopes; 2.4 miles south of Boardman on secondary road 1506, 0.8 mile west of the road, in a wooded area (238,500N; 2,010,000E):

A—0 to 5 inches; gray (10YR 6/1) sand; single grained; loose; common fine and medium roots; many clean sand grains; very strongly acid; clear wavy boundary.

E—5 to 20 inches; light gray (10YR 7/1) sand; single grained; loose; few fine roots; very strongly acid; clear irregular boundary.

C/Bh—20 to 32 inches; yellowish brown (10YR 5/8) sand (C part); single grained; loose; common medium lumps and streaks of dark reddish brown (5YR 3/2) organically coated sand grains (Bh part); few tongues of light gray (10YR 7/1) sand from horizon above; many clean and coated sand grains; few fine roots; very strongly acid; gradual irregular boundary.

C—32 to 80 inches; yellow (10YR 7/6) sand; single grained; loose; very strongly acid.

The solum is 30 to 60 inches thick. Reaction is very strongly acid to neutral except where lime has been added to the soil.

The A horizon has hue of 10YR, value of 3 to 7, and chroma of 1 or 2. The E horizon has hue or 10YR, value of 7 or 8, and chroma of 1 or 2.

The C part of the C/Bh horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. The Bh part of the C/Bh horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. The texture of the C/Bh horizon is sand or fine sand.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 8. The texture is sand or fine sand.

Leon Series

The Leon series consists of poorly drained soils that formed in sandy marine sediment. These soils are on uplands and stream terraces. Slope ranges from 1 to 4 percent.

Typical pedon of Leon sand, 1 to 4 percent slopes; 1.5 miles south of Fair Bluff on U.S. Highway 76, 525 feet east along a power line right-of-way, in a wooded area (193,500N; 1,988,500E):

A—0 to 6 inches; black (10YR 2/1) sand; single grained; loose; many fine and medium roots; many clean sand grains; extremely acid; clear smooth boundary.

E—6 to 11 inches; light brownish gray (10YR 6/2) sand; single grained; loose; common medium and fine roots; extremely acid; gradual wavy boundary.

Bh1—11 to 19 inches; dark reddish brown (5YR 2/2) sand; massive; friable; weakly cemented; extremely acid; gradual wavy boundary.

Bh2—19 to 25 inches; dark brown (7.5YR 3/2) sand; massive; friable; weakly cemented; extremely acid; gradual wavy boundary.

BE—25 to 30 inches; brown (7.5YR 4/2) sand; common medium faint brown (7.5YR 5/2) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

B'h1—30 to 45 inches; dark brown (7.5YR 3/2) sand; massive; very friable; few uncoated sand grains; extremely acid; gradual wavy boundary.

B'h2—45 to 58 inches; dark reddish brown (5YR 2/2) sand; massive; very friable; extremely acid; gradual wavy boundary.

B'h3—58 to 80 inches; dark brown (7.5YR 3/2) sand; common medium distinct yellowish brown (10YR 5/4) mottles; massive; very friable; extremely acid.

The solum is 40 to at least 70 inches thick. The texture is sand or fine sand. 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 2 to 4, and chroma of 1; or it is neutral and has value of 2 to 4. When dry, this horizon has a salt-and-pepper appearance because of the mixture of organic matter and white sand grains. The E horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2; or it is neutral and has value of 5 to 8.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. The BE horizon has hue of 10YR or 7.5YR, value of 3 to 5, chroma of 2 to 4. Some pedons have an E' horizon that has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2.

The B'h horizon is similar in color to the Bh horizon.

Lumbee Series

The Lumbee series consists of poorly drained soils that formed in loamy sediment underlain by sandy deposits. These soils are on stream terraces. Slope ranges from 0 to 2 percent.

Lumbee soils in Columbus County are taxadjuncts to the series because in most places they have slightly less than 18 percent clay in the Btg horizon. This is outside the range defined for the series, but does not significantly affect the use or behavior of the soil.

Typical pedon of Lumbee fine sandy loam; 1 mile north of the Waccamaw River Bridge on North Carolina Highway 130, 0.6 mile west on a logging road, 50 feet north of the road, in a wooded area (129,000N; 2,131,000E):

A—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; friable; common fine roots; very strongly acid; abrupt smooth boundary.

Eg—6 to 11 inches; light brownish gray (10YR 6/2) fine

sandy loam; few fine distinct brownish yellow (10YR 6/6) mottles and few fine prominent reddish brown (5YR 4/4) mottles; moderate medium granular structure; friable; few fine roots; very strongly acid; clear wavy boundary.

Btg—11 to 27 inches; gray (10YR 5/1) fine sandy loam; common medium distinct strong brown (7.5YR 5/8) mottles and common medium prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—27 to 36 inches; light brownish gray (10YR 6/2) fine sandy loam; pockets of gray (10YR 6/1) fine sand; common medium distinct reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/6) mottles and few fine prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

2Cg—36 to 72 inches; light gray (10YR 7/2) fine sand; common medium distinct grayish brown (10YR 5/2) mottles; single grained; loose; very strongly acid.

The solum is 20 to 40 inches thick. Reaction is very strongly acid or strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 to 3; or it is neutral and has value of 2 to 5. The Eg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The texture is loam, sandy loam, fine sandy loam, sandy clay loam, or clay loam. The BCg horizon is similar in color to the Btg horizon. The texture is fine sandy loam, sandy loam, or loamy sand. Some pedon do not have a BCg horizon.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 or 2. The texture is sand, fine sand, loamy coarse sand, or loamy sand. Some pedons have thin lenses of sandy loam, loam, or clay loam below a depth of 40 inches.

Lynchburg Series

The Lynchburg series consists of somewhat poorly drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Lynchburg fine sandy loam; 1.8 miles south of Cherry Grove on North Carolina Highway 904, 150 feet east of North Carolina Highway 904, in a wooded area (170,000N; 2,011,500E):

A—0 to 8 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; extremely acid; clear smooth boundary.

Bt—8 to 21 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine, medium, and coarse roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg1—21 to 30 inches; gray (10YR 6/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles and common medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—30 to 50 inches; light gray (10YR 7/1) sandy clay loam; few fine distinct brownish yellow (10YR 6/8) mottles and few fine prominent strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—50 to 65 inches; light gray (10YR 7/1) sandy clay loam; many coarse distinct brownish yellow (10YR 6/6) mottles and common medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—65 to 80 inches; light gray (10YR 7/1) sandy clay; pockets of sandy loam; many coarse distinct brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; 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 2.5Y, value of 2 to 4, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. In some pedons, it is mottled in shades of red, brown, or yellow. The Btg and BCg horizons have hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. The texture of the Bt, Btg, and BCg horizons is sandy clay loam, clay loam, sandy loam, or fine sandy loam.

Meggett Series

The Meggett series consists of poorly drained soils that formed in loamy and clayey alluvial sediments underlain by marly material. These soils are on flood plains and low stream terraces. Slope is less than 2 percent.

Typical pedon of Meggett fine sandy loam, frequently flooded; 2.4 miles southeast of Bolton, 0.9 mile southeast on secondary road 1806 from the intersection with U.S. Highway 74-76, 0.3 mile south of secondary road 1806 on a farm road, 50 feet west of the road, in a wooded area (204,000N; 2,190,000E):

A—0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine roots; strongly acid; abrupt wavy boundary.

Btg1—5 to 16 inches; grayish brown (10YR 5/2) sandy clay; common medium prominent strong brown (7.5YR 5/8) mottles and few fine distinct white (10YR 8/1) mottles; weak medium subangular blocky structure; firm; few fine roots; few faint clay skins on faces of peds; slightly acid; gradual wavy boundary.

Btg2—16 to 32 inches; gray (5Y 5/1) clay; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; common faint clay skins on faces of peds; slightly acid; gradual wavy boundary.

Btg3—32 to 45 inches; gray (10YR 5/1) sandy clay; common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; firm; common faint clay skins on faces of peds; neutral; gradual wavy boundary.

BCg—45 to 72 inches; light gray (10YR 6/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; moderately alkaline.

The solum is 40 to at least 80 inches thick. Reaction is very strongly acid to slightly acid in the surface layer except where lime has been added. It is strongly acid to moderately alkaline in the upper part of the subsoil and slightly acid to moderately alkaline in the lower part.

The A or Ap horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, and has few to many distinct higher chroma mottles. The texture is clay loam, sandy clay, or clay.

The BCg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. In some pedons, this horizon is mottled in shades of brown, yellow, red, and gray. The texture is sandy clay loam or sandy clay. Shell fragments range from none to common.

Muckalee Series

The Muckalee series consists of poorly drained soils that formed in loamy and sandy alluvial sediments. These soils are on flood plains. Slope is less than 2 percent.

Typical pedon of Muckalee sandy loam, frequently flooded; 4.1 miles north of Whiteville on U.S. Highway 701, 150 feet west of the road, in a wooded area (233,500N; 2,081,000E):

A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; strongly acid; gradual wavy boundary.

Cg1—8 to 18 inches; grayish brown (10YR 5/2) sandy loam; massive; very friable; few fine, medium, and coarse roots; moderately acid; gradual wavy boundary.

Cg2—18 to 28 inches; light gray (10YR 7/1) loamy sand; common medium distinct grayish brown (10YR 5/2) mottles; massive; very friable; few medium roots; moderately acid; gradual wavy boundary.

Cg3—28 to 33 inches; grayish brown (10YR 5/2) sandy loam; thin layers of fine sand and pockets of sandy clay loam; common fine prominent strong brown (7.5YR 5/8) mottles and few common distinct light yellowish brown (10YR 6/4) mottles; massive; friable; slightly acid; gradual wavy boundary.

Cg4—33 to 40 inches; light gray (10YR 7/1) loamy sand; single grained; loose; mildly alkaline; gradual wavy boundary.

Cg5—40 to 50 inches; dark grayish brown (10YR 4/2) loamy sand; single grained; loose; mildly alkaline; gradual wavy boundary.

Cg6—50 to 62 inches; dark grayish brown (10YR 4/2) loamy sand stratified with very dark gray (10YR 3/1) sandy loam and light brownish gray (10YR 6/2) sand; massive; very friable; mildly alkaline.

The A horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. Reaction is strongly acid to neutral.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. The texture is loamy sand or sandy loam. Strata of sand, sandy clay loam, or clay

loam are in some pedons. The 10- to 40-inch control section averages 10 to 18 percent clay. Reaction is moderately acid to moderately alkaline.

Murville Series

The Murville series consists of very poorly drained soils that formed in sandy marine sediment. These soils are on low flats and in Carolina bays. Slope ranges from 0 to 2 percent.

Typical pedon of Murville fine sand; 1.3 miles southwest of Nakina, 0.2 mile south of the intersection of secondary roads 1113 and 1116, 300 feet west of secondary road 1113 (135,500N; 2,094,000E):

Oi—3 to 0 inches; partly decomposed leaves, moss, and twigs.

A1—0 to 4 inches; black (N 2/0) fine sand; weak medium granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

A2—4 to 7 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

Bh1—7 to 14 inches; black (5YR 2/1) fine sand; massive; friable; weakly cemented; coatings of organic matter on sand grains; few fine roots; extremely acid; gradual wavy boundary.

Bh2—14 to 40 inches; dark reddish brown (5YR 2/2) fine sand; massive; friable; weakly cemented; coatings of organic matter on sand grains; extremely acid; gradual wavy boundary.

Cg1—40 to 60 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; extremely acid; gradual wavy boundary.

Cg2—60 to 70 inches; light gray (10YR 7/1) fine sand; single grained; loose; extremely acid.

The solum is 30 to 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 7.5YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2.

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The texture is sand or fine sand.

The C horizon has hue of 10YR, value of 5 to 8, and chroma of 1 to 3. The texture is dominantly fine sand or sand, but lenses or layers of loamy material can occur at a depth of 50 to 70 inches.

Nahunta Series

The Nahunta series consists of somewhat poorly drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Nahunta very fine sandy loam; 3.1 miles east of Bug Hill on secondary road 1943, 90 feet south of the road, in a field (103,500N; 2,122,500E):

Ap—0 to 8 inches; very dark gray (10YR 3/1) very fine sandy loam; weak medium granular structure; very friable; common fine roots; moderately acid; abrupt smooth boundary.

BE—8 to 13 inches; light yellowish brown (2.5Y 6/4) loam; common medium distinct brownish yellow (10YR 6/6) mottles and few fine prominent reddish yellow (7.5YR 6/6) mottles; weak medium granular structure; very friable; common fine roots; strongly acid; gradual wavy boundary.

