SOIL SURVEY OF

New Hanover County, North Carolina

United States Department of Agriculture
Soil Conservation Service

In cooperation with
North Carolina Agricultural Experiment Station
and the
New Hanover County Board of Commissioners

How To Use This Soil Survey

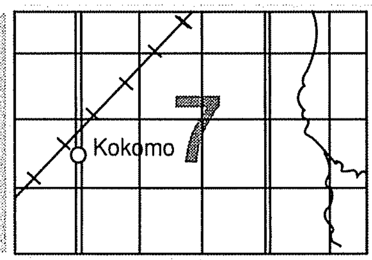
General Soil Map

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.

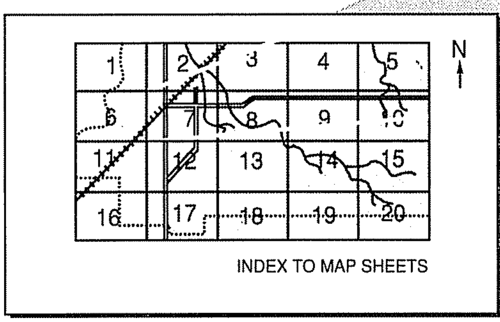
Detailed Soil Maps

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

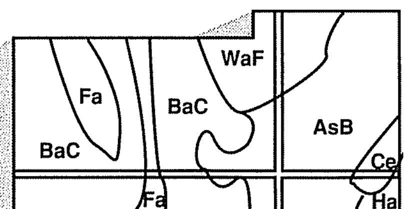
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute to individual soil surveys. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1970-72. Soil names and descriptions were approved in 1973. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service, the North Carolina Agricultural Experiment Station, and the New Hanover County Board of Commissioners. It is part of the technical assistance furnished to the Lower Cape Fear Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show the small areas of contrasting soils that could be shown on a larger mapping scale.

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Issued April 1977

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Summary of Tables

Foreword

The soil survey of New Hanover County can help you and your community to plan and to use wisely one of our most precious natural resources—the soil.

This soil survey is intended for many different users. It can help a homebuyer or developer determine soil-related hazards or limitations that affect homesites. It can help land-use planners determine the suitability of areas for homes or onsite sewage disposal systems. This survey can help a farmer estimate the potential crop or forage production of his land. It can be used to determine the suitability and limitations of soils for pipelines, buildings, landfills, recreation areas, and many other uses.

Many people assume that soils are all more or less alike. They are unaware that great differences in soil properties can occur, even within short distances. Soils may be seasonally wet or subject to flooding. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

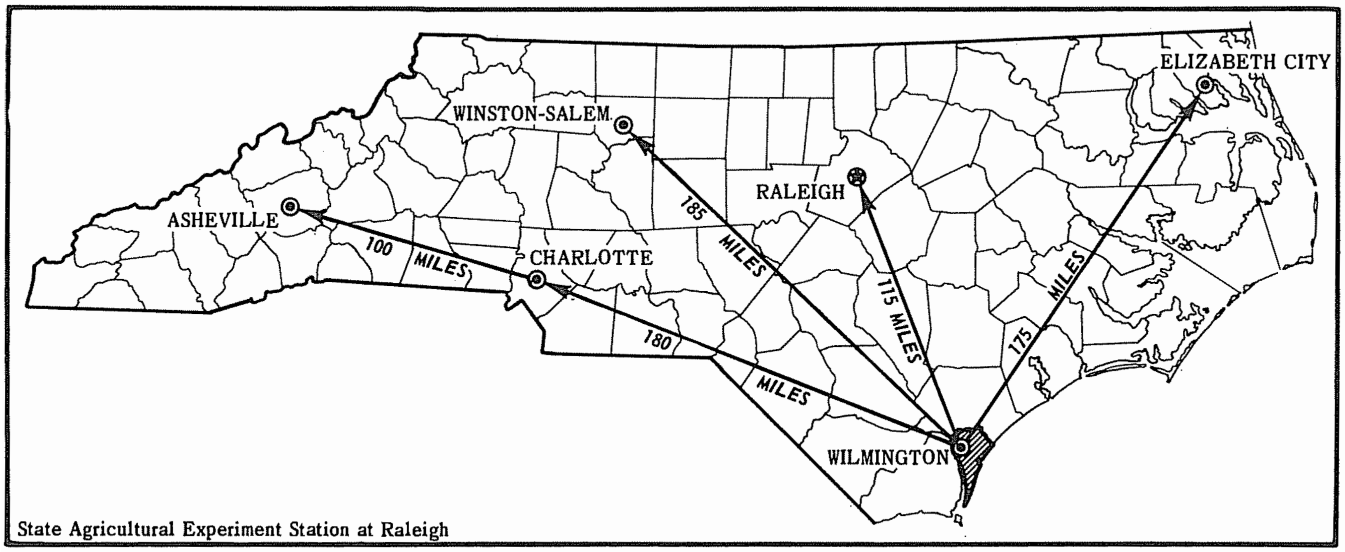
These and many other soil properties that affect land use are described in this soil survey. This publication also shows the location of broad areas of soils on the general soil map and the location of each kind of soil on detailed maps at the back. It provides descriptions of each kind of soil in the survey area, describes soil-related hazards and limitations, and gives much information on the suitability and potential of each soil for specific uses.

We cannot explain here all the ways this soil survey can help you. If you need additional information or assistance in using this survey, please call your local office of the Soil Conservation Service or the Cooperative Extension Service. The soil conservationist or soil scientist assigned to the Lower Cape Fear Soil and Water Conservation District or the county extension director can assist you.

We believe that this soil survey, along with other resource information, will enable you to have a better environment and a better life. The widespread use of this publication will greatly assist all of us in the conservation, development, and productive use of our soil, water, and related resources.

Jesse L. Hicks

State Conservationist
Soil Conservation Service



Location of New Hanover County in North Carolina

SOIL SURVEY OF NEW HANOVER COUNTY, NORTH CAROLINA

BY ARLIN WEAVER, SOIL CONSERVATION SERVICE

Soils Surveyed by Arlin Weaver, Clarence Brandon, and W. Everette Lynn, Jr.,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in
Cooperation with the North Carolina Agricultural Experiment Station and
the New Hanover County Board ot Commissioners

Introduction

New Hanover County is in the southeastern part of North Carolina (see opposite page). The county is 118,656 acres, or about 185 square miles, in size. According to the 1970 census, the population of the county was 82,996. Wilmington, the county seat, had a population of 46,169. It is one of the major ports along the Atlantic Coast.

New Hanover County is in the lower part of the Coastal Plain physiographic province. Elevation ranges from sea level to 60 feet. Most of the county is level to gently sloping, but short breaks separate the uplands from the flood plains and marshes.

New Hanover County is mainly industrial. There has been rapid, widespread urbanization over most of the county in recent years. Only a small percentage of the county is used for farms and pasture.

General Nature of the County

This section gives general facts about New Hanover County. It briefly discusses climate; water supply; settlement and development; transportation and industry; and community facilities.

Climate

New Hanover County is hot and humid in summer, but the coastal area of the county is frequently cooled by sea breezes. Winter is cool but has occasional brief cold spells. Rains occur throughout the year but are usually heaviest late in summer and early in fall. Annual precipitation is adequate for all crops.

Table 1 shows temperature and precipitation data for the county, as recorded at Wilmington for the period 1952 to 1974. Tables 2 and 3 show probable dates of the first and last freeze and the length of the growing season.

In winter the average temperature is about 47 degrees F, and the average daily minimum is 37 degrees. The lowest temperature on record, 10 degrees, occurred at Wilmington on December 13, 1962. In summer the average temperature is about 79 degrees F, and the average daily maximum is 88 degrees. The highest temperature on record, 104 degrees, was recorded on June 27, 1952.

Growing degree days, shown in table 1, are equivalent to "heat units." Starting in spring, growing degree days accumulate by the amount that the average temperature each day exceeds the 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, 32.86 inches, or 61 percent, usually falls during the period April through September, which includes the growing season for most crops. Two years in 10, the April-September rainfall is less than 26.51 inches. The heaviest 1-day rainfall during the period of record was 7.49 inches at Wilmington on September 27, 1958. Thunderstorms number about 45 each year, 27 of which occur in summer.

Snowfall is rare. In 36 percent of the winters, there is no measureable snowfall, and in 59 percent the total snowfall is less than 2 inches. The heaviest snowfall ever observed in 1 day was more than 11 inches.

The average relative humidity in midafternoon in spring is less than 55 percent, and during the rest of the year it is about 58 percent. Humidity is higher at night in all seasons, and the average at dawn is about 83 percent. The percentage of possible sunshine is 65 percent in summer and 59 percent in winter. The prevailing direction of the wind is from the south-southwest. Average annual windspeed is 9.2 miles per hour. Average windspeed is highest, 10.9 miles per hour, in April.

Every few years a hurricane crosses the county.

Water Supply

Ground water is obtained from three geologic formations that are associated with three geologic ages. These are the Pee Dee Formation of upper Cretaceous Age, the Castle Hayne Limestone Formation of Eocene age, and the surficial sands of post-Miocene age.

Settlement and Development

New Hanover County was established on November 27, 1729. The original area included what is now Onslow, Bladen, Duplin, Pender, and Brunswick Counties. New Hanover County has had its present boundaries since 1875 (*3*).

Early economic activitites in the county were based on two main natural resources, the soil and the forest. The most important sources of income were naval stores of tar, pitch, and turpentine, which were derived from the abundant supply of longleaf pine in the area. Lumber, shingles, barrel staves, and other products came from the large expanse of various trees in the county.

Transportation and Industry

Overland access to the county is provided by four major highways—U.S. 421 and U.S. 117 from the north, U.S. 17 from the east and west, and U.S. 74-76 from the west—and by the Seaboard Coast Line Railroad from the west, north, and east.

The manufacturing plants in the county provide a wide variety of products and services, such as clothing, electronic equipment, chemicals, pile fabrics, concrete, fertilizer, boilers and related equipment, automotive parts, shipbuilding, and ship repair.

Wilmington is North Carolina's major deepwater port and is open to navigation 24 hours a day. Cruise ships that travel to the West Indies and South America frequently leave and return to Wilmington. Large quantities of paper products, tobacco, cotton goods, fertilizer materials, lumber, foodstuffs, and other commodities are handled regularly for export. Petroleum products are regularly shipped in large quantities into Wilmington for distribution. Bulk storage for approximately 8,000,000 barrels of petroleum is available. Imports handled are mostly nitrates, molasses, sugar, hardwood, softwood, and burlap. The port is capable of handling ten ships at a time.

There are about 15 shopping centers in the county and more than 60 hotels and motels.

Community Facilities

Many public elementary and high schools, along with eight private schools, are located throughout New Hanover County. Cape Fear Technical Institute offers a large number of 2-year courses and specializes in the field of marine technology. The University of North Carolina at Wilmington is a fully accredited, tax-supported institution. A private business college is also located in the county and provides training in business administration, accounting, and secretarial science. The county also has 145 churches and 3 hospitals.

Tourist attractions include the famed Greenfield and Airlie Gardens, Fort Fisher, Battleship Memorial U.S.S. North Carolina, and Blockade Runner Museum. Several golf courses are located in the county.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are located, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes, the size of streams and the general pattern of drainage, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has been changed very little by leaching or by the action of plant roots.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Soil series commonly are named for towns or other geographic features near the place where they were first observed and mapped. Baymeade and Kureb, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in characteristics.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases.

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

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

Some mapping units are made up of soils of different series, or of different phases within one series, and some have little or no soil.

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. Existing ratings of suitabilities and limitations (interpretations) of the soils are field tested and modified as necessary during the course of the survey, and new interpretations are added to meet local needs. This is done mainly through field observations of behavior of different kinds of soil for different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and other information available from State and local specialists. For example, data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so to be readily useful to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation. Presenting the detailed information in an organized, understandable manner is the purpose of this publication.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in an association can occur in other associations, but in different patterns.

A map showing soil associations is useful to people who want to have a general idea of the soils in a survey area, who want to compare different parts of that area, or who want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide for broad planning of a watershed, a wooded tract, or a wildlife area or for broad planning of recreational facilities, community developments and such engineering works as transportation corridors. It is not a suitable map for detailed planning for management of a farm or field or for selecting the exact location of a road or building or other structure, because the soils within an association ordinarily vary in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey area are described on the pages that follow.

1. Dorovan-Johnston association

Very poorly drained soils that have a muck, loam, or sandy loam surface layer and a muck or sand underlying layer; in areas that are flooded by streams or tides

This association consists of long, broad and narrow areas on the flood plains of the Cape Fear and Northeast Cape Fear Rivers. Some of the areas are subject to daily and seasonal tidal flooding.

This association makes up 6 percent of the county. It is 60 percent Dorovan soils and 30 percent Johnston soils. Soils of minor extent make up 10 percent of the association and are chiefly Pamlico, Murville, Lynn Haven, Torhunta, and Woodington soils.

The nearly level Dorovan soils are very poorly drained. The surface layer is black muck. The underlying layer is black or very dark gray muck.

The nearly level Johnston soils are very poorly drained. The surface layer is black loam in the upper part and black sandy loam in the lower part. The underlying layer is light gray sand.

The major soils in this association are used for forest, and some small areas have been filled and used for industrial and residential sites.

A seasonal high water table, flooding, and high organic-matter content are the main limitations in the use and management of the major soils in this association.