Bt—13 to 20 inches; light yellowish brown (2.5Y 6/4) clay loam; many coarse distinct light gray (10YR 7/2) and brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg1—20 to 35 inches; light brownish gray (2.5Y 6/2) clay loam; common medium prominent yellowish brown (10YR 5/8) and red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—35 to 55 inches; gray (10YR 6/1) clay loam; common medium prominent red (2.5YR 4/8) and reddish yellow (7.5YR 6/8) mottles and common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—55 to 72 inches; gray (10YR 6/1) clay loam; common medium prominent strong brown (7.5YR 5/8) mottles and few fine distinct light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable; pockets of loam; very strongly acid; gradual wavy boundary.

The solum is 60 to at least 80 inches thick. Reaction is very strongly acid or 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 5, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. The texture is silty clay

loam, clay loam, or loam. The upper 20 inches of this horizon has more than 30 percent silt. The Btg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2; or it is neutral and has value of 6 or 7. The texture is similar to that of the Bt horizon.

Some pedons have a Cg horizon that has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The texture is clay or clay loam.

Nakina Series

The Nakina series consists of very poorly drained soils that formed in loamy marine sediment and soft marl. These soils are on uplands and terraces and in shallow drainageways. Slope is less than 2 percent.

Typical pedon of Nakina fine sandy loam; 3.5 miles north of Nakina, 1.7 miles south of the intersection of secondary road 1925 and Cattail Bay Farm road, 100 feet west of farm road, in a field (151,500N; 2,103,500E):

Ap—0 to 14 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable; common fine roots; slightly acid; clear wavy boundary.

BAg—14 to 19 inches; dark grayish brown (10YR 4/2) fine sandy loam; common medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; few fine and very fine roots; very strongly acid; gradual wavy boundary.

Btg1—19 to 33 inches; very dark gray (10YR 3/1) fine sandy loam; thin bands of loamy sand; few fine prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—33 to 39 inches; dark grayish brown (10YR 4/2) sandy clay loam; common medium faint grayish brown (10YR 5/2) mottles and few fine prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; neutral; gradual wavy boundary.

BCg—39 to 49 inches; dark gray (10YR 4/1) sandy loam; thin lenses of loamy sand; few fine prominent strong brown (7.5YR 5/8) mottles and few medium distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; neutral; gradual wavy boundary.

2Cg—49 to 70 inches; greenish gray (5GY 5/1) sand; thin bands of sandy loam; single grained; loose; moderately alkaline; gradual wavy boundary.

3Cg—70 to 80 inches; grayish green (5G 5/2) sandy clay loam; massive; friable; moderately alkaline.

The solum is 40 to at least 60 inches thick. Reaction is strongly acid to slightly acid in the A horizon except where lime has been added to the soil. It is very strongly acid to moderately alkaline in the B horizon and strongly acid to moderately alkaline in the C horizon.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The texture is sand, loamy sand, or fine sandy loam.

The BAg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The texture is sandy loam, fine sandy loam, or sandy clay loam. Some pedons do not have a BAg horizon.

The Btg horizon has hue of 10YR, value of 3 to 6, and chroma of 1 or 2. Mottles in shades of brown or yellow are in some pedons. The texture is sandy loam, fine sandy loam, or sandy clay loam. The BCg horizon is similar in color to the Btg horizon. The texture is sandy loam, fine sandy loam, sandy clay loam, or clay loam. Some pedons do not have a BCg horizon.

The Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5G, value of 4 to 7, and chroma of 1 or 2. The texture is dominantly sand or loamy sand but includes stratified sand to clay. In some pedons, the Cg horizon is greenish gray marl.

Norfolk Series

The Norfolk series consists of well drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 6 percent.

Typical pedon of Norfolk loamy fine sand, 0 to 2 percent slopes; 6 miles northwest of Whiteville, 530 feet north of the intersection of secondary roads 1005 and 1002, 120 feet west of secondary road 1005 (237,000N; 2,070,000E):

Ap—0 to 9 inches; brown (10YR 5/3) loamy fine sand; weak medium granular structure; very friable; common fine and medium roots; slightly acid; gradual wavy boundary.

BA—9 to 12 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; very friable; few medium and fine roots; strongly acid; clear wavy boundary.

Bt1—12 to 28 inches; yellowish brown (10YR 5/8)

sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—28 to 48 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent red (2.5YR 5/8) mottles, common medium distinct brownish yellow (10YR 6/6) mottles, and few fine distinct very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—48 to 62 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles, few fine distinct light gray (10YR 6/1) mottles, and common medium prominent red (2.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BC—62 to 76 inches; reddish yellow (7.5YR 6/8) sandy clay loam; common medium distinct light gray (10YR 7/2) mottles and common medium prominent red (2.5YR 5/8) mottles; weak medium subangular blocky structure; friable; very strongly acid.

The solum is 60 to at least 80 inches thick. Reaction is strongly acid or very 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 4 to 7, and chroma of 1 to 4. Some pedons have an E horizon that has hue of 10YR, value of 5 to 7, and chroma of 3 or 4; or it has hue of 2.5Y, value of 6, and chroma of 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. The texture is sandy clay loam, sandy loam, or clay loam.

Some pedons have a C horizon that commonly is mottled in shades of red, brown, yellow, and gray. The texture is variable, ranging from sand to clay.

Pantego Series

The Pantego series consists of very poorly drained soils that formed in loamy marine sediment. These soils are on uplands. Slope is less than 2 percent.

Typical pedon of Pantego fine sandy loam; 6 miles south of Bolton on North Carolina Highway 211 to the intersection with secondary road 1842, 1 mile east on secondary road 1842, 40 feet north of the center of the road, in a wooded area (177,000N; 2,189,500E):

A1—0 to 6 inches; black (10YR 2/1) fine sandy loam; moderate fine granular structure; friable; common fine and medium roots; common uncoated sand grains; extremely acid; clear wavy boundary.

A2—6 to 20 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; friable; common fine and medium roots; very strongly acid; gradual wavy boundary.

Btg1—20 to 40 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct brown (7.5YR 4/4) mottles and few fine distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; few faint clay skins on faces of peds; extremely acid; gradual wavy boundary.

Btg2—40 to 57 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; very friable; few fine and medium roots; few faint clay skins on faces of peds; extremely acid; gradual wavy boundary.

Btg3—57 to 80 inches; grayish brown (10YR 5/2) sandy loam; pockets of sandy clay loam; many coarse prominent yellow (10YR 7/6), strong brown (7.5YR 5/8), and dark red (2.5YR 3/6) mottles; weak medium subangular blocky structure; very friable; extremely 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 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is sandy clay loam, sandy loam, or clay loam. In some pedons, it is sandy loam that has pockets of sandy clay loam.

Some pedons have a Cg horizon that has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, and has mottles of higher chroma. The texture is sandy clay loam, sandy loam, loamy sand, or sand.

Pender Series

The Pender series consists of moderately well drained to somewhat poorly drained soils that formed in loamy marine sediment underlain by marly material. These soils are on uplands and terraces. Slope ranges from 0 to 3 percent.

Pender soils in Columbus County are taxadjuncts to the series because they do not typically have an abrupt texture change from the E horizon to the Bt horizon.

Typical pedon of Pender fine sandy loam; 0.6 mile North of Wananish on secondary road 1740, 50 feet east of the road, in a wooded area (212,000N; 2,152,500E):

A—0 to 5 inches; dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; very strongly acid; clear wavy boundary.

E—5 to 12 inches; very pale brown (10YR 7/4) fine sandy loam; weak medium granular structure; very friable; very strongly acid; clear wavy boundary.

BE—12 to 15 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Bt1—15 to 20 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—20 to 35 inches; mottled strong brown (7.5YR 5/8), light brownish gray (10YR 6/2), and red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; moderately acid; gradual wavy boundary.

Bt3—35 to 52 inches; mottled strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and light gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; moderately acid; gradual wavy boundary.

BC—52 to 58 inches; mottled strong brown (7.5YR 5/8), light gray (10YR 7/1), and dark red (10R 3/6) sandy clay loam; pockets of sandy loam; weak medium subangular blocky structure; friable; moderately acid; gradual wavy boundary.

Cg—58 to 72 inches; light gray (10YR 7/1) sandy clay; pockets of sandy loam; few fine prominent red (2.5YR 4/8) mottles, common medium prominent strong brown (7.5YR 5/8) mottles, and common medium distinct yellow (10YR 7/6) mottles; massive; firm; moderately acid.

The solum is 40 to at least 70 inches thick. Reaction is very strongly acid to slightly acid in the A horizon and upper part of the B horizon except where lime has been added to the soil. It is moderately acid to mildly alkaline in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 3. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. The texture is loamy sand, loamy fine sand, sandy loam, or fine sandy loam. Some pedons do not have an E horizon.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. The lower part has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8; or it is mottled. The texture is sandy clay loam or clay loam. Silt content in the control section is less than 30 percent.

The Cg horizon is stratified sandy, loamy, or clayey sediment. In some pedons it is light colored marl that is stratified with clay and sandy clay.

Rains Series

The Rains series consists of poorly drained soils that formed in loamy and clayey marine sediment. These soils are on uplands. Slope is less than 2 percent.

Typical pedon of Rains fine sandy loam; 1.5 miles northwest of Chadbourn, 0.5 mile northwest on secondary road 1574 from the intersection of secondary road 1528, 30 feet east of the road, under a power line (221,500N; 2,045,500E):

A—0 to 7 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

BEg—7 to 17 inches; light brownish gray (10YR 6/2) sandy loam; moderate medium subangular blocky structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

Btg1—17 to 27 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) mottles and few medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg2—27 to 38 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) mottles and common medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Btg3—38 to 62 inches; gray (10YR 6/1) sandy clay loam; many coarse prominent yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly

plastic; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

BCg—62 to 75 inches; light gray (10YR 7/1) sandy clay; pockets of sandy loam; common medium prominent strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; very 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 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 or 2.5Y, value of 4 to 6, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is sandy clay loam or clay loam.

Some pedons have a Cg horizon that has hue of 10YR, value of 5 to 7, and chroma of 1. The texture is variable, ranging from loamy sand to sandy clay.

Stallings Series

The Stallings series consists of somewhat poorly drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 2 percent.

Typical pedon of Stallings sandy loam; 5.5 miles northwest of Clarendon in Big Bay, 2.5 miles north of the intersection of secondary road 1314 and Boulevard Road, 1,000 feet west of Boulevard Road (176,000N; 2,030,700E):

A—0 to 7 inches; very dark gray (10YR 3/1) sandy loam; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

BE—7 to 12 inches; pale brown (10YR 6/3) sandy loam; few fine distinct yellowish brown (10YR 5/8) mottles and few medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; very friable; common fine and medium roots; very strongly acid; clear wavy boundary.

Bt—12 to 23 inches; pale brown (10YR 6/3) sandy loam; few medium distinct yellowish brown (10YR 5/8) mottles and common medium faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few clay bridges between coated sand grains; few fine and medium roots; very strongly acid; gradual wavy boundary.

Btg1—23 to 35 inches; light brownish gray (10YR 6/2) sandy loam; few medium prominent strong brown (7.5YR 5/8) mottles and few fine prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few clay bridges between coated sand grains; few white (10YR 8/1) skeletons; very strongly acid; gradual wavy boundary.

Btg2—35 to 45 inches; light brownish gray (10YR 6/2) sandy loam; common medium prominent red (2.5YR 4/8) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay bridges between coated sand grains; few white (10YR 8/1) skeletons; very strongly acid; gradual wavy boundary.

BC—45 to 75 inches; mottled brownish yellow (10YR 6/8), strong brown (7.5YR 5/8), and gray (10YR 6/1) sandy loam; pockets of sandy clay loam; weak medium subangular blocky structure; friable; 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 to 5Y, value of 3 to 6, and chroma of 1 to 3; or it is neutral and has value of 3 to 6. Some pedons have an E horizon that has hue of 10YR to 5Y, value of 5 to 8, and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2; or it is neutral and has value of 5 to 7. The Bt and Btg horizons are sandy loam or fine sandy loam.

The BC horizon is similar in color to the Bt horizon. The texture is sandy loam, loamy sand, or loamy fine sand. Pockets of heavier textured material are in many pedons.

Torhunta Series

The Torhunta series consists of very poorly drained soils that formed in loamy and sandy marine or fluvial sediments. These soils are on uplands and stream terraces. Slope is less than 2 percent.

Typical pedon of Torhunta fine sandy loam; 0.8 mile northwest of Evergreen on secondary road 1513, 800 feet northwest of the road, in a wooded area (244,000N; 2,027,000E):

A1—0 to 11 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; friable; many fine roots; extremely acid; clear wavy boundary.

A2—11 to 15 inches; very dark gray (10YR 3/1) loamy sand; weak medium granular structure; very friable; many fine roots; extremely acid; gradual wavy boundary.

Bg—15 to 36 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium subangular blocky structure; friable; many fine roots; few faint coatings on sand grains; extremely acid; gradual wavy boundary.

BCg—36 to 45 inches; dark grayish brown (10YR 4/2) loamy sand; weak medium granular structure; very friable; few fine and medium roots; extremely acid; gradual wavy boundary.