2. Kureb-Baymeade-Rimini association

Excessively drained and well drained soils that have a sand and fine sand surface layer and a sand, fine sandy loam, and loamy fine sand subsoil or underlying layer; on uplands

This association consists of nearly level to sloping soils on the uplands. These soils are in the broad areas between the major streams. This association is dissected by many small streams and depressions.

This association occupies 25 percent of the county. It is 25 percent Kureb soils, 20 percent Baymeade soils, and 8 percent Rimini soils. Soils of minor extent make up 47 percent of this association and are chiefly Lakeland, Leon, Lynn Haven, Murville, and Wakulla soils.

The nearly level to sloping Kureb soils are excessively drained. The surface layer is dark gray sand. The subsurface layer is light gray sand. The underlying layer is brownish yellow sand in the upper part and pale brown sand in the lower part.

The nearly level to gently sloping Baymeade soils are well drained. The surface layer is dark gray fine sand. The subsurface layer is light gray fine sand in the upper part and very pale brown fine sand in the lower part. The subsoil is strong brown fine sandy loam in the upper part and strong brown loamy fine sand in the lower part. The underlying layer is mottled white and very pale brown fine sand in the upper part and very pale brown fine sand and loamy fine sand in the lower part.

The nearly level to gently sloping Rimini soils are excessively drained. The surface layer is dark gray sand. The subsurface layer is light gray sand. The subsoil is dark reddish bown sand in the upper part and dark brown sand in the lower part.

The major soils in this association are used for forest and for residential and industrial sites.

Very low available water capacity, moderately rapid and rapid permeability, leaching of plant nutrients, droughtiness, and soil blowing are the main limitations in the use and management of the major soils in this associaion.

3. Wrightsboro-Onslow-Kenansville association

Somewhat poorly drained to well drained soils that have a fine sandy loam, loamy fine sand, and fine sand surface layer and a sandy clay loam, clay, fine sandy loam, sandy loam, and clay loam subsoil; on uplands

This association consists of nearly level to gently sloping soils on broad, smooth flats on the uplands.

This association occupies 7 percent of the county. It is 22 percent Wrightsboro soils, 20 percent Onslow soils, and 15 percent Kenansville soils. Soils of minor extent make up 43 percent of this association and are chiefly Seagate, Stallings, Norfolk, Pantego, and Torhunta soils.

The nearly level Wrightsboro soils are moderately well drained. The surface layer is grayish brown fine sandy loam. The subsurface layer is very pale brown fine sandy loam. The subsoil is mottled brownish yellow sandy clay loam in the upper part and mottled light gray clay in the lower part.

The nearly level Onslow soils are moderately well drained and somewhat poorly drained. The surface layer is gray loamy fine sand. The subsurface layer is mottled dark brown and yellowish brown loamy sand in the upper part and mottled light yellowish brown loamy fine sand in the lower part. The subsoil is mottled light yellowish brown sandy clay loam in the upper part, mottled pale brown sandy loam in the middle part, and light gray clay loam in the lower part.

The nearly level to gently sloping Kenansville soils are well drained. The surface layer is grayish brown fine sand. The subsurface layer is fine sand that is pale brown in the upper part and mottled very pale brown in the lower part. The subsoil is strong brown fine sandy loam in the upper part and reddish yellow fine sandy loam in the lower part. The underlying material is yellow loamy fine sand.

The major soils in this association are used for cultivation, pasture and forest and for residential and industrial sites.

A seasonal high water table, moderate and moderately rapid permeability, leaching of plant nutrients, droughtiness, low available water capacity, and soil blowing are the main limitations in the use and management of the major soils in this association.

4. Kenansville-Craven-Lakeland association

Moderately well drained to excessively drained soils that have a sand, fine sand, or fine sandy loam surface layer and a fine sandy loam, clay loam, clay, and sand subsoil or underlying layer; on uplands

This association consists of nearly level to sloping soils on broad smooth flats on the uplands and on broad long ridges. The areas are dissected by many small drainageways.

This association occupies 3 percent of the county. It is 45 percent Kenansville soils, 20 percent Craven soils, and 15 percent Lakeland soils. Soils of minor extent make up 20 percent of this association and are chiefly Leon, Norfolk, Onslow, and Wrightsboro soils.

The nearly level to gently sloping Kenansville soils are well drained. The surface layer is grayish brown fine sand. The subsurface layer is fine sand that is pale brown in the upper part and mottled very pale brown in the lower part. The subsoil is strong brown fine sandy loam in the upper part and reddish-yellow fine sandy loam in the lower part. The underlying layer is yellow loamy fine sand.

The nearly level to gently sloping Craven soils are moderately well drained. The surface layer is dark gray fine sandy loam. The subsoil is mottled yellowish brown clay loam in the upper part, mottled light brownish gray clay loam in the middle part, and mottled light gray clay in the lower part. The underlying layer is mottled light gray sandy clay loam.

The nearly level to sloping Lakeland soils are excessively drained. The surface layer is grayish brown sand. The underlying layer is sand that is yellowish brown in the upper part and brownish yellow in the lower part.

The major soils in this association are used for cultivation, for forest, and for residential and industrial sites.

Low available water capacity, leaching of plant nutrients, permeability, soil blowing, erosion, seasonal wetness, and droughtiness are the main limitations in the use and management of the major soils in this association.

5. Tidal Marsh-Newhan association

Tidal Marsh and excessively drained soils that are sandy throughout; on flats and dunes along the seashore

This association consists of nearly level to gently sloping soils on dunes, commonly near beaches and waterways along the coast, and on flats between the coastal dunes and the interior uplands and along the Cape Fear River.

This association makes up 13 percent of the county. It is 53 percent Tidal Marsh and 25 percent Newhan soils. Soils of minor extent make up 22 percent of this association and are chiefly Urban land.

The Tidal Marsh is nearly level. The surface layer is black clay loam. The underlying layer is very dark gray and black silty clay loam.

The gently sloping Newhan soils are excessively drained. The surface layer is grayish brown fine sand. The underlying layer is light gray fine sand and sand.

Tidal Marsh is used as natural habitat for shore and water birds. Some areas are used for shellfish gardens. Many areas are dredged, filled, and converted to summer cottage sites and recreational areas. The Newhan soils are used as sites for year-round homes and summer beach cottages and as industrial and recreation sites.

Wetness and tidal flooding on the Tidal Marsh and permeability and droughtiness on the Newhan soils are the main limitations in the use and management of these soils.

6. Murville-Seagate-Leon association

Very poorly drained to somewhat poorly drained soils that have a fine sand and sand surface layer and a fine sand, sand, sandy loam, and clay loam subsoil; on uplands and stream terraces

This association consists of nearly level soils in flat or slightly depressional areas on rims of depressions and on broad smooth flats.

This association occupies 46 percent of the county. It is 26 percent Murville soils, 13 percent Seagate soils, and 13 percent Leon soils. Soils of minor extent make up 48 percent of this association and are chiefly Kureb, Lynn Haven, Onslow, Pamlico, Rimini, and Wakulla soils. Also, in areas adjacent to the towns, Urban land has been mapped with Baymeade, Kureb, Leon, and Seagate soils.

The nearly level Murville soils are very poorly drained. The surface layer and subsoil are black fine sand. The underlying layer is pale brown. It is fine sand in the upper part, sandy clay loam and sandy loam in the middle part, and fine sand in the lower part.

The nearly level Seagate soils are somewhat poorly drained. The surface layer is dark gray fine sand. The subsurface layer is light gray fine sand. The underlying layer is fine sand that is dark brown in the upper part, brown in the middle part, and light gray in the lower part. The subsoil is mottled brownish yellow sandy loam in the upper part and light gray clay loam in the lower part.

The nearly level Leon soils are poorly drained. The surface layer is very dark gray sand. The subsurface layer is light gray sand. The subsoil is dark reddish brown sand. The underlying material is light gray sand.

The major soils in this association are forested or are used as residential and industrial sites.

A seasonal high water table and leaching of plant nutrients are the main limitations in the use and management of the major soils in this association.

Soil Maps for Detailed Planning

The kinds of soil (mapping units) shown on the detailed soil maps at the back of this publication are described in this section. These descriptions together with the soil maps can be useful in determining the potential of soil and in managing it for food and fiber production, in planning land use and developing soil resources, and in enhancing, protecting, and preserving the environment. More detailed information for each soil is given in the section "Planning the Use and Management of the Soils."

Preceding the name of each mapping unit is the symbol that identifies the unit on the detailed soil map. Each mapping unit description includes general facts about the soil and a brief description of the soil profile. The potential of the soil for various major land uses is estimated. The principal hazards and limitations are indicated, and the management concerns and practices for the major uses are discussed.

A mapping unit represents an area on the landscape and consists of a dominant soil or soils for which the unit is named. Most mapping units have one dominant soil, but some have two or more dominant soils. A mapping unit commonly includes small, scattered areas of other soils. The properties of some included soils can differ substantially from those of the dominant soil or soils and thus greatly influence the use of the dominant soil. How the included soils may affect the use and management of the mapping unit is discussed.

In most areas surveyed there is land that has little or no identifiable soil and supports no vegetation. This land, called miscellaneous areas, is delineated on the map and given a descriptive name. Urban land is an example. Areas too small to be delineated are identified by special symbols on the soil maps.

The acreage and proportionate extent of each mapping unit are given in table 4, and additional information on each unit is given in interpretive tables in other sections (see "Summary of Tables"). Many of the terms used in describing soils are defined in the Glossary.

Soil Descriptions and Potentials

Ba—Bayboro loam. This nearly level, very poorly drained soil is on broad, smooth flats and in slight depressions on the uplands. The areas are small in size and irregular in shape. Most of the acreage is forested, and only a small acreage is used as residential areas. The dominant vegetation in the wooded areas consists of loblolly pine, pond pine, sweetgum, tupelo-gum, sweetbay, water oak, wax-myrtle, gallberry, greenbrier, and switchcane.

Typically, the surface layer is black loam 16 inches thick. The subsoil is about 56 inches thick. The upper part is very dark gray sandy clay loam, and the lower part is mottled gray clay loam.

Included with this soil in mapping are soils that are underlain by clay at a depth of 4 to 6 feet.

The organic-matter content of the surface layer is medium. Permeability is slow, available water capacity is high, and shrink-swell potential is moderate. Reaction is strongly acid or very strongly acid throughout, unless the soil is limed. The seasonal high water table is at or near the surface. Many areas are commonly flooded for brief periods.

A seasonal high water table, flooding, moderate shrink-swell potential, and slow permeability are the main limitations in the use and management of this soil. If this soil is drained, most lawn grasses and some varieties of shrubs are easily established. Some shrubs and trees, such as camellias and dogwood, may be difficult to establish because of wetness. Capability subclasses VIw, where undrained, and IIIw, where drained; woodland group 2w.

Be—Baymeade fine sand, 1 to 6 percent slopes. This well drained soil is on flats and low ridges that are on the uplands and in small areas that are along drainageways but are not subject to flooding. The areas are irregular in shape. Most of the acreage is used as residential and industrial sites, and the rest is forested. The dominant vegetation is longleaf pine, turkey oak, bluejack oak, post oak, dwarf waxmyrtle, dwarf huckleberry, and pineland three-awn. This vegetation increases in density on the lower slopes along with additional species, such as hickory, American holly, red oak, black oak, and bracken.

Typically, the surface layer is dark gray fine sand 3 inches thick. The subsurface layer is fine sand 33 inches thick. It is light gray in the upper part and very pale brown in the lower part. The subsoil is 22 inches thick. It is strong brown fine sandy loam in the upper part and strong brown loamy fine sand in the lower part. The underlying layer, to a depth of 78 inches, is mottled white and very pale brown fine sand in the upper part and very pale brown fine sand and loamy fine sand in the lower part.

Included with this soil in mapping are a few small areas of Norfolk, Kenansville, Seagate, and Wakulla soils.

The organic-matter content of the surface layer is very low. Permeability is moderately rapid, available water capacity is very low, and shrink-swell potential is low. Reaction is strongly acid to slightly acid throughout, unless the soil is limed. The seasonal high water table is at a depth of more than 4 feet.

Very low available water capacity, moderately rapid permeability, leaching of plant nutrients, droughtiness, and soil blowing are the main limitations in the use and management of this soil. If supplemental irrigation is not used, available moisture capacity in this soil is generally inadequate for the establishment and maintenance of most lawn grasses, shrubs, and trees. Soil conditioners may also be needed. Capability subclass IIIs; woodland group 3s.

Bh—Baymeade-Urban land complex, 1 to 6 percent slopes. This mapping unit is on the flats and low ridges of the upland and in small areas that are along the drainageways but are not subject to flooding. It consists of Baymeade soils and Urban land that are in areas so small and so intermingled that is was not practical to map them separately. About 35 to 45 percent of this mapping unit is Baymeade soils, and 30 to 50 percent is Urban land. The percentage of Urban land in the mapped areas is greater near the towns.

Typically, the surface layer of a Baymeade soil is dark gray fine sand 3 inches thick. The subsurface layer is fine sand 33 inches thick. It is light gray in the upper part and very pale brown in the lower part. The subsoil is 22 inches thick. It is strong brown fine sandy loam in the upper part and strong brown loamy fine sand in the lower part. The underlying layer, to a depth of 78 inches, is mottled white and very pale brown fine sand in the upper part and very pale brown fine sand and loamy fine sand in the lower part.

The Urban land part of this unit consists of areas where the original soils have been cut, filled, graded, or paved so that most soil properties have been altered to the extent that the soils cannot be identified. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, or parking lots, or for other purposes where buildings are closely spaced or the soil is covered with pavement. Slope is generally modified to fit the site needs, and it generally ranges from 0 to 6 percent. The extent of site modification varies greatly. Many areas are relatively undisturbed, but other areas have been cut and filled.

Included with these soils in mapping are small areas of Kureb, Leon, Seagate, Rimini, Lakeland, Murville, Lynn Haven, and Torhunta soils.

The runoff of the Urban land is greater than that of the Baymeade soils because of the impervious cover of buildings, streets, and parking lots.

Very low available water capacity, moderately rapid permeability, leaching of plant nutrients, droughtiness, and soil blowing are the main limitations in the use and management of these soils. If supplemental irrigation is not used, available water capacity in this soil is generally inadequate for the establishment and maintenance of most lawn grasses, shrubs, and trees. Soil conditioners may be needed. Capability subclass not assigned; Baymeade part in woodland group 3s, Urban land part not placed in a woodland group.

Bp—Borrow pits. Borrow pits consists of small areas where the soil has been removed and is used as a fill material around bridges, industrial sites, and other structures. Areas range in size from about 2 to 15 acres, but most areas are less than 5 acres. Most areas have not been reclaimed, and areas that are revegetated were done so by volunteer stands of grasses and trees. Capability subclass and woodland group not assigned.

Cr—Craven fine sandy loam, 1 to 4 percent slopes. This moderately well drained soil is on broad, smooth flats on the uplands and on short side slopes along drainageways. Areas are small in size and irregular in shape. Most of the acreage is used for residential or industrial sites. The rest is used for pasture or is forested. The native vegetation is American holly, various oaks, hickory, loblolly pine, sweetgum, sweetleaf, sweet pepperbush, waxmyrtle, and gallberry.

Typically, the surface layer is dark gray fine sandy loam 8 inches thick. The subsoil is 48 inches thick. The upper part is mottled yellowish brown clay loam, the middle part is mottled light brownish gray clay loam, and the lower part is mottled light gray clay. The underlying layer, to a depth of 64 inches, is mottled light gray sandy clay loam.

Included with this soil in mapping are a few areas of soils that have a sandy loam and loamy fine sand surface layer. Also included are small areas of soils that have a sandy surface layer, and a few small areas of Norfolk, Onslow, and Wrightsboro soils.

The organic-matter content of the surface layer is low. Permeability is slow, available water capacity is medium, and shrink-swell potential is moderate. The seasonal high water table is at a depth of 2 to 3 feet.

The clayey texture of the lower part of the subsoil, erosion, seasonal wetness, and slow permeability are the main limitations in the use and management of this soil. If drained, this soil is suited to most locally grown crops. The main crops are corn, soybeans, tobacco, and peanuts. Minimum tillage and crop residue management aid in maintaining organic-matter content. This soil has good tilth and can be worked over a wide range of moisture content, but tillage is delayed during wet seasons. Drainage is needed for most uses. Capability subclass IIIe; woodland group 3w.

DO—Dorovan soils. These nearly level, very poorly drained soils are in bays and in long, broad areas of tidal and stream flood plains. All of the acreage is used for woodland and as wildlife habitat. The native vegetation is red maple, willow, tupelo, cypress, sweetgum, ash, American cyrilla, and greenbrier.

Typically the surface layer is black muck 4 inches thick. The underlying layer, to a depth of 64 inches, is black or very dark gray muck.

Included with these soils in mapping are small areas of Johnston soils and Tidal marsh. A few small areas of soils that have thin, continuous mineral layers are also included.

The organic-matter content in the surface layer is very high. Permeability is very slow, available water capacity is very high, and shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout, unless the soils are limed. The seasonal high water table is at or near the surface. These soils are frequently flooded for very long periods.

Flooding and high organic-matter content are the main limitations in the use and management of these soils. If these soils are drained and tilled, the organic matter decomposes and the soil subsides. Capability subclass VIIIw; woodland group 4w.

JO—Johnston soils. These nearly level, very poorly drained soils are on flood plains of the major streams. Areas are commonly long and narrow. Most of the acreage is forested, and some small areas have been filled and used for industrial and residential sites. The native vegetation consists of pond pine, tupelo-gum, ash, water oak, cypress, red maple, sweetgum, American cyrilla, waxmyrtle, and gallberry.

Typically, the surface layer is 42 inches thick. It is black loam in the upper part and black sandy loam in the lower part. The underlying layer, to a depth of about 64 inches, is light gray sand.

Included with these soils in mapping are small areas of Pamlico, Dorovan, and Murville soils. A few small areas of soils that are less acid than these Johnston soils are also included.

The organic-matter content of the surface layer is high. Permeability is moderately rapid, available water capacity is high, and shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout, unless these soils are limed. The seasonal high water table is at or near the surface. These soils are frequently flooded for long periods.

A seasonal high water table and flooding are the main limitations in the use and management of these soils. These soils subside if drained and tilled. Capability subclasses VIIw, where undrained, and IVw, where drained; woodland group 1w.

Ke—Kenansville fine sand, 0 to 3 percent slopes. This well drained soil is on broad smooth flats on the uplands. Areas are commonly large in size and irregular in shape. Most of the acreage is cultivated. The rest is forested or is used for residential or industrial sites. The native vegetation consists of longleaf and loblolly pines; white, red, black, turkey, water, and bluejack oaks; hickory; dogwood; holly; and sassafras.

Typically, the surface layer is grayish brown fine sand 3 inches thick. The subsurface layer is fine sand 30 inches thick. It is is pale brown in the upper part and mottled very pale brown in the lower part. The subsoil is fine sandy loam 17 inches thick. It is strong brown in the upper part and reddish yellow in the lower part. The underlying layer, to a depth of 80 inches, is yellow loamy fine sand.

Included with this soil in mapping are a few small areas of Norfolk and Lakeland soils. Some small areas of soils that are less acid throughout are also included.

The organic-matter content of the surface layer is very low. Permeability is moderately rapid, available water capacity is low, and shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout, unless this soil is limed. The seasonal high water table is at a depth of more than 6 feet.

Leaching of plant nutrients, moderately rapid permeability, droughtiness, low available water capacity, and soil blowing are the main limitations in the use and management of this soil. This soil is well suited to most locally grown crops. The main crops are corn, soybeans, peanuts, tobacco, and truck crops, such as squash, lettuce, cucumbers, cabbage, snapbeans, and corn. Winter cover crops, minimum tillage, and crop residue management aid in maintaining organic-matter content and conserving moisture. Soil blowing is a concern in the management of this soil. The blowing sand often causes damage to young plants. This soil is droughty during periods of low rainfall. Some supplemental irrigation, soil conditioners, and fertilizers are needed for lawn grasses, shrubs, and trees. Capability subclass IIs; woodland group 3s.

Kr—Kureb sand, 1 to 8 percent slopes. This excessively drained soil is on long, broad ridges on the uplands. Areas are generally broad and long. Most of the acreage is forested. The rest is used for residential and industrial sites. The sparse native vegetation on the higher elevations is turkey oak, scattered longleaf pine, a few bluejack oaks, and scattered dwarf myrtle and huckleberry. Much of the area is barren of any vegetation, except for mosses and lichens. On the lower slopes, the vegetation increases in density and includes various oaks, scattered hickory, holly, and brackenfern.

Typically, the surface layer is dark gray sand 3 inches thick. The subsurface layer is light gray sand 23 inches thick. The underlying layer, to a depth of 89 inches, is brownish yellow sand in the upper part and pale brown sand in the lower part.

Included with this soil in mapping are small areas of Lakeland, Baymeade, Rimini, and Leon soils. Some small areas of soils that are generally at an elevation of less than 25 feet are also included. These soils have mixed mineralogy.

The organic-matter content of the surface layer is very low. Permeability is rapid, available water capacity is very low, and shrink-swell potential is low. Reaction is neutral to very strongly acid throughout, unless this soil is limed. The seasonal high water table is at a depth of more than 6 feet.

Very low available water capacity and rapid permeability are the main limitations in the use and management of this soil. This soil is very droughty. Irrigation, soil conditioners, and fertilizer are needed if lawn grasses, shrubs, and trees are to be established. Capability subclass VIIs; woodland group 5s.

Ku—Kureb-Urban land complex, 1 to 8 percent slopes. This mapping unit consists of areas of Kureb soils and Urban land that are too small and too intermingled to be mapped separately. About 30 to 40 percent of the acreage is Kureb soils, and about 30 to 35 percent is Urban land. The percentage of Urban land in the mapped areas is greatest near towns and around shopping centers.

Typically, the surface layer of a Kureb soil is dark gray sand 3 inches thick. The subsurface layer is light gray sand 23 inches thick. The underlying layer, to a depth of 89 inches, is brownish yellow sand in the upper part and pale brown sand in the lower part.

The urban land consists of areas where the original soil has been cut, filled, graded, or paved so that most soil properties have been altered to the extent that a soil series is not recognized. These areas are now used for shopping centers, factories, municipal buildings, apartment complexes, or parking lots, or for other purposes where buildings are closely spaced or soil is covered with pavement. Slope is generally modified to fit the site needs and commonly ranges from 0 to 5 percent. The extent of site modification varies greatly. Many areas are relatively undisturbed, but in the process of smoothing, high areas have been cut down and low areas have been filled.

Included in mapping are small areas of Lakeland, Baymeade, Leon, and Rimini soils. A few small areas of soils that have slopes greater than 8 percent are also included.

Runoff from Urban land is greater than that from Kureb soils, because of the impervious cover of buildings, streets, and parking lots.

Very low available water capacity and rapid permeability are the main limitations in the use and management of this unit. It is very droughty. Irrigation, soil conditioners, and fertilizer are needed if lawn grasses, shrubs, and trees are established. Capability subclass not assigned; Kureb part in woodland group 5s, Urban land part not placed in a woodland group.

La—Lakeland sand, 1 to 8 percent slopes. This excessively drained soil is on broad, long ridges on uplands. Areas generally are large in size and irregular in shape. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation on the higher elevations is dominantly turkey oak, bluejack oak, and sand post oak. Some scattered longleaf pine, dwarf myrtle, and huckleberry trees are also in these areas.

Typically the surface layer is grayish brown sand 2 inches thick. The underlying layer, to a depth of 80 inches, is sand that is yellowish brown in the upper part and brownish yellow in the lower part.

Included with this soil in mapping are small areas of Kureb, Baymeade, and Wakulla soils.

The organic-matter content of the surface layer is very low. Permeability is very rapid, available water capacity is low, and shrink-swell potential is very low. Reaction is medium acid to very strongly acid throughout where this soil is not limed. The seasonal high water table is at a depth of more than 6 feet.

Low available water capacity, leaching of plant nutrients, and soil blowing are the main limitations in the use and management of this soil. The soil is very droughty. Irrigation, soil conditioners, and fertilizers are needed if grasses, shrubbery, and trees are established. Capability subclass IVs; woodland group 3s.

Le—Leon sand. This nearly level, poorly drained soil is on rims of depressions, on smooth flats, and in indefinite patterns on the uplands and stream terraces. Areas are irregular in shape and are 5 to 250 acres in size. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation consists of longleaf pine, pond pine, sweetbay, water oak, winterberry, gallberry, bracken, and, in the more nearly open areas, a dense cover of pineland three-awn and creeping blueberry.

Typically the surface layer is very dark gray sand 3 inches thick. The subsurface layer is light gray sand 13 inches thick. The subsoil is dark reddish brown sand 24 inches thick. The underlying layer, to a depth of 64 inches, is light gray sand.

The organic-matter content of the surface layer is very low. Permeability is rapid in the surface layer, moderate to moderately rapid in the subsoil, and very rapid in the underlying layer. Available water capacity is low, and shrink-swell potential is very low. Reaction is strongly acid throughout, where this soil has not been limed. The seasonal high water table is at or near the surface.

A seasonal high water table and leaching of plant nutrients are the main limitations in the use and management of this soil. Most lawn grasses, shrubs, and trees are easily established and maintained. Some soil conditioners and liberal amounts of fertilizer may be needed in most areas. Capability subclass IVw; woodland group 4w.

Lo—Leon-Urban land complex. This mapping unit is on rims of depressions, on smooth flats, and in indefinite patterns on the uplands and stream terraces. It consists of areas of Leon soils and Urban land that are too small and too intermingled to be mapped separately. About 35 to 45 percent of the mapping unit is Leon soils, and about 30 to 50 percent is Urban land. The percentage of Urban land is greater near towns.

Typically, the surface layer of a Leon soil is very dark gray sand 3 inches thick. The subsurface layer is light gray sand 13 inches thick. The subsoil is dark reddish brown sand 24 inches thick. The underlying layer, to a depth of 64 inches, is light gray sand.

Urban land consists of areas where the original soil has been cut, filled, graded, or paved so that most soil properties have been altered to the extent that a soil series is not recognized. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, or parking lots, or for other purposes where buildings are closely spaced or soil is covered with pavement. Slope is generally modified to fit the site needs. The extent of site modification varies greatly. Many areas are relatively undisturbed, while other areas have been cut or filled.

Included in mapping are small areas of Seagate, Onslow, Rimini, Murville, Lynn Haven, Kureb, Lakeland, and Baymeade soils.

The runoff of the Urban Land part of this mapping unit is greater than that of the Leon soils because of the impervious cover of buildings, streets, and parking lots.