Cg—45 to 60 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; extremely acid.

The solum is 20 to 50 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 2.5Y, value of 2 or 3, and chroma of 1 or 2; or it is neutral and has value of 2 or 3.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 4 to 6. The texture is sandy loam or fine sandy loam.

The Cg horizon has the same range in colors as that of the Bg horizon. The texture is sand, loamy sand, loamy fine sand, or sandy loam.

Wagram Series

The Wagram series consists of well drained soils that formed in loamy marine sediment. These soils are on uplands. Slope ranges from 0 to 6 percent.

Typical pedon of Wagram loamy fine sand, 0 to 6 percent slopes; 1.6 miles northeast of Tabor City, 1.1 miles north of the intersection of U.S. Highway 701 and secondary road 1308, 0.5 mile southwest on a farm road, 30 feet east of the farm road (154,500N; 2,043,000E):

Ap—0 to 7 inches; brown (10YR 5/3) loamy fine sand; weak medium granular structure; very friable; moderately acid; abrupt smooth boundary.

E—7 to 23 inches; very pale brown (10YR 7/4) loamy fine sand; weak medium granular structure; very friable; strongly acid; clear smooth boundary.

Bt1—23 to 38 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; very friable; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt2—38 to 50 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium prominent red (10R 4/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay skins on faces of peds; strongly acid; gradual wavy boundary.

Bt3—50 to 62 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent red (2.5YR 5/8) mottles and few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid; gradual wavy boundary.

Bt4—62 to 77 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay skins on faces of peds; very strongly acid.

The solum is 60 to at least 80 inches thick. Reaction is very strongly acid to moderately acid except where lime has been added to the soil.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4; or it is neutral and has value of 4 to 6. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. The texture is sandy clay loam or sandy loam.

Wakulla Series

The Wakulla series consists of somewhat excessively drained soils that formed in sandy marine or fluvial sediment. These soils are on uplands and stream terraces. Slope ranges from 0 to 6 percent.

Typical pedon of Wakulla coarse sand, 0 to 6 percent slopes; 3.2 miles west-northwest of Williamson Crossroads, 0.3 mile north of Macedonia Church, 15 feet west of secondary road 1506, in a wooded area (233,000N; 2,013,000E):

A—0 to 6 inches; dark grayish brown (10YR 4/2) coarse sand; single grained; loose; many fine and common medium roots; strongly acid; abrupt smooth boundary.

E—6 to 30 inches; brownish yellow (10YR 6/6) coarse sand; single grained; loose; few medium and common fine roots; very strongly acid; clear wavy boundary.

Bt—30 to 43 inches; strong brown (7.5YR 5/6) loamy coarse sand; weak medium granular structure; very

friable; few fine roots; few faint clay bridges between coated sand grains; very strongly acid; gradual wavy boundary.

C1—43 to 54 inches; brownish yellow (10YR 6/8) coarse sand; common medium distinct yellowish red (5YR 5/8) mottles; single grained; loose; very strongly acid; gradual wavy boundary.

C2—54 to 90 inches; very pale brown (10YR 7/4) coarse sand; single grained; loose; very strongly acid; gradual wavy boundary.

The solum is 28 to 60 inches thick. Reaction is very strongly acid to moderately 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 2 to 4. The E horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 4 to 8.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8. The texture is loamy coarse sand, loamy sand, or loamy fine sand. Content of silt plus clay is 10 to 20 percent.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 to 8. The texture is sand, fine sand, or coarse sand.

Wilbanks Series

The Wilbanks series consists of very poorly drained soils that formed in clayey and loamy alluvial sediments and organic material. These soils are on flood plains. Slope is less than 2 percent.

Wilbanks soils in Columbus County are taxadjuncts to the series because they have an organic layer above the C horizon in most places.

Typical pedon of Wilbanks silt loam, frequently flooded; 250 feet west of the Lake Waccamaw dam, in a wooded area (158,000N; 2,119,000E):

A1—0 to 18 inches; dark gray (10YR 4/1) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

A2—18 to 45 inches; black (10YR 2/1) silty clay; weak medium subangular blocky structure; firm; common fine and medium roots; strongly acid; gradual wavy boundary.

2Oa—45 to 65 inches; very dusky red (2.5YR 2/2) muck; about 15 percent fiber, about 2 percent rubbed; massive; very friable; extremely acid; clear wavy boundary.

3Cg—65 to 80 inches; dark gray (10YR 4/1) clay; massive; firm; strongly acid.

Reaction is strongly acid to extremely acid in the A and Oa horizons except where lime has been added to the soil. It is very strongly acid to neutral in the C horizon.

The A1 or Ap horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2.

The A2, A3, and A4 horizons have hue of 10YR, 2.5Y, or 5Y, value of 2 or 3, and chroma of 1 or 2; or they are neutral and have value of 2 or 3. The texture is clay loam, silty clay, or clay. Some pedons do not have an A2, A3, or A4 horizon.

Some pedons have an AC horizon that has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. Mottles are in shades of gray or brown. The texture is loamy sand, loamy fine sand, or sandy loam in addition to the named textures for the umbric epipedon.

The 2Oa horizon has hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is 10 to 20 inches thick. Some pedons do not have a 2Oa horizon.

The 3C horizon is stratified grayish or brownish sand, loamy sand, sandy loam, loam, sandy clay loam, clay loam, silty clay loam, silty clay, sandy clay, or clay. Buried A horizons are common. Some pedons have marl deposits 5 to 8 feet below the surface.

Formation of the Soils

Factors that contribute to differences among soils are plant and animal life, climate, relief, time, and parent material. The characteristics of a soil at any given place depend upon these five factors and the resulting soil forming processes. The relative importance of each factor differs from place to place. In many places, one or two factors dominate the formation of a soil and determine most of its properties.

Plant and Animal Life

The plants and animals that live on and in the soil strongly influence the development of the soil. They determine the kind of organic matter and how it is incorporated into the soil. They transfer nutrient elements and soil particles from one horizon to another. Plants and animals affect the addition and removal of organic matter, nitrogen, and other plant nutrients and also influence the soil structure, porosity, and other characteristics.

Climate

Climate, chiefly precipitation and temperature, affects the physical, chemical, and biological relationships in the soil. Temperature and precipitation influence the rate at which parent material weathers and organic matter decomposes. The amount of leaching in a soil is also related to the amount of precipitation that falls and its movement through the soil. Temperature influences the kind and growth of organisms and the speed of chemical and physical reactions in the soil.

The effects of climate are reflected in the soils of Columbus County. Mild temperatures throughout the year and abundant rainfall have resulted in depletion of organic matter and considerable leaching of soluble bases from most soils. As a result, the soils of the county are mostly acid in reaction, are strongly leached, and are low in natural fertility.

Relief

In Columbus County, the relief generally results from the dissection of about two-thirds of the original, nearly level plains by the Lumber, Waccamaw, and the Cape Fear Rivers and their tributaries. The degree of dissection of the landscape affects the formation of the soils by influencing the depth to the water table and by affecting the rate of the natural erosion of soil material.

Aycock and Norfolk soils are on short, sharply rounded side slopes. These soils typically have a deep water table, a light colored A horizon, a thick E horizon, and a bright colored B horizon.

Lynchburg and Rains soils are on broad, nearly level parts of interstream areas. These soils typically have a shallow water table, a dark colored A horizon, a thin E horizon or no E horizon, and a gray B horizon.

Croatan and Dorovan soils are the major soils on flat parts of undissected, broad interstream areas. These soils typically have a high water table for long periods. In these flat areas, the rainfall exceeds evapotranspiration, subsurface drainage, and the slow flow of water over land. The resulting surface ponding creates an accumulation of organic matter.

Time

The length of time that soil material has been exposed to the soil forming processes accounts for some differences in soils. The length of time required for a well defined soil profile to develop depends upon the combined effect and intensity of the other factors of soil formation.

The oldest soils in Columbus County, such as Norfolk, Wagram, Lynchburg, and Rains soils, are on the smooth, nearly level upland divides. They have thick, well developed horizons. These soils formed in coastal plain material that has been in place for millions of years. By contrast, the youngest soils, which include Muckalee and Johnston soils, are on flood plains. They formed in alluvial material that has not been in place long enough for well defined horizons to develop.

Parent Material

The general types of parent material in Columbus County are unconsolidated marine deposits, more

recently deposited alluvium in drainageways and on terraces, and organic material that has accumulated on the broad interstream divides.

Many of the differences among the soils of Columbus County reflect the varying geologic materials from which the soils formed. These materials differ in mineral, chemical, and particle-size composition. Norfolk, Goldsboro, Lynchburg, and Rains soils formed in sediment that has a low percentage of silt and very fine sand. Autryville, Blanton, Butters, Stallings, and Wagram soils formed in sediment that has a high sand content. Bethera, Brookman, Craven, Gritney, Meggett, and Wilbanks soils formed in sediment that has a high percentage of clay and silt. Aycock, Exum, Nahunta, and Grantham soils formed in sediment that has a high percentage of silt and very fine sand. Meggett, Grifton, Muckalee, Pender, and Nakina soils formed in sediment that has a high content of calcium carbonate and a low percentage of silt. Croatan and Dorovan soils formed in organic material.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Carolina bay. A shallow, oval-shaped depression that does not have a natural drainage outlet. Such bays are oriented in a northwest-southeast direction and range from 5 to 500 acres or more. Most Carolina bays contain water unless they have been drained.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

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.

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.

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.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

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 generally are 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 generally are 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 generally are 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.

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.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

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.

Interstream area. The nearly level land between drainageways in relatively undissected parts of Coastal Plain uplands, low marine terraces, and stream terraces where the soils are dominantly poorly drained or very poorly drained.

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.

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.

Loamy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2 millimeters 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.

Low strength. The soil is not strong enough to support loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

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.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely 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

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

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.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

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.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

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
Moderately 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.

Sandy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2 millimeters 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.

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.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed 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.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-81 at Whiteville, 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----	55.0	31.9	43.5	78	12	76	3.76	2.25	5.11	7	0.4
February---	58.5	33.6	46.1	79	14	79	3.81	2.11	5.30	6	1.2
March------	66.1	40.7	53.4	84	22	190	4.58	2.93	6.07	7	.7
April------	76.1	48.6	62.4	91	30	372	3.06	1.20	4.61	5	.0
May--------	81.8	56.9	69.4	93	39	601	4.57	3.05	5.94	8	.0
June-------	86.8	64.0	75.4	98	48	762	5.57	3.19	7.68	8	.0
July-------	89.3	68.0	78.7	97	56	890	5.84	3.35	8.05	10	.0
August-----	88.8	67.4	78.1	98	55	871	4.97	2.46	7.14	8	.0
September--	84.2	61.9	73.1	94	45	693	4.72	2.51	6.66	7	.0
October----	75.2	49.6	62.4	89	27	388	2.98	1.12	4.53	5	.0
November---	66.7	40.5	53.6	83	20	150	2.81	1.24	4.14	4	.0
December---	57.9	33.9	45.9	77	14	78	3.16	1.64	4.48	7	.5
Yearly:											
Average--	73.9	49.8	61.8	---	---	---	---	---	---	---	---
Extreme--	---	---	---	98	9	---	---	---	---	---	---
Total----	---	---	---	---	---	5,150	49.83	44.16	55.91	82	2.8

* 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 1951-81 at Whiteville, 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 18	April 3	April 20
2 years in 10 later than--	March 9	March 28	April 13
5 years in 10 later than--	February 21	March 16	March 31
First freezing temperature in fall:			
1 year in 10 earlier than--	November 6	October 26	October 15
2 years in 10 earlier than--	November 12	November 1	October 20
5 years in 10 earlier than--	November 25	November 12	October 30

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-81 at Whiteville, 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	242	214	185
8 years in 10	254	223	195
5 years in 10	277	240	212
2 years in 10	299	258	230
1 year in 10	311	267	240