A seasonal high water table and leaching of plant nutrients are the main limitations in the use and management of this complex. Most lawn grasses, shrubs, and trees are easily established and maintained. Some soil conditioners and liberal amounts of fertilizer may be needed in most areas. Capability subclass not assigned; Leon part in woodland group 4w, Urban land part not placed in a woodland group.

Ls—Lynchburg fine sandy loam. This nearly level, somewhat poorly drained soil is on broad, smooth flats on the uplands. Areas are small in size and irregular in shape. Most of the acreage is used for residential or industrial sites. The rest is mainly forested. The dominant native vegetation consists of longleaf pine, loblolly pine, water oak, willow oak, red maple, waxmyrtle, short gallberry, tall gallberry, and sweet pepperbush.

Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The subsoil, to a depth of 64 inches, is very pale brown sandy clay loam in the upper part. The middle part is mottled, brownish yellow, light gray, and yellowish red sandy clay loam, and the lower part is mottled, light gray, brownish yellow, reddish yellow, and yellow clay loam.

Included with this soil in mapping are small areas of Rains, Stallings, Onslow, Woodington, and Wrightsboro soils.

The organic-matter content of the surface layer is low. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. Reaction is strongly acid or very strongly acid throughout if this soil has not been limed. The seasonal high water table is 1.5 feet from the surface.

Wetness is the main limitation in the use and management of this soil. Most lawn grasses, shrubs, and trees are easily established and maintained. Capability subclass IIw; woodland group 2w.

Ly—Lynn Haven fine sand. This nearly level, poorly drained soil is in broad, almost level to flat or depressional areas on uplands. Areas are irregular in shape and small to large in size. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation consists of longleaf pine, pond pine, red maple, water oak, American cyrilla, greenbrier, fetterbush, and pineland three-awn.

Typically, the surface layer is black fine sand 18 inches thick. The subsurface layer is gray fine sand 6 inches thick. The subsoil is 34 inches thick. It is sand that is black in the upper part, black and dark brown in the middle part, and dark brown and brown in the lower part. The underlying layer, to a depth of 75 inches, is pale brown sand in the upper part and light brownish gray sandy loam and dark greenish gray sandy clay in the lower part.

Included with this soil in mapping are small areas of Murville, Leon, and Torhunta soils.

The organic-matter content of the surface layer is low. Permeability is rapid in the surface layer and moderate and moderately rapid in the subsoil. Available water capacity is low, and shrink-swell potential is very low. Reaction is strongly acid to extremely acid throughout where this soil has not been limed. Unless this soil is artificially drained, the seasonal high water table is at or near the surface during periods of heavy rainfall. This soil is frequently flooded for brief periods.

A seasonal high water table is the main limitation in the use and management of this soil. Most lawn grasses, shrubs, and trees are fairly easily established and maintained. Some shrubs and trees, such as camellias and dogwood, may be unsuited because of wetness. Capability subclasses VIIw, where ponded, and IVw, where drained; woodland group 3w.

Mp—Mine Pits. Mine Pits consists of strip mines in the northern part of the county where soil material has been removed to a depth of 10 to 30 feet and the underlying marl has been removed to a depth of 20 to 70 feet. Active mining is still underway.

Some areas are covered with water, and other areas are continually pumped to keep the water level low enough for mining operations. Some areas are partially filled with water and covered with native vegetation, such as typha, sedges, and other annual weeds and grasses.

Reclamation of these areas is planned so that they may be used for recreation and as wildlife habitat. A few of these areas have been reclaimed and put to practical use. Capability subclass and woodland group not assigned.

Mu—Murville fine sand. This nearly level, very poorly drained soil is in flat or slightly depressional areas. Areas are irregular in shape and range from small to very large. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation is longleaf pine, pond pine, red maple, water oak, redbay, sweetbay, American cyrilla, greenbrier, and pineland three-awn.

Typically, the surface layer is black fine sand 8 inches thick. The subsoil is black fine sand 37 inches thick. The underlying material, to a depth of 70 inches, is pale brown fine sand in the upper part, sandy clay loam and sandy loam in the middle part, and fine sand in the lower part.

Included with this soil in mapping are small areas of Lynn Haven, Leon, and Pamlico soils. Also included are small areas of soils that have a much thicker subsoil than the Murville soils.

The organic-matter content of the surface layer is low. Permeability is rapid in the surface layer and moderately rapid in the subsoil. Available water capacity is low, and shrink-swell potential is low. The seasonal high water table is at or near the surface. This soil is frequently flooded for brief periods.

A seasonal high water table and rapid and moderately rapid permeability are the main limitations in the use and management of this soil. Most lawn grasses, shrubs, and trees are fairly easily established and maintained. Some shrubs and trees, such as camellias and dogwoods, may be unsuited because of wetness. Capability subclasses Vw, where drained, and VIIw, where ponded; woodland group 2w.

Nh—Newhan fine sand. This excessively drained soil is on dunes, commonly near beaches and waterways along the coast. Slopes are 2 to 6 percent. Most of the acreage is used for year-round homes and summer beach cottages and as industrial and recreation sites. The native vegetation consists of scattered waxmyrtle, eastern baccharis, yaupon, live oak, seaoats, cordgrass, marsh elder, beach pea, and hydrocotyle.

Typically, the surface layer is grayish brown fine sand 2 inches thick. The underlying layer, to a depth of 72 inches, is light gray fine sand and sand.

Included with this soil in mapping are small areas of Tidal Marsh and all of the coastal beach (figure 1, at end of section).

The organic-matter content of the surface layer is very low. Permeability is very rapid, available water capacity is very low, and shrink-swell potential is low. Reaction is neutral to mildly alkaline throughout. The seasonal high water table is at a depth of more than 6 feet.

Very low available water capacity and very rapid permeability are the main limitations in the use and management of this soil. Many species of shrubs are suited to this soil. Establishing and maintaining shrubs require soil conditioning and supplemental irrigation. Capability subclass VIIIs; not placed in a woodland group.

No—Norfolk fine sandy loam, 0 to 4 percent slopes. This well drained soil is on broad, smooth flats on the uplands. Areas are irregular in shape and are 5 to 50 acres in size. Most of the acreage is forested or is used as residential and industrial sites. The rest is cultivated. The native vegetation is water oak, red oak, black oak, post oak, hickory, dogwood, and holly.

Typically, the surface layer is grayish brown fine sandy loam 7 inches thick. The subsurface layer is pale brown loamy fine sand 5 inches thick. The subsoil is 58 inches thick. It is yellowish brown sandy clay loam in the upper part, mottled brownish yellow sandy loam in the middle part, and mottled yellowish brown sandy clay loam in the lower part. The underlying layer, to a depth of 120 inches, is mottled light gray clay in the upper part; mottled red, light gray, and yellow sandy loam in the middle part; and very pale brown stratified sand and loamy sand in the lower part.

Included with this soil in mapping are some small areas of Kenansville, Wrightsboro, Craven, and Stallings soils. Also included are soils that are less acid throughout than this Norfolk soil.

The soil is low in natural fertility and low in organic-matter content. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. The seasonal high water table is more than 6 feet below the surface.

Slope, surface runoff, and a hazard of erosion are the main limitations in the use and management of this soil. This soil is well suited to all locally grown crops. The main crops are corn, soybeans, tobacco, and peanuts (figure 2, at end of section). Winter cover crops, minimum tillage, and crop residue management aid in controlling runoff and erosion and maintaining tilth and organic-matter content. Conservation practices, such as maintaining drainageways in sod, establishing terraces and diversions, and rotating crops, also aid in conserving soil and water. Most lawn grasses, trees, and shrubs are easy to establish and maintain. Capability subclass IIe; woodland group 2o.

On—Onslow loamy fine sand. This nearly level, moderately well drained and somewhat poorly drained soil is on broad smooth flats on the uplands. Areas are irregular in shape and small in size. Most of the acreage is used as residential and industrial sites. The rest is forested (figure 3, at end of section). The dominant native vegetation is longleaf pine, loblolly pine, oaks, holly, hickory, dogwood, blackgum, waxmyrtle, sweet pepperbush, gallberry, and huckleberry.

Typically, the surface layer is gray loamy fine sand 7 inches thick. The subsurface layer is 10 inches thick. It is mottled dark brown and yellowish brown loamy sand in the upper part and mottled light yellowish brown loamy fine sand in the lower part. The subsoil is 47 inches thick. It is mottled light yellowish brown sandy clay loam in the upper part, mottled pale brown sandy loam in the middle part, and light gray clay loam in the lower part.

Included with this soil in mapping are small areas of Norfolk, Lynchburg, and Seagate soils.

The organic-matter content of the surface layer is low. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout where this soil is not limed. The seasonal high water table is at a depth of about 2 feet.

A seasonal high water table and moderate permeability are the main limitations in the use and management of this soil. This soil is well suited to all locally grown crops. The main crops are corn, soybeans, peanuts, and tobacco. Winter cover crops, minimum tillage, and crop residue management aid in maintaining organic-matter content. This soil has good tilth and can be worked over a fairly wide range of moisture content, but tillage is delayed during wet seasons. Some crops, such as tobacco, require drainage. Most lawn grasses, shrubs, and trees are fairly easily established and maintained. Capability subclass IIw; woodland group 2w.

Pm—Pamlico muck. This level or nearly level, very poorly drained soil is in broad, flat bay areas on uplands and along flood plains. Most of the acreage is forested. The rest is used for residential and recreation sites. The native vegetation consists of pond pine, bay trees, cypress, gum, red maple, American cyrilla, greenbrier, and gallberry.

Typically, the surface layer is very dark brown muck 3 inches thick. The underlying layer, to a depth of 60 inches, is very dark brown and black muck in the upper part and very dark grayish brown and gray sand in the lower part.

Included with this soil in mapping are small areas of Dorovan, Johnston, Murville, and Torhunta soils.

The organic-matter content of the surface layer is very high. Permeability is moderate, available water capacity is very high, and shrink-swell potential is low. The seasonal high water table is at or near the surface. This soil is frequently flooded for very long periods.

Wetness is the main limitation in the use and management of this soil. If the soil is drained, and if it is excessively dry, the burning of organic material and subsidence are limitations in the use and management of this soil. Unless this soil is drained, it is unsuited to use as residential and recreational sites. If this soil is drained and tilled, the organic matter decomposes and the soil subsides. Capability subclasses VIIw, where undrained, and IVw, where drained; woodland group 4w.

Pn—Pantego loam. This nearly level, very poorly drained soil is on broad, smooth flats and in slight depressions on the uplands. Areas are irregular in shape and small to large in size. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation is loblolly pine, pond pine, sweetgum, tupelo-gum, sweetbay, water oak, ash, red maple, waxmyrtle, greenbrier, switchcane, and bracken.

Typically, the surface layer is black loam 16 inches thick. The subsoil, to a depth of 100 inches, is gray sandy clay loam in the upper part and mottled gray clay loam in the lower part.

Included with this soil in mapping are small areas of Bayboro, Rains, and Woodington soils. Also included are some small areas of soils that have a combined surface layer and subsoil less than 60 inches thick.

The organic-matter content of the surface layer is medium. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. Reaction is strongly acid or very strongly acid throughout where this soil has not been limed. The seasonal high water table is at or near the surface.

A seasonal high water table and moderate permeability are the main limitations in the use and management of this soil. Most lawn grasses and some varieties of shrubs and trees are easily established and maintained. Some shrubs and trees, such as aucuba, camellia, and dogwood, may not be suited to these soils because of wetness. Capability subclasses VIw, where undrained, and IIIw, where drained; woodland group 1w.

Ra—Rains fine sandy loam. This nearly level, poorly drained soil is on broad smooth flats and in slight depressions on the uplands. Areas are irregular in shape and small in size. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation consists of loblolly pine, American holly, sweetgum, poplar, blackgum, water oak, willow oak, waxmyrtle, sweet pepperbush, and gallberry.

Typically, the surface layer is black fine sandy loam 5 inches thick. The subsoil is 59 inches thick. It is gray fine sandy clay loam in the upper part, mottled gray clay loam in the middle part, and mottled light gray clay in the lower part. The underlying layer, to a depth of 68 inches, is mottled light gray fine sandy loam.

Included with this soil in mapping are small areas of Torhunta, Pantego, Woodington, Lynchburg, and Wrightsboro soils.

The organic-matter content of the surface layer is low. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. The reaction is very strongly acid or strongly acid throughout where this soil has not been limed. The seasonal high water table is at or near the surface. This soil is frequently flooded for brief periods.

A seasonal high water table and flooding are the main limitations in the use and management of this soil. In areas that are drained, most lawn grasses, shrubs, and trees are easy to establish and maintain. Some shrubs and trees, such as camellias and dogwood, may be unsuited to this soil because of wetness. Capability subclasses Vw, where undrained, and IIIw, where drained; woodland group 2w.

Rm—Rimini sand, 1 to 6 percent slopes. This excessively drained soil is around the rims of bays and on broad smooth flats on the uplands. Areas are irregular in shape and small in size. Most of the acreage is forested. The rest is used for residential or industrial sites. The native vegetation consists of scattered longleaf pine, turkey oak, sand post oak, scattered dwarf myrtle, and huckleberry.

Typically, the surface layer is dark gray sand 3 inches thick. The subsurface layer is light gray sand 53 inches thick. The subsoil, to a depth of 80 inches, is dark reddish brown sand in the upper part and dark brown sand in the lower part.

Included with this soil in mapping are small areas of Lakeland, Kureb, and Leon soils. Also included are small areas of soils that have slopes of more than 6 percent.

The organic-matter content of the surface layer is very low. Permeability is moderate, available water capacity is very low, and shrink-swell potential is low. Reaction is strongly acid or very strongly acid throughout where this soil has been limed. The seasonal high water table is below a depth of 6 feet.

Droughtiness and leaching of plant nutrients are the main limitations in the use and management of this soil. Irrigation, soil conditioners, and fertilizer are needed to establish lawn grasses, shrubs, and trees. Capability subclass VIs; woodland group 5s.

Se—Seagate fine sand. This nearly level, somewhat poorly drained soil is on broad, smooth flats on uplands. Areas are irregular in shape and are small to large in size. Most of the acreage is used for residential and industrial sites. The rest is wooded. The native vegetation consists of turkey oak, post oak, red oak, water oak, longleaf pine, loblolly pine, waxmyrtle, gallberry, and pineland three-awn.

Typically, the surface layer is dark gray fine sand 8 inches thick. The subsurface layer is light gray fine sand 4 inches thick. Below this to a depth of 36 inches is fine sand that is dark brown in the upper part, brown in the middle part, and light gray in the lower part. The subsoil, to a depth of 66 inches, is mottled brownish yellow sandy loam in the upper part and light gray clay loam in the lower part.

Included with this soil in mapping are small areas of Onslow and Leon soils and a few small areas of soils that are poorly drained.

The organic-matter content of the surface layer is low. Permeability is rapid to a depth of 36 inches and moderately slow below. Available water capacity is low, and the shrink-swell potential is low. Reaction is medium acid to very strongly acid throughout where this soil has not been limed. The seasonal high water table is about 1.5 to 2.5 feet below the surface.

A seasonal high water table is the main limitation in the use and management of this soil. Supplemental irrigation and soil conditioners may be needed to establish lawns, shrubs, and trees. Capability subclass IIIw; woodland group 3w.

Sh—Seagate-Urban land complex. This mapping unit is on broad, smooth flats on uplands. It consists of areas of Seagate soils and Urban land that are too small and too intermingled to be mapped separately. About 35 to 45 percent of the mapping unit is Seagate soils, and about 30 to 50 percent is Urban land. The percentage of Urban land is greater near towns.

Typically, the surface layer of a Seagate soil is dark gray fine sand 8 inches thick. The subsurface layer is light gray fine sand 4 inches thick. Below this, to a depth of 36 inches, is fine sand that is dark brown in the upper part, brown in the middle part, and light gray in the lower part. The subsoil, to a depth of 66 inches, is mottled brownish yellow sandy loam in the upper part and light gray clay loam in the lower part.

Urban land consists of areas where the original soils have been cut, filled, graded, or paved so that most soil properties have been altered to the extent that a soil series is not recognized. These areas are now used for shopping centers, factories, municipal buildings, apartment complexes, or parking lots, or for other purposes where buildings are closely spaced or soil is covered with pavement. Slope is generally modified to fit the site needs. The extent of site modification varies greatly. Many areas are relatively undisturbed, other areas have been cut down, and still other areas have been filled.

Included in mapping are small areas of Leon, Onslow, Rimini, Torhunta, Murville, Lynn Haven, Kureb, Baymeade, and Lakeland soils.

Runoff is greater on Urban land than on the Seagate soils because of the impervious cover of buildings, streets, and parking lots.

A seasonal high water table is the main limitation in the use and management of this complex. Supplemental irrigation and soil conditioners may be needed to establish lawns, shrubs, and trees. Capability subclass not assigned; Seagate part in woodland group 3w, Urban land part not placed in a woodland group.

St—Stallings fine sand. This nearly level to gently sloping, somewhat poorly drained soil is on broad smooth flats and on low ridges on the uplands. Areas are small in size and irregular in shape. Most of the acreage is forested or is used for residential and industrial sites. The native vegetation consists of longleaf pine, water oak, willow oak, sweetgum, blackgum, red maple, waxmyrtle, and gallberry.

Typically, the surface layer is dark gray fine sand 8 inches thick. The subsurface layer is light yellowish brown fine sand 6 inches thick. The subsoil, to a depth of 68 inches, is mottled light yellowish brown fine sandy loam in the upper part. The middle part is mottled light gray and light brownish gray fine sandy loam, and the lower part is mottled pale yellow loamy fine sand and fine sandy loam.

Included with this soil in mapping are small areas of Leon, Lynn Haven, Seagate, and Rimini soils.

The organic-matter content of the surface layer is low. Permeability is moderately rapid, available water capacity is medium, and shrink-swell potential is low. Reaction is strongly acid or very strongly acid throughout where this soil is not limed. The seasonal high water table is 1.5 to 2.5 feet below the surface.

A seasonal high water table is the main limitation in the use and management of this soil. Most lawn grasses, shrubs, and trees are fairly easily established and maintained if supplementary irrigation is occasionally used during long dry spells. Capability subclass IIw; woodland group 2w.

TM—Tidal Marsh. This land type is on the nearly level flats between the coastal dunes and the interior uplands and along the Cape Fear River near Wilmington. Many areas are flooded daily by tides. Further inland the seawater is diluted with freshwater. Some areas are protected from the seawater by long expanses of sand dunes that do not have inlets from the ocean. The water table is at or above the surface most of the time. Most of the acreage is used as natural habitat for shore and water birds, and some areas are used for shellfish gardens. Many areas are being dredged, filled, and converted to summer cottage sites and recreational areas. The dominant vegetation in areas that are flooded daily by saltwater is smooth cordgrass. Further inland, in areas that are flooded by seawater that has been diluted by freshwater, the vegetation is a mixture of smooth cordgrass and black rush.

Typically, the surface layer is black clay loam about 18 inches thick. The underlying layer is very dark gray and black silty clay loam to a depth of more than 60 inches.

Included with these soils in mapping are areas along the Intracoastal Waterway that are sandy because of the deep dredging.

The organic-matter content of the surface layer is high. Reaction is neutral to mildly alkaline. In the areas flooded by saltwater, sulfur content is 80 to 130 parts per million and salt content is 1 or 2 percent. Capability subclass VIIIw; woodland group not assigned.

To—Torhunta loamy fine sand. This nearly level, very poorly drained soil is on broad smooth flats and in slight depressions on the uplands. Areas are small to large in size and irregular in shape. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation consists of loblolly pine, pond pine, bay trees, red maple, water oak, gum, waxmyrtle, and gallberry.

Typically, the surface layer is 20 inches thick. It is black loamy fine sand in the upper part and very dark gray loamy fine sand in the lower part. The subsoil is mottled light gray fine sandy loam 26 inches thick. The underlying layer, to a depth of 64 inches, is mottled light gray fine sand.

Included with this soil in mapping are small areas of Stallings, Murville, and Pantego soils.

The organic-matter content of the surface layer is medium. Permeability is moderately rapid, available water capacity is medium, and shrink-swell potential is low. Reaction is extremely acid to strongly acid throughout where this soil has not been limed. The seasonal high water table is at or near the surface. This soil is frequently flooded for long periods.

A seasonal high water table and flooding are the main limitations in the use and management of this soil. Most lawn grasses, shrubs, and trees are generally easily established and maintained. Some shrubs and trees may be unsuited to this soil because of wetness. Capability subclasses Vw, where undrained, and IIIw, where drained; woodland group 2w.

Ur—Urban land. Urban land consists of areas where the original soil has been cut, filled, graded, or paved so that most soil properties have been altered to the extent that a soil series is not recognized. These areas are now used for shopping centers, factories, municipal buildings, apartment complexes, or parking lots, or for other purposes where buildings are closely spaced or soil is covered with pavement.

Included in mapping are a few small areas between buildings where the soil has not been altered. Also included are parks and other areas within the city of Wilmington. Some of the areas between buildings are used for small lawns, gardens, and shrubbery. Capability subclass and woodland group not assigned.

Wa—Wakulla sand, 1 to 8 percent slopes. This somewhat excessively drained soil is on broad smooth flats on the uplands. Areas are small to large in size and irregular in shape. Most of the acreage is forested. The rest is used for residential and industrial sites. The native vegetation on the higher elevations consists of longleaf pine, loblolly pine, post oak, bluejack oak, turkey oak, dwarf huckleberry, and myrtle. On the lower elevations, the vegetation increases in density and includes hickory, holly, water oak, blackjack oak, and a few dogwood trees.

Typically, the surface layer is grayish brown sand 2 inches thick. The subsurface layer is light yellowish brown sand 28 inches thick. The subsoil is strong brown loamy sand 18 inches thick. The underlying layer, to a depth of 64 inches, is strong brown sand.

Included with this soil in mapping are a few small areas of Kureb, Baymeade, Kenansville, Lakeland, and Rimini soils.

The organic-matter content of the surface layer is very low. Permeability is rapid, available water capacity is very low, and shrink-swell potential is low. Reaction is strongly acid or medium acid throughout where this soil has not been limed. The seasonal high water table is below a depth of 6 feet.

Droughtiness, slope, and rapid permeability are the main limitations in the use and management of this soil. Supplemental irrigation and fertilizers are generally needed to establish and maintain lawn grasses, shrubs, and trees. Capability subclass IIIs; woodland group 3s.

Wo—Woodington fine sandy loam. This nearly level, poorly drained soil is on broad smooth flats on the uplands. Areas are small in size and irregular in shape. Most of the acreage is forested or is used for residential and industrial sites. The native vegetation consists of loblolly pine, longleaf pine, pond pine, sweetgum, water oak, willow oak, poplar, waxmyrtle, eastern baccharis, American holly, gallberry, and sweet pepperbush.

Typically, the surface layer is very dark gray fine sandy loam 7 inches thick. The subsoil, to a depth of 65 inches, is mottled light brownish gray fine sandy loam in the upper part. The middle part is mottled gray fine sandy loam, and the lower part is mottled very pale brown fine sandy loam.

Included with this soil in mapping are small areas of Wrightsboro, Lynchburg, Seagate, and Stallings soils.

The organic-matter content of the surface layer is low. Permeability is moderately rapid, available water capacity is medium, and shrink-swell potential is low. The reaction is strongly acid or very strongly acid where this soil has not been limed. The seasonal high water table is at or near the surface.

A seasonal high water table and moderately rapid permeability are the main limitations in the use and management of this soil. Most lawn grasses, shrubs, and trees are easily established and maintained. Some trees, such as dogwood, may not be suited to this soil because of wetness. Capability subclasses VIw, where undrained, and IIIw, where drained; woodland group 2w.

Wr—Wrightsboro fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is on broad, smooth flats on the uplands. Areas are small to large in size and are irregular in shape. About half of the acreage is cultivated or is used for pasture. The rest is used as residential and industrial sites or is forested (figure 4, at end of section). The native vegetation is loblolly pine, longleaf pine, water oak, willow oak, sweetgum, waxmyrtle, gallberry, sweet pepperbush, dogwood, and holly.

Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The subsurface layer is very pale brown fine sandy loam 3 inches thick. The subsoil, to a depth of 65 inches, is mottled brownish yellow sandy clay loam in the upper part and mottled light gray clay in the lower part.

Included with this soil in mapping are small areas of Norfolk and Lynchburg soils and a few small areas of soils that have a higher clay content than this Wrightsboro soil.

The organic-matter content of the surface layer is low. Permeability is moderate, available water capacity is medium, and shrink-swell potential is low. Reaction is very strongly acid to medium acid throughout where this soil is not limed. The seasonal high water table is about 2 to 3 feet below the surface.

A seasonal high water table and moderate permeability are the main limitations in the use and management of this soil. This soil is well suited to most locally grown crops. The main crops are corn, soybeans, peanuts, tobacco, and truck crops, such as squash, lettuce, cucumbers, cabbage, greens, snap beans, and corn. Winter cover crops, minimum tillage, and crop residue management aid in maintaining tilth and organic-matter content. This soil has good tilth and can be worked throughout a fairly wide range of moisture content, but tillage is delayed during wet seasons. Some crops, such as tobacco, require drainage. Most lawn grasses, shrubs, and trees are generally easily established and maintained. Capability subclass IIw; woodland group 2w.

Planning the Use and Management of the Soils

The soil survey is a detailed analysis and evaluation of the most basic resource of the survey area—the soil. It may be used to fit the use of the land, including urbanization, to the limitations and potentials of the natural resources and the environment and to help avoid soil-related failures in uses of the land.

During a soil survey soil scientists, conservationists, engineers, and others keep extensive notes, not only about the nature of the soils but also about unique aspects of behavior of these soils in the field and at construction sites. These notes include observations of erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors relating the kinds of soil and their productivity, potentials, and limitations under various uses and management. In this way field experience incorporated with measured data on soil properties and performance is used as a basis for predicting soil behavior.

Information in this section will be useful in applying basic facts about the soils to plans and decisions for use and management of soils for crops and pasture, range, woodland, and many nonfarm uses, including building sites, highways and other transportation systems, sanitary facilities, parks and other recreational developments, and wildlife habitat. From the data presented, the potential of each soil for specified land uses may be determined, soil limitations to these land uses may be identified, and costly failures in homes and other structures, because of unfavorable soil properties, may be avoided. A site can be selected where the soil properties are favorable, or practices can be planned that will overcome the soil limitations.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area, and on the environment. Both of these factors are closely related to the nature of the soil. Plans can be made to maintain or create a land use pattern in harmony with the natural soil.

Contractors can find information useful in locating sources of sand and gravel, road fill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, trees and shrubs, and most other uses of land are influenced by the nature of the soil.