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AuB	Autryville sand, 0 to 3 percent slopes	12,078	2.0
AyB	Aycock very fine sandy loam, 1 to 4 percent slopes	1,823	0.3
Be	Bethera loam	1,733	0.3
BnB	Blanton sand, 0 to 6 percent slopes	2,204	0.4
Br	Brookman loam, frequently flooded	2,308	0.4
BuB	Butters loamy fine sand, 0 to 3 percent slopes	5,775	0.9
Ce	Centenary fine sand	1,244	0.2
Ch	Chastain and Chenneby soils, frequently flooded	1,316	0.2
Co	Coxville loam	4,369	0.7
CrB	Craven fine sandy loam, 1 to 4 percent slopes	2,277	0.4
Ct	Croatan muck	21,364	3.5
Do	Dorovan muck, frequently flooded	24,265	4.0
Ec	Echaw loamy sand	8,489	1.4
ExA	Exum very fine sandy loam, 0 to 2 percent slopes	2,558	0.4
Fo	Foreston loamy fine sand	22,615	3.7
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	34,762	5.7
Gr	Grantham very fine sandy loam	3,151	0.5
Gt	Grifton fine sandy loam	40,942	6.7
GyB	Gritney loamy fine sand, 2 to 7 percent slopes	1,193	0.2
Jo	Johns fine sandy loam	3,684	0.6
Js	Johnston loam, frequently flooded	28,104	4.6
KuB	Kureb sand, 1 to 8 percent slopes	576	0.1
LnB	Leon sand, 1 to 4 percent slopes	7,834	1.3
Lu	Lumbee fine sandy loam	3,561	0.6
Ly	Lynchburg fine sandy loam	55,843	9.2
Me	Meggett fine sandy loam, frequently flooded	31,949	5.2
Mk	Muckalee sandy loam, frequently flooded	25,565	4.2
Mu	Murville fine sand	10,188	1.7
Na	Nahunta very fine sandy loam	6,190	1.0
Nk	Nakina fine sandy loam	18,721	3.1
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes	20,807	3.4
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes	25,738	4.2
NuB	Norfolk-Urban land complex, 0 to 6 percent slopes	2,071	0.3
Pa	Pantego fine sandy loam	19,011	3.1
Pe	Pender fine sandy loam	18,024	3.0
Pu	Pender-Urban land complex	330	0.1
Ra	Rains fine sandy loam	59,028	9.7
Ru	Rains-Urban land complex	861	0.1
St	Stallings sandy loam	16,073	2.6
To	Torhunta fine sandy loam	26,463	4.3
Ud	Udorthents, loamy	1,000	0.2
Ut	Udults, steep	334	0.1
WaB	Wagram loamy fine sand, 0 to 6 percent slopes	15,563	2.5
WkB	Wakulla coarse sand, 0 to 6 percent slopes	2,583	0.4
Wn	Wilbanks silt loam, frequently flooded	6,035	1.0
	Water	9,280	1.5
	Total	609,882	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	Sweet potatoes	Peanuts	Wheat	Improved bermudagrass
		Bu	Bu	Lbs	Cwt	Lbs	Bu	AUM*
AuB---------- Autryville	IIs	75	25	2,200	195	3,000	---	9.0
AyB---------- Aycock	IIe	120	40	2,700	---	---	60	10.0
Be**---------- Bethera	VIw	---	---	---	---	---	---	---
BnB---------- Blanton	IIIs	60	25	2,000	185	2,200	---	8.0
Br**---------- Brookman	VIw	---	---	---	---	---	---	---
BuB---------- Butters	IIs	100	35	2,400	210	3,400	50	10.0
Ce---------- Centenary	IIIs	65	20	2,000	---	---	---	7.5
Ch:								
Chastain-------	VIw	---	---	---	---	---	---	---
Chenneby-------	IVw	---	---	---	---	---	---	---
Co**---------- Coxville	IVw	---	---	---	---	---	---	---
CrB---------- Craven	IIIe	105	40	2,500	---	2,800	50	---
Ct**---------- Croatan	VIIw	---	---	---	---	---	---	---
Do---------- Dorovan	VIIw	---	---	---	---	---	---	---
Ec---------- Echaw	IIIs	70	30	2,200	---	---	---	7.5
ExA---------- Exum	IIw	125	50	3,000	---	3,400	---	11.5
Fo---------- Foreston	IIw	130	35	2,700	---	3,400	55	10.0
GoA---------- Goldsboro	IIw	125	42	3,000	225	3,600	60	11.5
Gr**---------- Grantham	VIw	---	---	---	---	---	---	---
Gt**---------- Grifton	VIw	---	---	---	---	---	---	---
GyB---------- Gritney	IIIe	90	28	2,500	---	1,600	40	6.0

See footnotes 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	Sweet potatoes	Peanuts	Wheat	Improved bermudagrass
		Bu	Bu	Lbs	Cwt	Lbs	Bu	AUM*
Jo---------- Johns	IIw	120	45	2,700	---	---	50	---
Js**---------- Johnston	VIIw	---	---	---	---	---	---	---
KuB---------- Kureb	VIIs	---	---	---	---	---	---	---
LnB---------- Leon	IVw	50	---	---	---	---	---	---
Lu**---------- Lumbee	VIw	---	---	---	---	---	---	---
Ly---------- Lynchburg	IIw	115	45	2,800	---	---	50	11.0
Me**---------- Meggett	VIw	---	---	---	---	---	---	---
Mk---------- Muckalee	Vw	---	---	---	---	---	---	---
Mu---------- Murville	Vw	---	---	---	---	---	---	---
Na---------- Nahunta	IIw	120	45	2,800	---	2,800	---	---
Nk**---------- Nakina	VIw	---	---	---	---	---	---	12.0
NoA---------- Norfolk	I	110	40	3,000	235	4,000	60	10.5
NoB---------- Norfolk	IIe	100	35	2,900	235	3,700	55	10.0
NuB. Norfolk-Urban land								
Pa**---------- Pantego	VIw	---	---	---	---	---	---	---
Pe---------- Pender	IIw	125	45	2,800	---	---	55	---
Pu. Pender-Urban land								
Ra---------- Rains	IIIw	110	40	2,300	---	---	---	---
Ru. Rains-Urban land								

See footnotes 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	Sweet potatoes	Peanuts	Wheat	Improved bermudagrass
		Bu	Bu	Lbs	Cwt	Lbs	Bu	AUM*
St---------- Stallings	IIw	100	35	2,500	---	---	---	---
To**---------- Torhunta	VIw	---	---	---	---	---	---	---
Ud. Udorthents								
Ut. Udults								
WaB---------- Wagram	IIs	75	25	2,400	205	2,900	40	8.5
WkB---------- Wakulla	IIIs	45	20	1,700	---	---	---	6.0
Wn**---------- Wilbanks	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.

** Yields shown are for undrained conditions. See the map unit description for the drained land capabilities.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class1/	Trees to plant
AuB---------- Autryville	8S	Slight	Moderate	Moderate	Loblolly pine--------	78	8	Loblolly pine, longleaf pine.
					Longleaf pine--------	---	---	
					Southern red oak-----	---	---	
					Hickory----------	---	---	
					White oak----------	---	---	
					Post oak----------	---	---	
					Blackjack oak--------	---	---	
AyB---------- Aycock	8A	Slight	Slight	Slight	Loblolly pine--------	84	8	Loblolly pine.
					Longleaf pine--------	75	6	
					Southern red oak-----	80	4	
					White oak----------	---	---	
					Hickory----------	---	---	
Be---------- Bethera	8W	Slight	Moderate	Moderate	Sweetgum----------	95	8	Loblolly pine, 3/ hardwoods. 2/
					Water oak----------	---	---	
					Loblolly pine--------	---	---	
					Red maple----------	---	---	
BnB---------- Blanton	8S	Slight	Moderate	Moderate	Loblolly pine--------	80	8	Loblolly pine, longleaf pine.
					Longleaf pine--------	70	6	
					Blackjack oak--------	---	---	
					Turkey oak----------	---	---	
Br---------- Brookman	5W	Slight	Severe	Severe	Swamp tupelo---------	55	5	Baldcypress, hardwoods. 2/
					Baldcypress----------	---	---	
					Yellow poplar--------	---	---	
					Sweetgum----------	---	---	
					Blackgum----------	---	---	
					Water oak----------	---	---	
BuB---------- Butters	9A	Slight	Slight	Slight	Loblolly pine--------	86	9	Loblolly pine.
					Longleaf pine--------	76	6	
					Southern red oak-----	---	---	
					White oak----------	---	---	
Ce---------- Centenary	8S	Slight	Moderate	Moderate	Loblolly pine--------	85	8	Loblolly pine.
					Longleaf pine--------	72	6	
					Blackjack oak--------	---	---	
					Turkey oak----------	---	---	
					Post oak----------	---	---	
Ch:								
Chastain----------	8W	Slight	Severe	Severe	Sweetgum----------	95	8	Hardwoods. 2/
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Water oak----------	---	---	
Chenneby----------	9W	Slight	Moderate	Moderate	Loblolly pine--------	100	9	Loblolly pine, hardwoods. 2/
					Sweetgum----------	100	10	
					Water oak----------	100	7	
					Yellow poplar--------	110	9	
					American sycamore----	110	9	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class1/	Trees to plant
Co---------- Coxville	9W	Slight	Moderate	Moderate	Loblolly pine--------	90	9	Loblolly pine.
					Sweetgum----------	---	---	
					Blackgum----------	---	---	
					Water oak----------	---	---	
					Red maple----------	---	---	
CrB---------- Craven	8C	Slight	Moderate	Slight	Loblolly pine--------	81	8	Loblolly pine.
					Longleaf pine--------	67	5	
					Water oak----------	---	---	
					Sweetgum----------	---	---	
					White oak----------	---	---	
					Southern red oak-----	---	---	
					Red maple----------	---	---	
					Blackgum----------	---	---	
					Yellow poplar--------	---	---	
					Willow oak----------	---	---	
Ct---------- Croatan	2W	Slight	Severe	Severe	Pond pine----------	55	2	Loblolly pine. 3/
					Water tupelo---------	60	6	
					Baldcypress----------	---	---	
					Loblolly pine--------	70	6	
					Sweetgum----------	---	---	
					Swamp tupelo---------	---	---	
					Atlantic white cedar-	---	---	
Do---------- Dorovan	5W	Slight	Severe	Severe	Water tupelo---------	55	5	Baldcypress, hardwoods. 2/
					Sweetbay----------	---	---	
					Baldcypress----------	---	---	
					Redbay----------	---	---	
					Loblollybay----------	---	---	
					Pond pine----------	---	---	
					Sweetgum----------	---	---	
Ec---------- Echaw	5S	Slight	Slight	Moderate	Longleaf pine--------	68	5	Longleaf pine, loblolly pine.
					Loblolly pine--------	85	8	
					Turkey oak----------	---	---	
					Blackjack oak--------	---	---	
					Post oak----------	---	---	
ExA---------- Exum	8A	Slight	Slight	Slight	Loblolly pine--------	90	9	Loblolly pine, hardwoods. 2/
					Longleaf pine--------	77	7	
					Sweetgum----------	90	7	
					Yellow poplar--------	100	8	
					Southern red oak-----	---	---	
					White oak----------	---	---	
					Red maple----------	---	---	
Fo---------- Foreston	9A	Slight	Slight	Slight	Loblolly pine--------	90	9	Loblolly pine.
					Longleaf pine--------	75	6	
					Sweetgum----------	---	---	
					Water oak----------	---	---	
					Turkey oak----------	---	---	
					Blackjack oak--------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class1/	Trees to plant
GoA---------- Goldsboro	9A	Slight	Slight	Slight	Loblolly pine--------	90	9	Loblolly pine, hardwoods. 2/
					Longleaf pine--------	77	7	
					Sweetgum----------	90	7	
					Southern red oak-----	---	---	
					White oak----------	---	---	
					Water oak----------	---	---	
					Red maple----------	---	---	
Gr---------- Grantham	9W	Slight	Moderate	Moderate	Loblolly pine--------	86	9	Loblolly pine, 3/ hardwoods. 2/
					Sweetgum----------	---	---	
					Water oak----------	---	---	
					Red maple----------	---	---	
					Willow oak----------	---	---	
					Longleaf pine--------	---	---	
Gt---------- Grifton	9W	Slight	Moderate	Moderate	Loblolly pine--------	89	9	Loblolly pine, 3/ hardwoods. 2/
					Water tupelo---------	---	---	
					Willow oak----------	---	---	
					Red maple----------	---	---	
					Sweetgum----------	---	---	
					Longleaf pine--------	---	---	
					Swamp chestnut oak---	---	---	
GyB---------- Gritney	8A	Slight	Slight	Slight	Loblolly pine--------	85	8	Loblolly pine.
					Longleaf pine--------	65	5	
					Sweetgum----------	---	---	
					Yellow poplar--------	---	---	
					Red oak----------	---	---	
					White oak----------	---	---	
Jo---------- Johns	9A	Slight	Slight	Slight	Loblolly pine--------	86	9	Loblolly pine.
					Sweetgum----------	90	7	
					Longleaf pine--------	86	8	
					Southern red oak-----	---	---	
					Yellow poplar--------	---	---	
Js---------- Johnston	12W	Slight	Severe	Severe	Loblolly pine--------	106	12	Loblolly pine, 3/ hardwoods. 2/
					Water tupelo---------	---	---	
					Swamp tupelo---------	---	---	
					Water oak----------	---	---	
					Pond pine----------	---	---	
					Baldcypress----------	---	---	
					Yellow poplar--------	---	---	
KuB---------- Kureb	3S	Slight	Moderate	Severe	Longleaf pine--------	52	3	Longleaf pine.
					Southern red oak-----	---	---	
					Live oak----------	---	---	
					Blackgum----------	---	---	
					Hickory----------	---	---	
					Turkey oak----------	---	---	
LnB---------- Leon	5W	Slight	Moderate	Moderate	Longleaf pine--------	65	5	Longleaf pine.
					Loblolly pine--------	---	---	
					Turkey oak----------	---	---	
Lu---------- Lumbee	9W	Slight	Moderate	Moderate	Loblolly pine--------	94	9	Loblolly pine.
					Pond pine----------	---	---	
					Water tupelo---------	---	---	
					Sweetgum----------	---	---	
					Red maple----------	---	---	
					White oak----------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class1/	Trees to plant
Ly---------- Lynchburg	9W	Slight	Moderate	Slight	Loblolly pine--------	86	9	Loblolly pine.
					Yellow poplar--------	92	6	
					Sweetgum----------	90	7	
					Blackgum----------	---	---	
					Red maple----------	---	---	
					Willow oak----------	---	---	
					Water oak----------	---	---	
Me---------- Meggett	11W	Slight	Moderate	Severe	Loblolly pine--------	100	11	Loblolly pine. 3/
					Sweetgum----------	---	---	
					Willow oak----------	---	---	
					Green ash----------	---	---	
					Swamp tupelo---------	---	---	
					Blackgum----------	---	---	
					Red maple----------	---	---	
					Water oak----------	---	---	
					White oak----------	---	---	
					Swamp chestnut oak---	---	---	
Mk---------- Muckalee	7W	Slight	Moderate	Severe	Sweetgum----------	90	7	Hardwoods. 2/
					Loblolly pine--------	90	9	
					Slash pine----------	90	11	
					Water oak----------	90	6	
					Green ash----------	85	4	
					Eastern cottonwood---	100	9	
Mu---------- Murville	6W	Slight	Severe	Severe	Loblolly pine--------	70	6	Loblolly pine. 3/
					Pond pine----------	50	4	
Na---------- Nahunta	9W	Slight	Moderate	Slight	Loblolly pine--------	87	9	Loblolly pine. 3/
					Sweetgum----------	90	7	
					Yellow poplar--------	100	8	
					Southern red oak-----	---	---	
					White oak----------	---	---	
					Red maple----------	---	---	
					Water oak----------	---	---	
Nk---------- Nakina	9W	Slight	Severe	Severe	Loblolly pine--------	90	9	Loblolly pine, 3/ hardwoods. 2/
					Sweetgum----------	---	---	
					Water oak----------	---	---	
					Blackgum----------	---	---	
					Pond pine----------	---	---	
					Red maple----------	---	---	
					Baldcypress----------	---	---	
NoA, NoB---------- Norfolk	8A	Slight	Slight	Slight	Loblolly pine--------	84	8	Loblolly pine.
					Longleaf pine--------	68	5	
					White oak----------	---	---	
					Southern red oak-----	---	---	
					Yellow poplar--------	---	---	
					Hickory----------	---	---	
Pa---------- Pantego	10W	Slight	Severe	Severe	Loblolly pine--------	95	10	Loblolly pine. 3/
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Water oak----------	---	---	
					Sweetgum----------	---	---	
					American sycamore----	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class 1/	Trees to plant
Pe---------- Pender	10A	Slight	Slight	Slight	Loblolly pine--------	94	10	Loblolly pine, hardwoods. 2/
					Longleaf pine--------	75	6	
					Sweetgum----------	90	7	
					Yellow poplar--------	---	---	
Ra---------- Rains	10W	Slight	Moderate	Moderate	Loblolly pine--------	94	10	Loblolly pine, 3/ hardwoods, 2/ American sycamore.
					Red maple----------	---	---	
					Sweetgum----------	90	7	
					Willow oak----------	---	---	
					Water oak----------	---	---	
St---------- Stallings	8W	Slight	Moderate	Slight	Loblolly pine--------	79	8	Loblolly pine.
					Blackgum----------	---	---	
					Longleaf pine--------	---	---	
					Sweetgum----------	---	---	
					Yellow poplar--------	---	---	
					Water oak----------	---	---	
					Red maple----------	---	---	
To---------- Torhunta	9W	Slight	Severe	Severe	Loblolly pine--------	88	9	Loblolly pine, 3/ hardwoods. 2/
					Sweetgum----------	90	7	
					Water tupelo---------	---	---	
					Blackgum----------	---	---	
					Red maple----------	---	---	
WaB---------- Wagram	8S	Slight	Moderate	Moderate	Loblolly pine--------	82	8	Loblolly pine, longleaf pine.
					Longleaf pine--------	67	5	
					White oak----------	---	---	
					Southern red oak-----	---	---	
					Hickory----------	---	---	
WkB---------- Wakulla	7S	Slight	Moderate	Severe	Loblolly pine--------	73	7	Loblolly pine, longleaf pine.
					Longleaf pine--------	78	7	
					Post oak----------	---	---	
Wn---------- Wilbanks	7W	Slight	Moderate	Severe	Water oak----------	100	7	Loblolly pine, 3/ hardwoods. 2/
					Sweetgum----------	111	12	
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Swamp chestnut oak---	---	---	
					Red maple----------	104	---	
					Overcup oak----------	---	---	
					Willow oak----------	92	6	

1/ Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

2/ 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 recommendation of a forester.

3/ Potential productivity is attainable in areas adequately drained or bedded, or both.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AuB: Autryville	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
AyB: Aycock	Moderate: percs slowly.	Slight	Moderate: slope.	Slight	Slight.
Be: Bethera	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
BnB: Blanton	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Br: Brookman	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
BuB: Butters	Slight	Slight	Slight	Slight	Moderate: droughty.
Ce: Centenary	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Ch:					
Chastain	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Chenneby	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Severe: erodes easily.	Severe: flooding.
Co: Coxville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CrB: Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	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.
Ec: Echaw	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
ExA: Exum	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Fo: Foreston	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Moderate: droughty.
GoA: Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
Gr: Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Gt: Grifton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
GyB: Gritney	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
Jo: Johns	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Js: Johnston	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
KuB: Kureb	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LnB: Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Lu: Lumbee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ly: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Me: Meggett	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Mk: Muckalee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Mu: Murville	Severe: ponding.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.	Severe: ponding.
Na: Nahunta	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Nk: Nakina	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.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
NuB:					
Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land.					
Pa: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pe: Pender	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Pu:					
Pender	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Urban land.					
Ra: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ru:					
Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.					
St: Stallings	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
To: Torhunta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud. Udorthents					
Ut. Udults					
WaB: Wagram	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
WkB: Wakulla	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Wn: Wilbanks	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

TABLE 8.--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 map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AuB---------- Autryville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AyB---------- Aycock	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Be---------- Bethera	Very poor.	Very poor.	Poor	Fair	Poor	Good	Good	Very poor.	Fair	Good.
BnB---------- Blanton	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Br---------- Brookman	Very poor.	Poor	Fair	Poor	Poor	Good	Good	Poor	Fair	Good.
BuB---------- Butters	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ce---------- Centenary	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Ch:										
Chastain----------	Very poor.	Poor	Poor	Fair	Poor	Good	Good	Poor	Fair	Good.
Chenneby----------	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Co---------- Coxville	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
CrB---------- Craven	Good	Good	Good	Good	Good	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.
Ec---------- Echaw	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
ExA---------- Exum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Fo---------- Foreston	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GoA---------- Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gr---------- Grantham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Gt---------- Grifton	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GyB: Gritney	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Jo: Johns	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Js: Johnston	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
KuB: Kureb	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
LnB: Leon	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
Lu: Lumbee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Ly: Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Me: Meggett	Poor	Fair	Fair	Fair	Good	Good	Good	Fair	Good	Good.
Mk: Muckalee	Poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair.
Mu: Murville	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Na: Nahunta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Nk: Nakina	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
NoA, NoB: Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NuB:										
Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
Pa: Pantego	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Pe: Pender	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Pu:										
Pender	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land.										
Ra: Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ru:										
Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Urban land.										
St Stallings	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
To Torhunta	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ud. Udorthents										
Ut. Udults										
WaB Wagram	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WkB Wakulla	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Wn Wilbanks	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. 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
AuB: Autryville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty, too sandy.
AyB: Aycock	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
Be: Bethera	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
BnB: Blanton	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Br: Brookman	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, flooding.
BuB: Butters	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
Ce: Centenary	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Ch:						
Chastain	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Chenneby	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: flooding.
Co: Coxville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
CrB: Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	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: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: ponding, flooding, excess humus.
Ec: Echaw	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.

TABLE 9.--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
ExA---------- Exum	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
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.
Gr---------- Grantham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Gt---------- Grifton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
GyB---------- Gritney	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
Jo---------- Johns	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Moderate: wetness.
Js---------- Johnston	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
KuB---------- Kureb	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
LnB---------- Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Lu---------- Lumbee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
Ly---------- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Me---------- Meggett	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, wetness, flooding.	Severe: wetness, flooding.
Mk---------- Muckalee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Mu---------- Murville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Na---------- Nahunta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.

TABLE 9.--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
Nk: Nakina	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.						
Pa: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pe: Pender	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Pu:						
Pender	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Urban land.						
Ra: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ru:						
Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.						
St: Stallings	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
To: Torhunta	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud. Udorthents						
Ut. Udults						
WaB: Wagram	Slight	Slight	Slight	Slight	Slight	Moderate: droughty.
WkB: Wakulla	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Wn: Wilbanks	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.

TABLE 10.--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
AuB: Autryville	Moderate: wetness.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AyB: Aycock	Severe: percs slowly.	Moderate: seepage, slope, wetness.	Moderate: too clayey.	Slight	Fair: too clayey.
Be: Bethera	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
BnB: Blanton	Moderate: wetness.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
Br: Brookman	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
BuB: Butters	Moderate: wetness.	Severe: seepage.	Severe: wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ce: Centenary	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ch:					
Chastain	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, too clayey, hard to pack.
Chenneby	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Co: Coxville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
CrB: 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.

TABLE 10.--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
Do---------- Dorovan	Severe: subsides, flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
Ec---------- Echaw	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
ExA---------- Exum	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
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.
Gr---------- Grantham	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Gt---------- Grifton	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
GyB---------- Gritney	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey. hard to pack.
Jo---------- Johns	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Js---------- Johnston	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
KuB---------- Kureb	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LnB---------- Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Lu---------- Lumbee	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Ly---------- Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 10.--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
Me---------- Meggett	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Mk---------- Muckalee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Mu---------- Murville	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Na---------- Nahunta	Severe: wetness.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
Nk---------- Nakina	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness, thin layer.
NoA, NoB---------- Norfolk	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight----------	Good.
NuB:					
Norfolk----------	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight----------	Good.
Urban land.					
Pa---------- Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pe---------- Pender	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, thin layer.
Pu:					
Pender----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, thin layer.
Urban land.					
Ra---------- Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ru:					
Rains----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land.					
St---------- Stallings	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
To---------- Torhunta	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.

TABLE 10.--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
Ud. Udorthents					
Ut. Udults					
WaB---------- Wagram	Slight----------	Moderate: seepage.	Slight----------	Slight----------	Good.
WkB---------- Wakulla	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Wn---------- Wilbanks	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