Crops

The major management concerns when using the soils for crops are described in this section. In addition, the crops best adapted to the soil are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the predicted yields of the main crops are presented for each soil.

This section provides information about the overall agricultural potential and needed practices in the survey area for those in the agribusiness sector—equipment

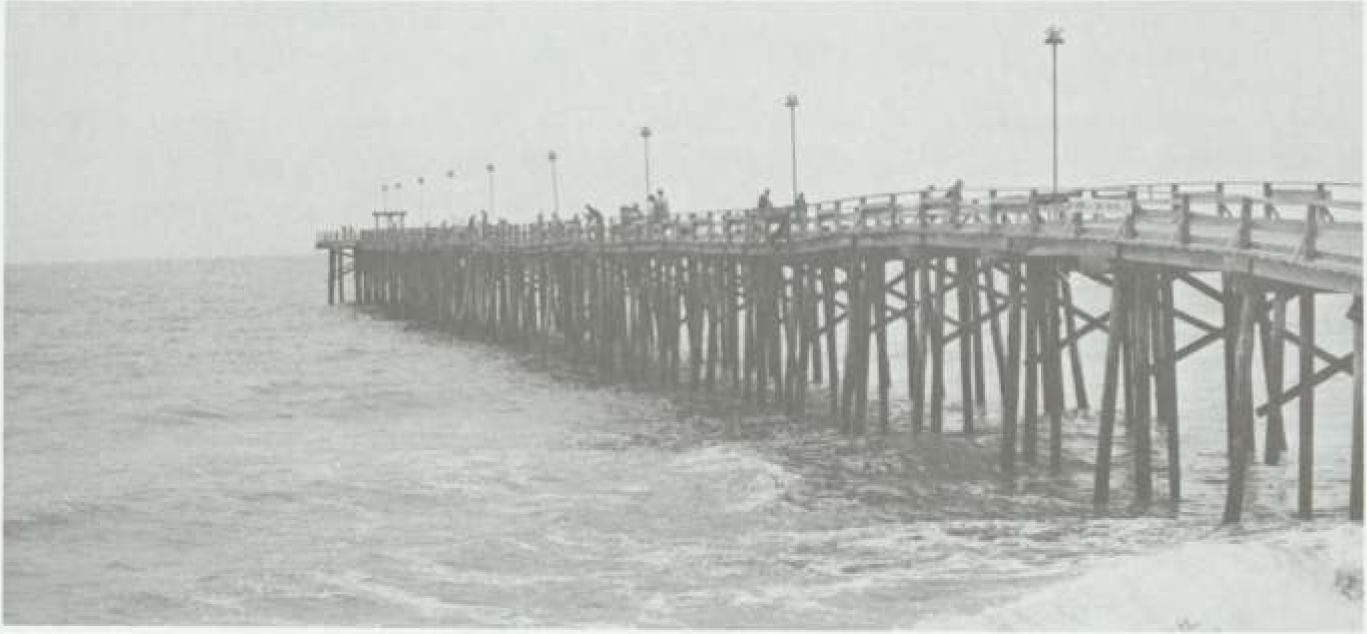


Figure 1. —Fishing pier at Carolina Beach.

Figure 2. —Corn and soybeans on Norfolk fine sandy loam, 0 to 4 percent slopes.

Figure 3. —Longleaf pine trees on Onslow loamy fine sand.

Figure 4. —Foreground shows streets being cut for a residential development in an area that had been used for farming.

dealers, drainage contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil Maps for Detailed Planning." Plans for management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Yields Per Acre

The per acre average yields 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 table 5 because of seasonal variations in rainfall and other climatic factors. Absence of a yield estimate indicates that the crop is not suited to or not commonly grown on the soil or that irrigation of a given crop is not commonly practiced on the soil.

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

The latest soil and crop management practices used by many farmers in the county are assumed in predicting the yields. A few farmers may be using more advanced practices and obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends upon the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; for effective use of crop residue, barnyard manure, and green-manure crops; for harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

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

Crops other than those shown in table 5 are grown in the survey area, but because their acreage is small, predicted yields for these crops are not included. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the productivity and management concerns of the soils for these crops.

Capability Classes and Subclasses

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. This classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineerng purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. Only the capability 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, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

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

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 landforms have limitations that nearly preclude their use for commercial plants.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty or stony; and *c*, used in only some parts of the United States, but not in New Hanover County, shows that the chief limitation is climate that is too cold or too dry.

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

The capability subclass is identified in the description of each soil mapping unit in the section "Soil Maps for Detailed Planning."

Woodland Management and Productivity

Table 6 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for those soils suitable for wood crops are listed alphabetically by soil name, and the woodland group for each soil is given. All soils in the same group require the same general kinds of woodland management and have about the same potential productivity.

The first part of the woodland group symbol, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates no significant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the order in which the letters are listed above—x, w, t, d, c, s, f, and r.

In table 6 the soils are also rated for a number of factors to be considered in management. The ratings of slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well-managed woodland. The risk is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competiion is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable trees on a soil is expressed as a site index. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in tables in this section are based on test data and estimated data in the "Soil Properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

Based on the information assembled about soil properties, ranges of values may be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values may be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to—(1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternate sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, ratings of the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have different meanings in soil science and in engineering; the Glossary defines many of these terms.

Building Site Development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal water table, the texture and consistence of soils, the tendency of soils to cave in or slough, and the presence of very firm, dense soil layers. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation do not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Slope is also an important consideration in the choice of sites for these structures and was considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO and Unified classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, and depth to very compact layers, all of which affect stability and ease of excavation, were also considered.

Sanitary Facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that deal with the ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for these uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is indicated by the rating *slight*, soils are favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect the absorption of the effluent are permeability, depth to seasonal high water table, and susceptibility to flooding. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel at a depth of less than 4 feet below the tilelines. In these soils the absoption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated. Soils having a hazard of inadequate filtration are indicated by footnotes in table 8.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it may be possible to install special systems that lower the seasonal water table or to increase the size of the absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor area surrounded by cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil at least 4 feet thick for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that are very high in organic matter are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope and susceptibility to flooding also affect the location of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste, either in excavated trenches or on the surface of the soil. The waste is spread, compacted in layers, and covered with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling the trenches. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 8 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

In addition to these features, the soils selected for final cover of landfills should be suitable for growing plants. In comparison with other horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Construction Materials

The suitability of each soil as a source of road fill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Road fill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within the profile. The estimated engineering properties in table 13 provide more specific information about the nature of each horizon that can help determine its suitability for road fill.

According to the Unified soil classification system, soils rated *good* have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*, regardless of the quality of the suitable material.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are low in content of gravel and other coarse fragments and have gentle slopes. They are low in soluble salts, which can limit plant growth. They are naturally fertile or respond well to fertilization. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel or soluble salt.

Soils rated *poor* are very sandy soils, very firm clayey soils, soils with suitable layers less than 8 inches thick, soils having large amounts of gravel or soluble salt, steep soils, and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is much preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter. Consequently, careful preservation and use of material from these horizons is desirable.

Water Management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the rated use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance are required.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by the permeability and depth over fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and is of favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water created by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability, texture, structure, depth to claypan or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff and allow the water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity of slope and steepness, depth to bedrock or other unfavorable material, permeability, ease of establishing vegetation, and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff at nonerosive velocities to outlets. Features that affect the use of soils for waterways are slope, permeability, erodibility, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreational use by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 11 the limitations of soils are rated as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling tent and parking areas, stablizing 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 for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and not wet nor subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

The design and layout of *paths and trails* for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes.

Wildlife Habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populates an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife will either be scarce or will not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering the natural establishment of desirable plants.

In table 12 the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, sorghum, wheat, oats, millet, soybeans, and sunflowers. The major soil properties 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, stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, lovegrass, ryegrass, panicgrass, clover, trefoil, and annual lespedeza. Major soil properties 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.

Wild herbaceous plants are native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are tickclover, ragweed, wild strawberry, and pokeweed. Major soil properties 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.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are oak, poplar, sweetgum, dogwood, persimmon, sassafras, sumac, hickory, blackberry, grape, viburnum, and greenbriers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are autumn-olive and crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, yew, cedar, and juniper. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, saltgrass, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, and other wildlife ponds. Major soil properties affecting shallow water areas are wetness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Open-land habitat consists of croplands, pastures, 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 kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, red fox, and woodchuck.

Woodland habitat consists of hardwoods or conifers or a mixture of both, with associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are marsh rabbit, woodpeckers, tree squirrels, raccoon, and deer.

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, shore birds, rails, muskrat, and mink.

Soil Properties

Extensive data about soil properties collected during the soil survey are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of samples selected from representative soil profiles in the field.

When he makes soil borings during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in-place under the existing soil moisture conditions. He records the root depth of existing plants; determines soil pH, or reaction; and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to characterize key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many of the soil series are available from nearby areas.

Based on summaries of available field and laboratory data, and listed in tables in this section, are estimated ranges in engineering properties and classifications and in physical and chemical properties for each major horizon of each soil in the survey area. Also, pertinent soil and water features, engineering test data, and data obtained from laboratory analyses, both physical and chemical, are presented.

Engineering Properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties of each horizon is given for each soil series in "Soil Series Descriptions and Morphology."

Texture is described in table 13 in standard terms used by the United States Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified soil classification system (Unified) (*2*) and the American Association of State Highway and Transportation Officials soil classification system (AASHTO) (*1*). In table 13 soils in the survey area are classified according to both systems.

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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified as one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. The AASHTO classification for soils tested in the survey area is given in table 16. The estimated classification, without group index numbers, is given in table 13.

Also in table 13 the percentage, by weight, of cobbles, the rock *fragments more than 3 inches* in diameter, are estimated for each major horizon. These estimates are determined largely by observing volume percentage in the field and then converting it, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four standard sieves is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistency of soil. These indexes are used in both the Unified and the AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior.

Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and Chemical Properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 14, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Soil and Water Features

Features that relate to runoff or infiltration of water, to flooding, to grading and excavation, and to subsidence and frost action of each soil are indicated in table 15. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table.

Flooding is rated in general terms that describe the frequency and duration of flooding and the period of the year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding; local information about floodwater heights and the extent of flooding; and local knowledge that relates the unique landscape position of each soil to historic floods.

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or the upper part of the ground water table; and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not to construct basements and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Engineering Test Data

Samples of 5 soils were tested by the North Carolina State Highway Commission so that the soils could be evaluated for engineering purposes. For the soil series not tested, classification was estimated from descriptions of soil profiles written by the soil scientists. The test data are given in table 16. The test data indicate the characteristics of the soil at the specified location. The physical characteristics of similar soils at other locations may vary from those of the soil sampled. All samples were obtained at a depth of less than 7 feet.

The engineering classifications in table 16 are based on data obtained by mechanical analyses and by tests made to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods.

Moisture-density data are obtained by compacting soil material at a successively higher moisture content. Assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest density obtained in the compaction test is termed "maximum dry density." Optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The tests to determine plastic limit and liquid limit measure the effect of water on the consistency of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. The plasticity index indicates the range of moisture content within which soil material is in a plastic condition.

Classification of the Soils

This section describes the soil series of the survey area, defines the current system of classifying soils, and classifies the soils of the area according to that system.

Soil Series

On the following pages each soil series in the survey area is described in detail. The series descriptions are presented in alphabetic order by series name.

For each series, some facts about the soil are presented first. Then a pedon, a small three dimensional area of soil typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*4*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series mapped in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil Maps for Detailed Planning."

Bayboro series

The Bayboro series consists of very poorly drained, slowly permeable, nearly level soils that formed in marine and fluvial sediments. These soils are on flats and in slight depressions. Slopes are 0 to 2 percent.

Typical pedon of Bayboro loam 6.5 miles north of Wilmington on U.S. Highway 117, 0.5 mile east of U.S. Highway 117, on North Carolina Horticultural Crops Research Farm:

A1—0 to 16 inches, black (10YR 2/1) loam; moderate medium and coarse granular structure; friable; strongly acid; clear wavy boundary.

B1g—16 to 19 inches, very dark gray (10YR 3/1) sandy clay loam; few fine distinct brownish yellow mottles; weak medium subangular blocky structure; friable; few faint clay films on peds; very strongly acid; gradual wavy boundary.

B2tg—19 to 56 inches, gray (10YR 5/1) clay loam; many fine and medium distinct strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure that parts to moderate medium angular blocky structure; firm, very sticky, very plastic; common amounts of A1 material in root channels and between primary structural aggregates; faces of primary structural aggregates are dark gray (10YR 4/1); prominent clay films on faces of peds; common fine roots mainly between faces of primary structural aggregates; very strongly acid; gradual wavy boundary.

B3g—56 to 72 inches, gray (10YR 6/1) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; few fine roots; very strongly acid.

The Ap or A1 horizon is black or very dark gray loam or fine sandy loam. The B1 horizon is very dark gray or dark gray sandy clay loam or clay loam. The B2 horizon is gray or dark gray clay loam, clay, or sandy clay. The B3 horizon is gray or light gray clay loam or sandy clay loam. The C horizon, if present, is dominantly gray and ranges from sand to clay.

Baymeade series

The Baymeade series consists of well drained, moderately rapidly permeable, nearly level and gently sloping soils that formed on flats and low ridges. Slopes are 1 to 6 percent.