TABLE 11.--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
AuB: Autryville	Good	Improbable: thin layer.	Poor: too sandy.
AyB: Aycock	Fair: low strength.	Improbable: excess fines.	Fair: too clayey.
Be: Bethera	Poor: low strength, wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
BnB: Blanton	Good	Probable	Poor: too sandy.
Br: Brookman	Poor: low strength, wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
BuB: Butters	Good	Improbable: thin layer.	Fair: too sandy.
Ce: Centenary	Good	Probable	Poor: too sandy.
Ch:			
Chastain	Poor: wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
Chenneby	Fair: wetness.	Improbable: excess fines.	Fair: too clayey.
Co: Coxville	Poor: wetness, low strength.	Improbable: excess fines.	Poor: thin layer, wetness.
CrB: 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.
Ec: Echaw	Fair: wetness.	Probable	Poor: too sandy.
ExA: Exum	Fair: wetness.	Improbable: excess fines.	
Fo: Foreston	Fair: wetness.	Improbable: excess fines.	Fair: too sandy.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
GoA: Goldsboro	Fair: wetness.	Improbable: excess fines.	Good.
Gr: Grantham	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
Gt: Grifton	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
GyB: Gritney	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
Jo: Johns	Fair: wetness.	Probable	Fair: thin layer.
Js: Johnston	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
KuB: Kureb	Good	Probable	Poor: too sandy.
LnB: Leon	Poor: wetness.	Probable	Poor: too sandy, wetness.
Lu: Lumbee	Poor: wetness.	Probable	Poor: wetness.
Ly: Lynchburg	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Me: Meggett	Poor: wetness, shrink-swell.	Improbable: excess fines.	Poor: too clayey, wetness.
Mk: Muckalee	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Mu: Murville	Poor: wetness.	Probable	Poor: too sandy, wetness.
Na: Nahunta	Poor: low strength.	Improbable: excess fines.	Good.
Nk: Nakina	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
NoA, NoB: Norfolk	Good	Improbable: excess fines.	Fair: too sandy.
NuB:			
Norfolk	Good	Improbable: excess fines.	Fair: too sandy.
Urban land.			
Pa: Pantego	Poor: wetness.	Improbable: excess fines.	Poor: wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
Pe---------- Pender	Fair: thin layer, wetness.	Improbable: excess fines.	Good.
Pu:			
Pender----------	Fair: thin layer, wetness.	Improbable: excess fines.	
Urban land.			
Ra---------- Rains	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ru:			
Rains----------	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Urban land.			
St---------- Stallings	Fair: wetness.	Probable----------	Good.
To---------- Torhunta	Poor: wetness.	Probable----------	Poor: wetness.
Ud. Udorthents			
Ut. Udults			
WaB---------- Wagram	Good----------	Improbable: excess fines.	Fair: too sandy.
WkB---------- Wakulla	Good----------	Probable----------	Poor: too sandy.
Wn---------- Wilbanks	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. 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--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AuB: Autryville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy	Droughty.
AyB: Aycock	Moderate: seepage.	Moderate: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Be: Bethera	Slight	Severe: ponding, hard to pack.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
BnB: Blanton	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Br: Brookman	Moderate: seepage.	Severe: hard to pack, wetness.	Flooding	Flooding, wetness, percs slowly.	Wetness	Wetness.
BuB: Butters	Severe: seepage.	Severe: seepage, piping.	Deep to water	Fast intake, droughty.	Too sandy	Droughty.
Ce: Centenary	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Ch:						
Chastain	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Chenneby	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Flooding	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Co: Coxville	Slight	Severe: wetness.	Favorable	Wetness	Wetness	Wetness.
CrB: Craven	Moderate: seepage.	Severe: hard to pack.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
Ct: Croatan	Severe: seepage.	Severe: piping, wetness.	Percs slowly, subsides.	Wetness, percs slowly.	Wetness	Wetness, percs slowly.
Do: Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Ponding, flooding, subsides.	Ponding, flooding.	Ponding	Wetness.
Ec: Echaw	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
ExA: Exum	Slight	Moderate: piping, wetness.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
Fo: Foreston	Severe: seepage.	Severe: seepage, piping.	Favorable	Wetness, droughty, fast intake.	Wetness, soil blowing.	Droughty.
GoA: Goldsboro	Moderate: seepage.	Moderate: piping, wetness.	Favorable	Wetness	Wetness	Favorable.
Gr: Grantham	Slight	Severe: wetness.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
Gt: Grifton	Severe: seepage.	Severe: wetness.	Favorable	Wetness	Wetness	Wetness.
GyB: Gritney	Slight	Moderate: thin layer, hard to pack, wetness.	Percs slowly	Slope, wetness.	Wetness, percs slowly.	Percs slowly.
Jo: Johns	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness	Wetness, too sandy.	Favorable.
Js: Johnston	Severe: seepage.	Severe: piping, ponding.	Ponding, flooding.	Ponding, droughty, flooding.	Ponding	Wetness, droughty.
KuB: Kureb	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Too sandy	Droughty.
LnB: Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Lu: Lumbee	Severe: seepage.	Severe: wetness.	Cutbanks cave	Wetness	Wetness	Wetness.
Ly: Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness	Wetness.
Me: Meggett	Moderate: seepage.	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Mk: Muckalee	Moderate: seepage.	Severe: piping, wetness.	Flooding, cutbanks cave.	Wetness, droughty, flooding.	Wetness, too sandy.	Wetness, droughty.
Mu: Murville	Severe: seepage.	Severe: seepage, piping, ponding.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy.	Wetness, droughty.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Na: Nahunta	Slight	Severe: wetness.	Favorable	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
Nk: Nakina	Severe: seepage.	Severe: wetness.	Percs slowly	Wetness	Wetness, percs slowly.	Wetness, percs slowly.
NoA: Norfolk	Moderate: seepage.	Moderate: piping.	Deep to water	Fast intake	Favorable	Favorable.
NoB: Norfolk	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
NuB:						
Norfolk	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
Urban land.						
Pa: Pantego	Moderate: seepage.	Severe: wetness.	Favorable	Wetness	Wetness	Wetness.
Pe: Pender	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness	Favorable.
Pu:						
Pender	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness	Favorable.
Urban land.						
Ra: Rains	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness, soil blowing.	Wetness.
Ru:						
Rains	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness, soil blowing.	Wetness.
Urban land.						
St: Stallings	Severe: seepage.	Severe: piping, wetness.	Cutbanks cave	Wetness	Wetness	Wetness.
To: Torhunta	Severe: seepage.	Severe: piping, wetness.	Favorable	Wetness	Wetness	Wetness.
Ud. Udorthents						
Ut. Udults						

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
WaB---------- Wagram	Moderate: seepage.	Slight---------	Deep to water	Droughty, fast intake, slope.	Favorable------	Droughty.
WkB---------- Wakulla	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, slope.	Too sandy------	Droughty.
Wn---------- Wilbanks	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications 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		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
AuB---------- Autryville	0-23	Sand----------	SP-SM, SM	A-2, A-3	100	100	50-100	5-20	---	NP
	23-34	Sandy loam, sandy clay loam, fine sandy loam.	SM	A-2	100	100	50-100	15-30	<25	NP-3
	34-55	Sand, loamy sand, loamy fine sand.	SP-SM, SM	A-2, A-3	100	100	50-100	5-20	---	NP
	55-85	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	100	100	60-100	20-49	<30	NP-10
AyB---------- Aycock	0-11	Very fine sandy loam.	ML, CL-ML, CL	A-4	100	95-100	80-100	51-80	<25	NP-10
	11-75	Clay loam, silty clay loam, loam.	CL	A-4, A-6, A-7	100	95-100	90-100	60-90	22-49	8-30
Be---------- Bethera	0-6	Loam----------	CL	A-4, A-6	100	95-100	85-95	60-75	30-37	8-14
	6-68	Clay, clay loam, sandy clay.	CL, CH, ML, MH	A-6, A-7	100	98-100	93-100	55-95	37-55	12-30
	68-72	Clay, sandy clay, sandy clay loam.	CL, CH	A-7, A-6, A-4	100	98-100	80-100	51-95	30-55	8-30
BnB---------- Blanton	0-57	Sand----------	SP-SM, SM	A-3, A-2-4	100	90-100	65-100	5-20	---	NP
	57-80	Sandy clay loam, sandy loam, fine sandy loam.	SC, SM-SC, SM	A-4, A-2-4, A-2-6, A-6	100	95-100	69-100	25-50	12-45	3-22
Br---------- Brookman	0-11	Loam----------	CL, ML, CL-ML	A-6, A-4	100	95-100	75-100	51-81	25-40	4-19
	11-54	Sandy clay, clay, clay loam.	CH, CL	A-7, A-6	100	98-100	85-100	55-91	37-65	18-41
	54-72	Sandy clay, clay, sandy clay loam.	CL, CH, SC	A-6, A-7	100	90-100	70-100	43-90	25-55	11-35
BuB---------- Butters	0-13	Loamy fine sand	SP-SM, SM	A-2, A-3	100	95-100	50-75	5-25	---	NP
	13-27	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	100	95-100	60-85	20-40	<30	NP-7
	27-58	Loamy sand, loamy fine sand, sand.	SP, SP-SM, SM	A-2, A-3	100	95-100	50-75	3-20	---	NP
	58-82	Sandy loam, sandy clay loam, fine sandy loam.	SM, SM-SC, SC	A-2, A-4, A-6	100	95-100	60-85	25-49	15-35	3-15
Ce---------- Centenary	0-9	Fine sand--------	SP, SP-SM	A-3	100	100	60-90	4-10	---	NP
	9-68	Sand, fine sand, loamy sand.	SP-SM, SP, SM	A-3, A-2-4	100	100	65-90	4-20	---	NP
	68-90	Sand, fine sand, loamy sand.	SP, SP-SM, SM	A-3, A-2-4	100	100	60-90	3-20	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Ch:										
Chastain	0-4	Silty clay loam	ML, CL, CL-ML	A-4, A-6, A-7	100	100	90-100	70-95	23-45	3-18
	4-62	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	100	100	95-100	85-98	35-75	12-40
Chenneby	0-12	Silty clay loam	CL, ML, MH, CH	A-6, A-7	100	95-100	90-100	85-95	30-55	8-20
	12-60	Loam, silt loam, silty clay loam.	CL, ML, MH, CH	A-4, A-6, A-7	100	95-100	90-100	75-95	30-55	8-20
Co Coxville	0-14	Loam	SM, ML, CL-ML, CL	A-4, A-6, A-7	100	100	85-97	46-75	20-46	3-15
	14-62	Clay loam, sandy clay, clay.	CL, CH	A-6, A-7	100	100	85-98	50-85	30-55	12-35
	62-72	Variable	---	---	---	---	---	---	---	---
CrB Craven	0-7	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	100	100	75-100	45-90	<35	NP-15
	7-42	Clay, silty clay, silty clay loam.	CH	A-7	100	100	90-100	65-98	51-70	24-43
	42-67	Sandy clay loam, sandy loam, sandy clay.	SM, SM-SC, SC	A-2, A-4, A-6	100	95-100	50-100	15-49	<35	NP-15
Ct Croatan	0-40	Muck	PT	---	---	---	---	---	---	---
	40-50	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	100	100	60-85	25-49	<30	NP-10
	50-74	Variable	---	---	---	---	---	---	---	---
Do Dorovan	0-70	Muck	PT	---	---	---	---	---	---	---
	70-75	Sand, sandy loam, loam.	SP-SM, SM-SC, SM	A-1, A-3, A-4, A-2-4	100	100	5-70	5-49	<20	NP-7
Ec Echaw	0-8	Loamy sand	SM	A-2	100	100	65-80	15-35	---	NP
	8-42	Loamy sand, fine sand, sand.	SM, SP-SM	A-2, A-3	100	100	50-75	5-30	---	NP
	42-85	Fine sand, loamy sand, sand.	SM, SP-SM	A-2, A-3	100	100	50-70	5-20	---	NP
ExA Exum	0-6	Very fine sandy loam.	ML, CL-ML, CL	A-4	100	95-100	80-100	51-80	<25	NP-10
	6-70	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	100	95-100	90-100	60-90	22-49	8-30
Fo Foreston	0-9	Loamy fine sand	SM	A-2	100	100	60-100	15-30	---	NP
	9-26	Sandy loam, fine sandy loam.	SM	A-2	100	100	70-100	18-35	<25	NP-4
	26-70	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3	100	100	50-98	6-25	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
GoA---------- Goldsboro	0-10	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	95-100	95-100	50-100	15-45	<25	NP-14
	10-62	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	98-100	95-100	60-100	25-55	16-37	4-18
	62-78	Sandy clay loam, clay loam, sandy clay.	SC, CL, CL-ML, CH	A-4, A-6, A-7-6	95-100	90-100	65-95	36-70	25-55	6-32
	78-85	Variable---------	---	---	---	---	---	---	---	---
Gr---------- Grantham	0-10	Very fine sandy loam.	ML, CL-ML	A-4	100	100	85-100	55-85	<30	NP-7
	10-75	Loam, clay loam.	CL	A-4, A-6, A-7	100	100	90-100	60-95	22-49	8-30
Gt---------- Grifton	0-10	Fine sandy loam	SM	A-2, A-4	100	95-100	60-100	20-45	<30	NP-7
	10-65	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	98-100	95-100	60-100	31-60	20-35	8-15
GyB---------- Gritney	0-10	Loamy fine sand loam.	SP-SM, SM	A-2-4	90-100	85-100	75-99	10-20	---	NP
	10-55	Sandy clay, clay, clay loam.	CH, CL, SC	A-6, A-7	95-100	90-100	80-100	45-80	45-70	22-40
	55-75	Variable---------	---	---	---	---	---	---	---	---
Jo---------- Johns	0-6	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	100	95-100	70-98	20-49	<30	NP-10
	6-38	Sandy clay loam, sandy loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6, A-7	100	95-100	60-98	30-65	20-45	5-25
	38-80	Sand, loamy sand, coarse sand.	SM, SP-SM, SP	A-2, A-3	95-100	95-100	51-90	4-25	---	NP
Js---------- Johnston	0-40	Loam, sandy loam	ML, SM	A-2, A-4	100	100	60-100	18-65	<35	NP-10
	40-50	Stratified loamy sand to sand.	SM, SP-SM	A-2, A-3	100	100	50-100	5-30	---	NP
	50-62	Stratified fine sandy loam to sandy loam.	SM	A-2, A-4	100	100	50-100	25-49	<35	NP-10
KuB---------- Kureb	0-80	Sand----------	SP, SP-SM	A-3	100	100	60-100	0-7	---	NP
LnB---------- Leon	0-11	Sand----------	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
	11-25	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-3, A-2-4	100	100	80-100	3-20	---	NP
	25-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
Lu---------- Lumbee	0-11	Fine sandy loam	SM, SM-SC	A-2, A-4	100	85-100	65-98	15-45	<20	NP-7
	11-36	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-4, A-6, A-7	100	90-100	65-98	36-60	19-45	7-25
	36-72	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	90-100	85-100	50-90	4-25	---	NP
Ly---------- Lynchburg	0-8	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	92-100	90-100	75-100	25-55	<30	NP-7
	8-80	Sandy clay loam, sandy loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	92-100	90-100	70-100	25-67	15-40	4-18