Typical pedon of Baymeade fine sand, 1 to 6 percent slopes, in Wilmington, 0.5 mile south of Dawson and Sixteenth Street intersection, on west side of Sixteenth Street road cut:

A1—0 to 3 inches, dark gray (10YR 4/1) fine sand; weak granular structure; loose; many fine and medium roots; many uncoated sand grains; medium acid; abrupt smooth boundary.

A2—3 to 12 inches, light gray (10YR 7/2) fine sand; single grained; loose; many fine and medium roots; slightly acid; gradual wavy boundary.

A2&Bh—12 to 36 inches, very pale brown (10YR 7/4) fine sand; single grained; loose common irregular bodies of friable organic coated sand that are dark brown (7.5YR 3/2) and brown (7.5YR 4/4) make up about 12 percent of this horizon; many fine and medium roots; medium acid; abrupt smooth boundary.

B2t—36 to 49 inches, strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable; many fine and medium roots; medium acid; gradual wavy boundary.
B3—49 to 58 inches, strong brown (7.5YR 5/6) loamy fine sand; weak fine granular structure; very friable; few fine roots; medium acid; gradual wavy boundary.
C1—58 to 75 inches, mottled white (10YR 8/1) and very pale brown (10YR 7/4) fine sand; single grained; loose; medium acid; gradual wavy boundary.
C2—75 to 78 inches, very pale brown (10YR 8/3) fine sand and loamy fine sand; single grained; loose; medium acid.

The A1 horizon is dark gray or gray and has some clean white sand grains. The A2 horizon is light gray or white. The Bh part of the A2&Bh horizon is very pale brown, brown, dark brown, very dark brown, or black and has organic coatings. The B2t horizon is strong brown, brown, reddish yellow, or light olive brown fine sandy loam or sandy clay loam. In some pedons this horizon occurs as lamellae of fine sand and fine sandy loam with a composite thickness of more than 6 inches. The B3 horizon is strong brown, reddish yellow, brownish yellow, or olive yellow. The C horizon is white, very pale brown, yellow, light gray, or brownish yellow fine sand or loamy fine sand. Some pedons have thin discontinuous Bh bodies in the C horizon.

Craven series

The Craven series consists of moderately well drained, slowly and very slowly permeable, nearly level and gently sloping soils that formed on flats and side slopes on uplands. Slopes are 1 to 4 percent.

Typical pedon of Craven fine sandy loam, 1 to 4 percent slopes, 0.6 mile northwest from Masonboro on State Road 1515, and about 600 feet north of State Road 1515 on farm road, 100 feet east of farm road:

Ap—0 to 8 inches, dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; common medium and large roots; strongly acid; abrupt smooth boundary.
B21t—8 to 20 inches, yellowish brown (10YR 5/6) clay loam; few medium distinct reddish yellow (7.5YR 6/8) mottles; moderate coarse angular blocky structure; very firm, very sticky, very plastic; continuous silt and clay coating on faces of peds; common medium and large roots; strongly acid; gradual wavy boundary.
B22t—20 to 28 inches, yellowish brown (10YR 5/6) clay loam; many medium distinct yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) mottles, and common medium faint light brownish gray (10YR 6/2) mottles; moderate coarse angular blocky structure; very firm, very sticky, very plastic; continuous clay films on faces of peds; few medium and large roots; very strongly acid; gradual wavy boundary.
B23tg—28 to 44 inches, light brownish gray (10YR 6/2) clay loam; common medium prominent red (2.5YR 5/8) and common medium distinct strong brown (7.5YR 5/8) mottles; moderate fine and medium angular blocky structure; very firm, very sticky, very plastic; prominent clay films on faces of peds; very strongly acid; abrupt smooth boundary.
IIB24tg—44 to 56 inches, light gray (10YR 7/1) clay; common medium prominent red (2.5YR 4/8) and common medium distinct strong brown (7.5YR 5/8) mottles; massive and weak medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; very strongly acid; gradual wavy boundary.
IICg—56 to 64 inches, light gray (10YR 7/1) sandy clay loam with pockets of sandy loam; few medium distinct yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) mottles; massive; friable; very strongly acid.

The A1 or Ap horizon is gray, dark gray, or dark grayish brown fine sandy loam or loam. If present, the A2 horizon is pale brown or very pale brown loamy fine sand or fine sandy loam. The B21t and B22t horizons are brownish yellow, yellowish brown, or light yellowish brown clay loam, clay, and silty clay. The B23tg horizon is brownish yellow, strong brown, yellowish red, light brownish gray, or light gray clay loam and clay. The B24tg horizon is light gray or very pale brown clay, clay loam, or sandy clay loam. The C horizon is light gray or gray sandy clay loam, sandy loam, or sand.

Craven soils in New Hanover County have slightly less clay in the upper part of the B2t horizon than is defined as within the range for the series. This difference, however, does not significantly alter their usefulness or behavior.

Dorovan series

The Dorovan series consists of very poorly drained, very slowly permeable, nearly level soils that formed on tidal and stream flood plains and in bays. Slopes are less than 1 percent.

Typical pedon of Dorovan muck in an area of Dorovan soils west of Wilmington from north bridge along U.S. Highway 421 north to railroad crossing, about 100 feet west of U.S. Highway 421 and 50 feet north of railroad:

Oe—0 to 4 inches, black (l0YR 2/1) hemic material (muck); massive; about 50 percent fiber after rubbing; very strongly acid; clear smooth boundary.
Oa1—4 to 36 inches, black (10YR 2/1) sapric material; about 25 percent fiber, about 10 percent after rubbing; massive; nonsticky; few to common roots, partially decomposed limbs and logs; very strongly acid; diffuse smooth boundary.
Oa2—36 to 55 inches, very dark gray (10 YR 3/1) saphic material; about 25 percent fiber, about 10 percent after rubbing; massive; few roots; partially decomposed limbs and twigs and occasional logs; very strongly acid; diffuse smooth boundary.
Oe—55 to 64 inches, black (10YR 2/1) hemic material; about 50 percent fiber, about 20 percent after rubbing; massive; decomposed limbs and twigs and occasional logs; very strongly acid.

The Oe horizon is black or very dark grayish brown. Fiber content is 50 to 90 percent unrubbed and 20 to 50 percent rubbed. The Oa horizon is black or very dark gray. Fiber content is 15 to 35 percent unrubbed and 5 to 20 percent rubbed. Many logs, limbs, and other woody fragments are in the middle and lower parts of the organic layer.

Johnston series

The Johnston series consists of very poorly drained, moderately rapidly permeable soils that formed on the flood plains of the major streams. Slopes are less than 2 percent.

Typical pedon of Johnston loam, in an area of Johnston soils about 4 miles south of Wilmington, 300 yards west of U.S. Highway 421, 0.2 mile southwest of entrance to dairy farm, in wooded area along stream:

A11—0 to 20 inches, black (10YR 2/1) loam; weak medium granular structure; very friable; many medium and fine roots; strongly acid; gradual wavy boundary.
A12—20 to 36 inches, black (10YR 2/1) loam; weak medium granular structure; friable; few medium and large roots; strongly acid; gradual wavy boundary.
A13—36 to 42 inches, black (10YR 2/1) sandy loam; weak medium granular structure; very friable; strongly acid; gradual wavy boundary.
C1—42 to 64 inches, light gray (10YR 7/1) sand; single grained; loose, compact in places; strongly acid.

The A horizon is black or very dark gray loam, sandy loam, or fine sandy loam. The AC horizon, if present, is dark gray or dark grayish brown loamy fine sand or loamy sand. The C horizon is light gray, light brownish gray, or dark gray sand, fine sandy loam, sandy loam, or loamy sand.

Kenansville series

The Kenansville series consists of well drained, moderately rapidly permeable, nearly level soils that formed on flats in the uplands. Slopes are less than 3 percent.

Typical pedon of Kenansville fine sand, 0 to 3 percent slopes, 0.7 mile northeast of Ogden along U.S. Highway 17 to Bayshore Estate Road (State Road 1363), then 0.8 mile southeast along State Road 1363 to State Road 1364, then 0.5 mile northeast on State Road 1364 to cultivated field on the north side of road, then 100 yards northeast on east side of farm road in woods.

O1—2 to 0 inches, partially decomposed pine needles.

A1—0 to 3 inches, grayish brown (10YR 5/2) fine sand; weak granular structure; loose; many fine and medium roots; medium acid; gradual smooth boundary.

A21—3 to 16 inches, pale brown (10YR 6/3) fine sand; single grained; loose; few fine and medium roots; medium acid; gradual wavy boundary.

A22—16 to 33 inches, very pale brown (10YR 8/4) fine sand; few fine faint brownish yellow mottles; single grained; loose; few fine and medium roots; medium acid; abrupt smooth boundary.

B21t—33 to 38 inches, strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; strongly acid; clear smooth boundary.

B22t—38 to 44 inches, strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; common coarse sand grains; strongly acid; clear smooth boundary.

B23t—44 to 50 inches, reddish yellow (7.5YR 6/8) fine sandy loam; weak coarse subangular blocky structure; friable; strongly acid; clear smooth boundary.

C—50 to 80 inches, yellow (10YR 7/8) loamy fine sand; single grained; loose; grades to very pale brown with depth; strongly acid.

The Ap or Al horizon commonly is grayish brown, gray, or dark grayish brown sand or fine sand, but in places it is loamy sand or loamy fine sand. The A2 horizon is pale brown, very pale brown, and light yellowish brown fine sand, sand, or loamy sand. The Bt horizon is strong brown, yellowish brown, light yellowish brown, brownish yellow, or reddish yellow. The Bt horizon commonly is fine sandy loam or sandy loam, but in places it has thin layers of sandy clay loam. The C horizon commonly is yellow, pale yellow, light yellowish brown, or brownish yellow sand, loamy sand, fine sand, or loamy fine sand.

Kureb series

The Kureb series consists of excessively drained, rapidly permeable, nearly level to sloping soils that formed on ridges. Slopes are 1 to 8 percent.

Typical pedon of Kureb sand, 1 to 8 percent slopes, 1.75 miles south of junction of U.S. Highway 421 and North Carolina Highway 132 to Battle Park development, east about 1/4 mile, then south 200 feet on east side of road:

A1—0 to 3 inches, dark gray (10YR 4/1) sand; single grained; loose; organic matter and quartz grains have salt and pepper appearance; many fine and large roots; neutral; clear wavy boundary.

A2—3 to 26 inches, light gray (10YR 7/1) sand; single grained; loose; few large roots; neutral; clear irregular boundary.

C&Bh—26 to 51 inches, brownish yellow (10YR 6/6) sand; single grained; loose; few tongues of light gray extend from above horizon; dark brown (7.5YR 4/4) bands and few lumps of dark reddish brown (5YR 3/2) are intermittent at horizon contact and run vertically along walls of tongues; many clean grains and coated sand grains are observable; neutral; gradual wavy boundary.

C—51 to 89 inches, pale brown (10YR 6/3) sand; single grained; loose; slightly acid.

Texture of the profile is sand or coarse sand, and content of clay plus silt is less than 5 percent. The A1 horizon is dark gray or gray and has many clean grains of white or light gray quartz. The A2 horizon is light gray or white. Tongues of the A2 horizon fill old root channels extending into the C&Bh horizon. The C&Bh horizon is brownish yellow, yellowish brown, light yellowish brown, or pale brown. It has vertical streaks and bands of brownish yellow, dark brown, and dark reddish brown scattered throughout. The C horizon is light yellowish brown, very pale brown, pale brown, or light gray.

Lakeland series

The Lakeland series consists of excessively drained, very rapidly permeable, nearly level to sloping soils that formed on ridges. Slopes are 1 to 8 percent.

Typical pedon of Lakeland sand, 1 to 8 percent slopes, 0.6 mile northeast of the junction of U.S. Highway 421 and State Road 1148 along State Road 1148, 600 feet east on dirt road and on north bank of road:

A1—0 to 2 inches, grayish brown (10YR 5/2) sand; weak fine granular structure; very friable; few fine roots; medium acid; clear smooth boundary.

C1—2 to 48 inches, yellowish brown (10YR 5/8) sand; single grained; loose; common coated dark minerals; medium acid; gradual wavy boundary.

C2—48 to 80 inches, brownish yellow (10YR 6/8) sand; single grained; loose; common dark minerals and clean sand grains; strongly acid.

The A horizon is gray, dark gray, grayish brown, or dark grayish brown. The C horizon is yellow, yellowish brown, very pale brown, and brownish yellow sand and fine sand.

Leon series

The Leon series consists of poorly drained, nearly level, rapidly permeable soils on the rims of depressions and on flats. Slopes are 0 to 2 percent.

Typical pedon of Leon sand 0.7 mile east of cemetery on Shipyard Boulevard to stoplight, then north on paved road 0.4 mile, on east side of road:

A1—0 to 3 inches, very dark gray (10YR 3/1) sand that has salt and pepper appearance; weak granular and single grained structure; very friable and loose; many medium and fine roots; strongly acid; gradual wavy boundary.

A2—3 to 16 inches, light gray (10YR 7/1) sand; single grained; loose; few medium roots; strongly acid; abrupt wavy boundary.

B21h—16 to 24 inches, dark reddish brown (5YR 2/2) sand; massive; firm and weakly cemented; streaked and tongued with very pale brown; strongly acid; gradual wavy boundary.

B22h—24 to 40 inches, dark reddish brown (5YR 2/2) sand; massive; strongly cemented; strongly acid; abrupt wavy boundary.