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Me---------- Meggett	0-5	Fine sandy loam	SM	A-2, A-4	100	95-100	50-85	15-55	---	NP
	5-32	Clay, sandy clay, clay loam.	CH, MH, CL	A-6, A-7	100	90-100	75-100	51-90	30-60	11-30
	32-45	Clay, sandy clay, clay loam.	CH, MH, CL	A-6, A-7	100	90-100	75-100	51-90	35-65	11-30
	45-72	Sandy clay, sandy clay loam.	SC, SM, ML, MH	A-4, A-6, A-7	90-100	65-100	50-100	36-90	30-60	7-25
Mk---------- Muckalee	0-8	Sandy loam-------	SM	A-2, A-4	95-100	90-100	55-90	25-40	<20	NP-4
	8-62	Sandy loam, loamy sand.	SM	A-2, A-4	95-100	80-100	60-90	20-40	<20	NP-4
Mu---------- Murville	0-7	Fine sand--------	SP-SM, SM	A-2, A-3	100	100	85-100	5-30	---	NP
	7-40	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3	100	100	85-100	5-20	---	NP
	40-70	Fine sand, sand.	SP-SM, SP	A-2, A-3	100	100	80-100	3-12	---	NP
Na---------- Nahunta	0-8	Very fine sandy loam.	ML, CL-ML, CL	A-4	100	95-100	80-100	51-85	<25	NP-10
	8-72	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	100	95-100	90-100	60-95	22-49	8-30
Nk---------- Nakina	0-14	Fine sandy loam	SM, ML	A-2-4, A-4	100	100	85-100	20-60	<30	NP-7
	14-49	Sandy clay loam, sandy loam, fine sandy loam.	SC	A-4, A-6, A-2	100	100	90-100	28-45	28-40	9-18
	49-80	Variable---------	---	---	---	---	---	---	---	---
NoA, NoB--------- Norfolk	0-9	Loamy fine sand	SM	A-2	95-100	92-100	50-95	13-30	<20	NP
	9-76	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	95-100	91-100	70-96	30-63	20-38	4-15
NuB:										
Norfolk---------	0-9	Loamy fine sand	SM	A-2	95-100	92-100	50-95	13-30	<20	NP
	9-76	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	95-100	91-100	70-96	30-63	20-38	4-15
Urban land.										
Pa---------- Pantego	0-20	Fine sandy loam	SM, SM-SC, CL, ML	A-2, A-4	100	95-100	60-95	25-75	<35	NP-10
	20-80	Sandy clay loam, sandy loam, clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	100	95-100	60-100	30-80	20-40	4-16
Pe---------- Pender	0-12	Fine sandy loam	SM, SM-SC	A-2, A-4	100	100	60-85	30-50	<25	NP-10
	12-58	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-6, A-7	100	100	80-100	35-70	30-45	10-20
	58-72	Variable---------	---	---	---	---	---	---	---	---
Pu:										
Pender----------	0-12	Fine sandy loam	SM, SM-SC	A-2, A-4	100	100	60-85	30-50	<25	NP-10
	12-58	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-6, A-7	100	100	80-100	35-70	30-45	10-20
	58-72	Variable---------	---	---	---	---	---	---	---	---
Urban land.										

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Ra---------- Rains	0-17	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	100	95-100	50-85	25-56	<35	NP-10
	17-62	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	100	95-100	55-98	30-70	18-40	4-20
	62-75	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	100	95-100	60-95	30-60	15-40	3-18
Ru:										
Rains----------	0-17	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	100	95-100	50-85	25-56	<35	NP-10
	17-62	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	100	95-100	55-98	30-70	18-40	4-20
	62-75	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	100	95-100	60-95	30-60	15-40	3-18
Urban land.										
St---------- Stallings	0-12	Sandy loam--------	SM	A-2, A-4	100	95-100	51-100	20-50	<25	NP-3
	12-45	Sandy loam, fine sandy loam, loamy sand.	SM	A-2, A-4	100	95-100	51-100	15-50	<25	NP-3
	45-75	Sandy loam, loamy sand, loamy fine sand.	SM, SP-SM, SM-SC	A-2, A-4	100	95-100	51-100	10-50	<25	NP-4
To---------- Torhunta	0-15	Fine sandy loam, loamy sand.	SM	A-2, A-4	100	95-100	70-96	20-49	<25	NP-4
	15-36	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	100	95-100	70-92	20-40	<25	NP-7
	36-60	Loamy sand, sand, sandy loam.	SM, SP-SM, SM-SC	A-2, A-3	100	95-100	65-92	5-35	<25	NP-4
Ud. Udorthents										
Ut. Udults										
WaB---------- Wagram	0-23	Loamy fine sand	SM, SP-SM	A-2, A-3	100	98-100	50-85	8-35	---	NP
	23-77	Sandy clay loam, sandy loam.	SC	A-2, A-4, A-6, A-7	100	98-100	60-95	31-49	21-41	8-25
WkB---------- Wakulla	0-30	Coarse sand------	SP, SP-SM	A-3	100	100	55-90	4-10	---	NP
	30-43	Loamy sand, loamy fine sand, loamy coarse sand.	SM, SP-SM	A-2	100	100	55-85	10-25	---	NP
	43-90	Sand, fine sand, coarse sand.	SM, SP-SM	A-2, A-3	100	100	50-70	4-15	---	NP
Wn---------- Wilbanks	0-18	Silt loam--------	ML, CL-ML, CL	A-4	100	100	70-100	51-98	20-46	6-20
	18-45	Silty clay, clay, clay loam.	CH, MH	A-7	100	100	90-100	75-95	45-65	18-35
	45-65	Muck----------	PT	A-8	---	---	---	---	---	---
	65-80	Variable---------	---	---	---	---	---	---	---	---

TABLE 14.--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 K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AuB---------- Autryville	0-23	2-10	1.60-1.70	>6.0	0.04-0.09	4.5-6.5	Low----------	0.10	5	.5-1
	23-34	10-25	1.40-1.60	2.0-6.0	0.08-0.13	4.5-5.5	Low----------	0.10		
	34-55	2-8	1.60-1.70	>6.0	0.03-0.08	4.5-5.5	Low----------	0.10		
	55-85	10-35	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.17		
AyB---------- Aycock	0-11	4-15	1.30-1.60	2.0-6.0	0.15-0.20	4.5-6.0	Low----------	0.37	5	1-4
	11-75	18-35	1.30-1.60	0.2-2.0	0.15-0.20	4.5-5.5	Low----------	0.43		
Be---------- Bethera	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
	6-68	35-50	1.30-1.50	0.06-0.6	0.14-0.18	3.6-6.0	Moderate-----	0.32		
	68-72	20-50	1.30-1.50	0.06-2.0	0.12-0.16	3.6-6.0	Moderate-----	0.32		
BnB---------- Blanton	0-57	1-7	1.30-1.60	6.0-20	0.03-0.07	4.5-6.0	Low----------	0.10	5	.5-1
	57-80	12-30	1.60-1.70	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.20		
Br---------- Brookman	0-11	5-30	1.20-1.45	0.6-2.0	0.15-0.20	4.5-6.5	Low----------	0.24	4	3-10
	11-54	35-55	1.30-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Moderate-----	0.28		
	54-72	20-55	1.45-1.65	0.06-0.2	0.12-0.16	5.1-7.8	Moderate-----	0.24		
BuB---------- Butters	0-13	5-12	1.50-1.70	6.0-20	0.05-0.10	4.5-5.5	Low----------	0.15	5	.5-2
	13-27	10-20	1.40-1.60	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.15		
	27-58	1-10	1.50-1.70	6.0-20	0.03-0.08	4.5-5.5	Low----------	0.10		
	58-82	10-25	1.30-1.50	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.17		
Ce---------- Centenary	0-9	1-8	1.40-1.60	6.0-20	0.03-0.08	4.5-6.5	Low----------	0.10	5	<1
	9-68	1-8	1.40-1.60	6.0-20	0.03-0.05	4.5-6.0	Low----------	0.10		
	68-90	2-10	1.50-1.70	2.0-6.0	0.03-0.10	4.5-6.0	Low----------	0.10		
Ch:										
Chastain--------	0-4	27-35	1.20-1.40	0.2-0.6	0.12-0.18	4.5-6.0	Moderate-----	0.32	5	2-6
	4-62	35-60	1.30-1.50	0.06-0.2	0.12-0.16	4.5-6.0	Moderate-----	0.37		
Chenneby--------	0-12	27-35	1.30-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.32	5	.5-2
	12-60	12-35	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.0	Low----------	0.32		
Co---------- Coxville	0-14	5-27	1.45-1.65	0.6-2.0	0.12-0.17	3.6-5.5	Low----------	0.24	5	2-4
	14-62	35-60	1.25-1.45	0.2-0.6	0.14-0.18	3.6-5.5	Moderate-----	0.32		
	62-72	---	---	---	---	---	----------	----		
CrB---------- Craven	0-7	7-27	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	Low----------	0.32	5	.5-2
	7-42	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
	42-67	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low----------	0.32		
Ct---------- Croatan	0-40	---	0.40-0.65	0.06-6.0	0.35-0.45	<4.5	Low----------	----	---	25-60
	40-50	8-20	1.40-1.60	0.2-6.0	0.10-0.15	3.6-6.5	Low----------	----		
	50-74	---	---	---	---	---	----------	----		
Do---------- Dorovan	0-70	---	0.25-0.40	0.6-2.0	0.25-0.50	3.6-4.4	----------	----	---	>60
	70-75	5-20	1.40-1.65	2.0-20	0.05-0.08	4.5-5.5	Low----------	----		
Ec---------- Echaw	0-8	5-10	1.20-1.50	2.0-20	0.05-0.10	4.5-6.5	Low----------	0.10	5	<1
	8-42	2-10	1.40-1.60	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.10		
	42-85	2-10	1.50-1.70	2.0-20	0.03-0.08	4.5-6.0	Low----------	0.10		
ExA---------- Exum	0-6	6-18	1.30-1.50	2.0-6.0	0.15-0.20	4.5-6.0	Low----------	0.37	5	.5-2
	6-70	18-35	1.30-1.40	0.2-0.6	0.15-0.20	4.5-5.5	Low----------	0.37		

TABLE 14.--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 K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Fo---------- Foreston	0-9	5-12	1.20-1.40	6.0-20	0.05-0.10	4.5-6.5	Low----------	0.15	5	.5-2
	9-26	10-18	1.20-1.40	2.0-6.0	0.09-0.13	4.5-6.0	Low----------	0.10		
	26-70	4-12	1.30-1.60	6.0-20	0.03-0.10	4.5-6.0	Low----------	0.10		
GoA---------- Goldsboro	0-10	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	5	.5-2
	10-62	18-30	1.30-1.50	0.6-2.0	0.11-0.18	4.5-5.5	Low----------	0.24		
	62-78	20-34	1.30-1.40	0.6-2.0	0.11-0.18	4.5-5.5	Low----------	0.24		
	78-85	---	---	---	---	---	----------	----		
Gr---------- Grantham	0-10	6-18	1.30-1.50	2.0-6.0	0.13-0.20	4.5-5.5	Low----------	0.37	5	2-4
	10-75	18-35	1.30-1.40	0.2-0.6	0.15-0.20	4.5-5.5	Low----------	0.43		
Gt---------- Grifton	0-10	7-18	1.45-1.65	2.0-6.0	0.10-0.14	4.5-6.0	Low----------	0.20	5	2-4
	10-65	18-35	1.35-1.45	0.6-2.0	0.12-0.17	5.6-8.4	Low----------	0.24		
GyB---------- Gritney	0-10	5-10	1.45-1.55	6.0-20	0.05-0.08	4.5-5.5	Low----------	0.10	4	.5-2
	10-55	35-60	1.30-1.50	0.06-0.2	0.10-0.17	4.5-5.5	Moderate-----	0.32		
	55-75	---	---	---	---	---	----------	----		
Jo---------- Johns	0-6	5-15	1.45-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low----------	0.20	5	.5-2
	6-38	18-35	1.40-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Low----------	0.24		
	38-80	2-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low----------	0.10		
Js---------- Johnston	0-40	5-18	1.30-1.55	2.0-6.0	0.10-0.20	4.5-5.5	Low----------	0.20	5	3-8
	40-50	2-12	1.55-1.65	6.0-20	0.02-0.07	4.5-5.5	Low----------	0.17		
	50-62	5-25	1.45-1.65	6.0-20	0.06-0.12	4.5-5.5	Low----------	0.17		
KuB---------- Kureb	0-80	0-3	1.60-1.80	6.0-20	<0.05	4.5-7.3	Low----------	0.10	5	<2
LnB---------- Leon	0-11	1-6	1.40-1.65	6.0-20	0.02-0.05	3.6-5.5	Low----------	0.10	5	.5-4
	11-25	2-8	1.50-1.70	0.6-6.0	0.05-0.10	3.6-5.5	Low----------	0.15		
	25-80	1-6	1.40-1.65	0.6-6.0	0.02-0.05	3.6-5.5	Low----------	0.10		
Lu---------- Lumbee	0-11	4-18	1.55-1.70	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.24	5	2-4
	11-36	18-35	1.30-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32		
	36-72	1-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low----------	0.10		
Ly---------- Lynchburg	0-8	5-20	1.30-1.60	2.0-6.0	0.09-0.13	3.6-5.5	Low----------	0.20	5	.5-5
	8-80	18-35	1.30-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.20		
Me---------- Meggett	0-5	5-20	1.20-1.40	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	5	2-8
	5-32	30-60	1.45-1.60	0.06-0.2	0.13-0.18	5.1-8.4	High----------	0.32		
	32-45	35-60	1.50-1.75	0.06-0.2	0.13-0.18	6.1-8.4	High----------	0.32		
	45-72	25-50	1.40-1.60	0.06-0.6	0.12-0.18	6.1-8.4	Moderate-----	0.28		
Mk---------- Muckalee	0-8	5-20	1.35-1.45	0.6-2.0	0.08-0.12	5.1-7.3	Low----------	0.20	5	---
	8-62	5-20	1.35-1.50	0.6-2.0	0.08-0.12	5.6-8.4	Low----------	0.20		
Mu---------- Murville	0-7	2-8	1.45-1.60	6.0-20	0.05-0.09	3.6-5.5	Low----------	0.10	5	2-9
	7-40	2-8	1.60-1.75	2.0-6.0	0.05-0.09	3.6-5.5	Low----------	0.10		
	40-70	2-8	1.60-1.75	6.0-20	0.04-0.17	3.6-5.5	Low----------	0.10		
Na---------- Nahunta	0-8	6-18	1.30-1.50	2.0-6.0	0.15-0.20	4.5-6.0	Low----------	0.43	5	2-4
	8-72	18-35	1.30-1.40	0.2-0.6	0.15-0.20	4.5-5.5	Low----------	0.43		
Nk---------- Nakina	0-14	10-15	1.40-1.60	2.0-6.0	0.15-0.20	5.1-6.5	Low----------	0.20	5	6-15
	14-49	18-35	1.60-1.70	0.6-6.0	0.12-0.17	4.5-8.4	Low----------	0.28		
	49-80	---	---	---	---	4.5-8.4	----------	----		
NoA, NoB--------- Norfolk	0-9	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.5	Low----------	0.17	5	.5-2
	9-76	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.24		

TABLE 14.--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 K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
NuB:										
Norfolk---------	0-9	2-8	1.55-1.75	6.0-20	0.06-0.11	4.5-6.5	Low----------	0.17	5	.5-2
	9-76	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.24		
Urban land.										
Pa----------	0-20	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	20-80	18-35	1.30-1.40	0.6-2.0	0.12-0.20	3.6-5.5	Low----------	0.28		
Pe----------	0-12	5-17	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.37	5	.5-2
Pender	12-58	18-35	1.30-1.60	0.6-2.0	0.10-0.15	5.6-7.8	Moderate-----	0.24		
	58-72	---	---	---	---	---	----------	----		
Pu:										
Pender----------	0-12	5-17	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.37	5	.5-2
	12-58	18-35	1.30-1.60	0.6-2.0	0.10-0.15	5.6-7.8	Moderate-----	0.24		
	58-72	---	---	---	---	---	----------	----		
Urban land.										
Ra----------	0-17	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.5	Low----------	0.20	5	1-6
Rains	17-62	18-35	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
	62-75	15-45	1.30-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.28		
Ru:										
Rains----------	0-17	5-20	1.30-1.60	2.0-6.0	0.10-0.14	4.5-6.5	Low----------	0.20	5	1-6
	17-62	18-35	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low----------	0.24		
	62-75	15-45	1.30-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low----------	0.28		
Urban land.										
St----------	0-12	5-18	1.40-1.60	2.0-20	0.10-0.15	3.6-5.5	Low----------	0.20	5	1-4
Stallings	12-45	5-18	1.40-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.17		
	45-75	2-18	1.50-1.60	2.0-20	0.06-0.15	3.6-5.5	Low----------	0.17		
To----------	0-15	5-18	1.35-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.15	5	3-10
Torhunta	15-36	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.15		
	36-60	2-18	1.45-1.65	6.0-20	<0.05	3.6-5.5	Low----------	0.10		
Ud.										
Udorthents										
Ut.										
Udults										
WaB----------	0-23	2-10	1.60-1.75	6.0-20	0.05-0.08	4.5-6.0	Low----------	0.15	5	.5-2
Wagram	23-77	10-35	1.35-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.20		
WkB----------	0-30	5-12	1.45-1.60	6.0-20	<0.05	4.5-6.0	Low----------	0.10	5	.5-1
Wakulla	30-43	2-8	1.45-1.60	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.10		
	43-90	2-8	1.45-1.60	6.0-20	<0.05	4.5-6.0	Low----------	0.10		
Wn----------	0-18	5-25	1.35-1.55	0.6-2.0	0.11-0.20	3.6-5.5	Low----------	0.20	5	2-5
Wilbanks	18-45	35-55	1.40-1.50	0.06-0.6	0.15-0.22	3.6-5.5	Moderate-----	0.24		
	45-65	---	0.40-0.65	0.06-6.0	0.35-0.45	3.6-5.5	Low----------	----		25-60
	65-80	---	---	---	---	---	----------	----		

TABLE 15.--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			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AuB: Autryville	A	None	---	---	4.0-6.0	Apparent	Jan-Apr	Low	High.
AyB: Aycock	B	None	---	---	4.0-6.0	Perched	Jan-Apr	Moderate	High.
Be: Bethera	D	None	---	---	+1-1.5	Apparent	Dec-Apr	High	High.
BnB: Blanton	A	None	---	---	5.0-6.0	Perched	Dec-Mar	High	High.
Br: Brookman	D	Frequent	Long	Nov-Apr	0-1.0	Apparent	Nov-May	Moderate	Moderate.
BuB: Butters	B	None	---	---	4.0-5.0	Apparent	Jan-Mar	Low	Moderate.
Ce: Centenary	A	None	---	---	3.5-5.0	Apparent	Dec-Mar	Moderate	High.
Ch:									
Chastain	D	Frequent	Very long	Dec-Apr	0-1.0	Apparent	Nov-May	High	High.
Chenneby	C	Frequent	Very brief	Dec-Apr	1.0-2.5	Apparent	Jan-Mar	High	Moderate.
Co: Coxville	D	None	---	---	0-1.5	Apparent	Nov-Apr	High	High.
CrB: Craven	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	High	High.
Ct: Croatan	D	Rare	---	---	0-1.0	Apparent	Dec-May	High	High.
Do: Dorovan	D	Frequent	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	High.
Ec: Echaw	A	None	---	---	2.5-5.0	Apparent	Nov-Apr	Low	High.
ExA: Exum	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Fo: Foreston	C	None	---	---	2.0-3.5	Apparent	Dec-Apr	Moderate	High.
GoA: Goldsboro	B	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Gr: Grantham	D	None	---	---	0-1.0	Apparent	Dec-May	High	High.
Gt: Grifton	D	None	---	---	0.5-1.0	Apparent	Dec-May	High	Low.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
GyB---------- Gritney	C	None---------	---	---	1.5-3.0	Perched	Dec-Apr	High-----	Moderate.
Jo---------- Johns	C	Rare---------	---	---	1.5-3.0	Apparent	Dec-Apr	Moderate	High.
Js---------- Johnston	D	Frequent----	Brief to long.	Nov-Jul	+1-1.5	Apparent	Nov-Jun	High-----	High.
KuB---------- Kureb	A	None---------	---	---	>6.0	---	---	Low------	Low.
LnB---------- Leon	B/D	None---------	---	---	0-1.0	Apparent	Nov-May	High-----	High.
Lu---------- Lumbee	B/D	Rare---------	---	---	0-1.5	Apparent	Nov-Apr	High-----	High.
Ly---------- Lynchburg	C	None---------	---	---	0.5-1.5	Apparent	Nov-Apr	High-----	High.
Me---------- Meggett	D	Frequent----	Long------	Dec-Apr	0-1.0	Apparent	Nov-Apr	High-----	Moderate.
Mk---------- Muckalee	D	Frequent----	Brief-----	Nov-Apr	0.5-1.5	Apparent	Dec-Mar	High-----	Moderate.
Mu---------- Murville	A/D	None---------	---	---	+1-1.0	Apparent	Nov-May	High-----	Moderate.
Na---------- Nahunta	C	None---------	---	---	1.0-2.5	Apparent	Dec-May	High-----	High.
Nk---------- Nakina	B/D	Rare---------	---	---	0-1.0	Apparent	Nov-Apr	High-----	Moderate.
NoA, NoB---------- Norfolk	B	None---------	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
NuB:									
Norfolk----------	B	None---------	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
Urban land.									
Pa---------- Pantego	B/D	None---------	---	---	0-1.5	Apparent	Dec-May	High-----	High.
Pe---------- Pender	C	None---------	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
Pu:									
Pender----------	C	None---------	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
Urban land.									
Ra---------- Rains	B/D	None---------	---	---	0-1.0	Apparent	Nov-Apr	High-----	High.
Ru:									
Rains----------	B/D	None---------	---	---	0-1.0	Apparent	Nov-Apr	High-----	High.
Urban land.									

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
St---------- Stallings	C	None--------	---	---	1.0-2.5	Apparent	Dec-Apr	High-----	High.
To---------- Torhunta	C	None--------	---	---	0.5-1.5	Apparent	Dec-May	High-----	High.
Ud. Udorthents									
Ut. Udults									
WaB---------- Wagram	A	None--------	---	---	>6.0	---	---	Low------	High.
WkB---------- Wakulla	A	None--------	---	---	>6.0	---	---	Low------	High.
Wn---------- Wilbanks	D	Frequent----	Brief-----	Nov-Mar	0-1.0	Apparent	Nov-Mar	High-----	High.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Autryville	Loamy, siliceous, thermic Arenic Paleudults
Aycock	Fine-silty, siliceous, thermic Typic Paleudults
Bethera	Clayey, mixed, thermic Typic Paleaquults
Blanton	Loamy, siliceous, thermic Grossarenic Paleudults
Brookman	Fine, mixed, thermic Typic Umbraqualfs
Butters	Coarse-loamy, siliceous, thermic Typic Paleudults
Centenary	Sandy, siliceous, thermic Grossarenic Entic Haplohumods
Chastain	Fine, mixed, acid, thermic Typic Fluvaquents
Chenneby	Fine-silty, mixed, thermic Fluvaquentic Dystrochrepts
Coxville	Clayey, kaolinitic, thermic Typic Paleaquults
Craven	Clayey, mixed, thermic Aquic Hapludults
Croatan	Loamy, siliceous, dysic, thermic Terric Medisaprists
Dorovan	Dysic, thermic Typic Medisaprists
Echaw	Sandy, siliceous, thermic Entic Haplohumods
Exum	Fine-silty, siliceous, thermic Aquic Paleudults
Foreston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Grantham	Fine-silty, siliceous, thermic Typic Paleaquults
Grifton	Fine-loamy, siliceous, thermic Typic Ochraqualfs
Gritney	Clayey, mixed, thermic Aquic Hapludults
Johns	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Aquic Hapludults
Johnston	Coarse-loamy, siliceous, acid, thermic Cumulic Humaquepts
Kureb	Thermic, uncoated Spodic Quartzipsamments
Leon	Sandy, siliceous, thermic Aeric Haplaquods
*Lumbee	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Ochraquults
Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Meggett	Fine, mixed, thermic Typic Albaqualfs
Muckalee	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Murville	Sandy, siliceous, thermic Typic Haplaquods
Nahunta	Fine-silty, siliceous, thermic Aeric Paleaquults
*Nakina	Fine-loamy, siliceous, thermic Typic Umbraqualfs
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
*Pender	Fine-loamy, siliceous, thermic Albaquic Hapludalfs
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Stallings	Coarse-loamy, siliceous, thermic Aeric Paleaquults
Torhunta	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Wagram	Loamy, siliceous, thermic Arenic Paleudults
Wakulla	Sandy, siliceous, thermic Psammentic Hapludults
*Wilbanks	Fine, mixed, acid, thermic Cumulic Humaquepts

* This soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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