C—40 to 64 inches, light gray (10YR 7/1) sand; single grained; loose; strongly acid.

The profile is sand or fine sand to a depth of 72 inches. The A1 or Ap horizon is dark gray, very dark gray, or black. The organic material and clean sand grains in this horizon give it a salt and pepper appearance. The A2 horizon is light gray to white. The Bh horizon is black, dark reddish brown, and reddish brown, with the darkest colors in the upper part of the horizon. It is sand, loamy sand, or fine sand. This horizon in places is a series of intermittent layers that are weakly cemented or loose and have lighter colored loose sand layers in between; less commonly the Bh horizon is continuous and extends to a depth of more than 64 inches. The C horizon is light gray or gray.

Lynchburg series

The Lynchburg series consists of somewhat poorly drained, moderately permeable, nearly level soils on smooth flats of uplands. Slopes are 0 to 2 percent

Typical pedon of Lynchburg fine sandy loam 1 mile south of Wrightsboro along State Road 1318, on west bank of road opposite State Road 1386 junction:

Ap—0 to 6 inches, grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

B21t—6 to 12 inches, very pale brown (10YR 7/4) sandy clay loam; weak fine subangular blocky structure; very friable; medium acid; gradual wavy boundary.

B22tg—12 to 20 inches, brownish yellow (10YR 6/6) sandy clay loam; many medium faint light gray (10YR 7/1) and reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B23tg—20 to 30 inches, brownish yellow (10YR 6/8), light gray (10YR 7/2), and yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B24tg—30 to 40 inches, gray (N 5/6), brownish yellow (10YR 6/8), and reddish yellow (7.5YR 7/8) clay loam; moderate medium subangular blocky structure; friable, sticky when wet; continuous clay films on faces of peds; root channels filled with dark gray silt, clay, and very fine sand; strongly acid; gradual wavy boundary.

IIB3—40 to 64 inches, light gray (N 7/0) and yellow (10YR 7/8) clay loam; weak thin platy structure; very fine sand coatings between platy layers; plastic when wet, hard and brittle when dry; very strongly acid.

The Ap or A1 horizon is dark gray, dark grayish brown, or grayish brown sandy loam, fine sandy loam, or loamy fine sand. The B21t and B22tg horizons are very pale brown, light yellowish brown, and brownish yellow, and the B23tg and B24tg horizons are light gray, gray, grayish brown, brownish yellow, reddish yellow, or yellowish red. The B2t horizon is chiefly sandy clay loam or clay loam. The C horizon, if present, is gray or light gray fine sandy loam, loamy sand, clay, or silty clay stratified with sandy material.

The upper part of the B horizon has high chroma colors to a slightly greater depth than is defined as within the range for the series. This difference, however, does not significantly alter usefulness or behavior.

Lynn Haven series

The Lynn Haven series consists of poorly drained, moderately permeable and moderately rapidly permeable, nearly level soils in flat or depressional areas of uplands. Slopes are less than 2 percent.

Typical pedon of Lynn Haven fine sand on west side of North Carolina Highway 132, 1.06 miles north of junction with U.S. Highway 421, at northeast corner of church property:

A1—0 to 18 inches, black (10YR 2/1) fine sand; weak medium granular structure; very friable; many fine roots; organic material gives loamy sand appearance; extremely acid; gradual wavy boundary.

A2—18 to 24 inches, gray (10YR 6/1) fine sand; single grained; loose; few fine roots; extremely acid; gradual wavy boundary.

B21h—24 to 31 inches, black (5YR 2/1) sand; massive; friable, weakly cemented; some streaks and pockets of A2 material, apparently in old root channels; very strongly acid; gradual wavy boundary.

B22h—31 to 50 inches, black (5YR 2/1) and dark brown (10YR 4/3) sand; massive; friable, loose to weakly cemented; very strongly acid; gradual wavy boundary.

B23h—50 to 58 inches, dark brown (10YR 4/3) and brown (10YR 5/3) sand; single grained; loose; very strongly acid; gradual wavy boundary.

C1—58 to 64 inches, pale brown (10YR 6/3) sand; single grained; loose; very strongly acid; gradual wavy boundary.

C2—64 to 75 inches, interbedded light brownish gray (10YR 6/2) sandy loam and dark greenish gray (5GY 4/1) sandy clay; strongly acid.

The A1 horizon is very dark gray or black sand, loamy fine sand, or fine sand. The A2 horizon is gray, light gray, or white sand or fine sand. The Bh horizon is black, dark reddish brown, dark brown, or brown sand or fine sand. The C horizon is pale brown, light brownish gray, dark greenish gray, gray, or light gray sand, fine sand, sandy loam, or sandy clay.

Murville series

The Murville series consists of very poorly drained, moderately rapidly permeable, nearly level soils on flats or in slight depressions on uplands. Slopes are 0 to 2 percent.

Typical pedon of Murville fine sand about 0.5 mile north of junction of U.S. Highway 421 and North Carolina Highway 132 along North Carolina Highway 132 and east 1,600 feet in wooded area along canal:

O1—0 to 2 inches, partially decayed leaves, moss, and twigs.

A1—0 to 8 inches, black (N 2/0) fine sand; weak fine granular structure; soft, very friable; many roots; many clean quartz grains; loamy feel and appearance results from organic matter content; very strongly acid; clear wavy boundary.

B2h—8 to 45 inches, black (10YR 2/1) fine sand; massive; soft, very friable; few roots in upper part, sand grains mostly have dark films or coatings; few clean quartz grains; loamy feel and appearance results from organic matter content; very strongly acid; gradual wavy boundary.

C1—45 to 56 inches, pale brown (10YR 6/3) fine sand; single grained; loose; streaks of light gray (10YR 7/1); few old root channels; very strongly acid; clear wavy boundary.

IIC2—56 to 60 inches, pale brown (10YR 6/3) sandy clay loam and sandy loam; streaks and splotches of light gray (10YR 7/1); massive; friable; strongly acid; clear wavy boundary.

IIIC3—60 to 70 inches, pale brown (10YR 6/3) fine sand; single grained; loose; strongly acid.

The O1 horizon is absent in some areas or blends into the mass of roots in the upper few inches of the A1 horizon. The A1 horizon has a loamy feel because of the organic matter content. It is sand or fine sand. The A1 horizon is black and has few to many clean quartz grains. It rests on a Bh horizon or has an intermittent A2 horizon a few centimeters thick in places. Transitional horizons (B3h) are in pedons that have a thinner B2h horizon. The Bh horizon is black or very dark gray. The sand grains are mostly coated with an organic film, but in some pedons this horizon has very thin discontinuous lamellae of clean quartz grains. The C horizon is light gray, gray, light brownish gray, grayish brown, pale brown, and very pale brown. The C horizon is dominantly fine sand, but lenses and layers of loamy textured material occur in places below a depth of 50 inches.

Newhan series

The Newhan series consists of excessively drained, very rapidly permeable, gently sloping soils on dunes, on beaches, and along waterways near the Atlantic Ocean. Slopes are 2 to 6 percent.

Typical pedon of Newhan fine sand at north end of Carolina Beach about 0.4 mile north of fishing pier and 0.2 mile west of surf in area of beach dunes:

A1—0 to 2 inches, grayish brown (10YR 5/2) fine sand; single grained; few fine roots; mildly alkaline; clear wavy boundary.

C1—2 to 50 inches, light gray (10YR 7/2) fine sand; single grained; loose; few fine roots in upper part of horizon; common small fragments of colored marine shells; uncoated; about 5 percent of grains are black and dark brown; mildly alkaline; gradual wavy boundary.

C2—50 to 72 inches, light gray (10YR 7/2) sand; single grained; loose; uncoated; about 5 percent of grains are black and dark brown; common small, medium, and large fragments of marine shells; few whole shells; mildly alkaline.

Shells and shell fragments mostly of sand grain size make up 5 to 10 percent of the soil mass, along with 2 to 5 percent phosphate pebbles. Shell fragments are calcareous and will effervesce with weak acid. Content of silt plus clay is less than 5 percent. The A horizon is grayish brown or light gray. The C horizon is light gray to white fine sand or sand.

Norfolk series

The Norfolk series consists of well drained, moderately permeable soils that formed in unconsolidated, stratified marine sediment. These soils are on uplands. Slopes range from 0 to 4 percent.

Typical pedon of Norfolk fine sandy loam, 0 to 4 percent slopes, 0.28 mile south of the junction of State Road 1322 and State Road 1318 along State Road 1318 and 412 feet east of road on the edge of a borrow pit:

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

A2—7 to 12 inches, pale brown (10YR 6/3) loamy fine sand; weak medium granular structure; very friable; strongly acid; gradual wavy boundary.

B2t—12 to 40 inches, yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

B31—40 to 60 inches, brownish yellow (10YR 6/6) sandy loam; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

B32t—60 to 70 inches, yellowish brown (10YR 5/8) sandy clay loam; common coarse distinct red (2.5YR 5/8) and common medium distinct light gray (10YR 7/2) mottles; massive; friable; very strongly acid; gradual wavy boundary.

IIC1—70 to 85 inches, light gray (10YR 7/1) clay; common coarse distinct red (2.5YR 5/8) and common medium distinct yellowish brown (10YR 5/8) mottles; massive; very firm; very strongly acid; gradual wavy boundary.

IIC2—85 to 105 inches, mottled red (2.5YR 5/8), light gray (10YR 7/2), and yellow (10YR 7/6) sandy loam; massive; very friable; very strongly acid; gradual wavy boundary.

IIC3—105 to 120 inches, very pale brown (10YR 7/4) stratified sand and loamy sand; single grained; loose; very strongly acid.

The Ap or A1 horizon is mainly gray and grayish brown fine sandy loam, but in places it is loamy fine sand. The A2 horizon is very pale brown and pale brown loamy sand and loamy fine sand. The B2t horizon is yellowish brown and brownish yellow to strong brown sandy clay loam, fine sandy loam, or clay loam. The B3 horizon is brownish yellow, yellowish brown, strong brown, and yellowish red sandy loam, sandy clay loam, or clay loam. The IIC horizon is quite variable, and it ranges from gray to yellow. It includes sandy to clayey materials.

Onslow series

The Onslow series consists of moderately well drained and somewhat poorly drained, moderately permeable soils that formed in stratified marine sediment. These soils are on broad smooth uplands. Slopes are less than 3 percent.

Typical pedon of Onslow loamy fine sand 4 miles north of Wilmington to first paved road north of nursery, east side of U.S. Highway 117, then along paved road east 2,000 feet, then north 340 feet in cultivated field:

Ap—0 to 7 inches, gray (10YR 5/1) loamy fine sand; weak medium granular structure; very friable; few medium fibrous roots; few small brown concretions on surface; strongly acid; abrupt smooth boundary.

A2&Bh—7 to 10 inches, mottled dark brown (7.5YR 3/2) and yellowish brown (10YR 5/4) loamy sand; massive friable, weakly cemented; few medium roots; strongly acid; clear irregular boundary.

A'2—10 to 17 inches, light yellowish brown (10YR 6/4) loamy fine sand; few fine reddish yellow (7.5YR 6/8) mottles; weak medium granular structure; very friable; few fine roots; common medium pores; few pockets of sandy loam; few medium strong brown, yellowish brown, and yellowish red nodules; very strongly acid; gradual wavy boundary.

B'21t—17 to 29 inches, light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few medium roots; few patchy clay films on faces of peds; few clean sand grains; very strongly acid; gradual wavy boundary.

B'22t—29 to 40 inches, pale brown (10YR 6/3) sandy loam; many coarse distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles and few coarse prominent red (2.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky when wet; few patchy clay films on faces of peds; few clean sand grains; very strongly acid; gradual wavy boundary.

IIB'3g—40 to 64 inches, light gray (10YR 7/1) clay loam pocketed with yellowish brown and yellowish red sandy clay loam and sandy loam; weak medium subangular blocky; firm, sticky and plastic; very strongly acid.

Some pedons contain few to common mica flakes and a few other weatherable minerals that make up less than 10 percent of the pedon.

The A horizon is loamy sand, loamy fine sand, fine sand, or fine sandy loam. The A1 or Ap horizon is gray, dark gray, or dark grayish brown. The A2 and A'2 horizon is gray, light gray, light brownish gray, light yellowish brown, or yellowish brown. The Bh part of the A2&Bh horizon makes up about 15 to 35 percent of the horizon and is dark yellowish brown, dark brown, or dark reddish brown, weakly to strongly cemented concretions 1/4 to 1 inch in size. In undisturbed areas, the Bh horizon is commonly 8 to 15 inches below the surface. In some cultivated areas the A2&Bh horizon has been obliterated through tillage and the brown concretions remain as evidence in the Ap layer. The B1 horizon, where present, is pale brown, light yellowish brown, brownish yellow, or light olive brown fine sandy loam or sandy loam. The B'2t horizon is pale brown, light yellowish brown to yellowish brown, or light olive brown sandy loam, sandy clay loam, or clay loam. Few to common mottles of gray are within 18 to 30 inches of the surface. The B'3 horizon is generally gray or prominently mottled sandy clay loam, clay loam, or sandy loam.

Pamlico series

The Pamlico series consists of very poorly drained, moderately permeable soils that formed in decomposed organic matter over mineral sediment. The Pamlico soils are on the flood plains of major streams, in level areas, and in depressional areas.

Typical pedon of Pamlico muck 10 miles south of Wilmington, 0.7 mile north of the junction of U.S. Highway 421 and State Road 1148, and 660 feet east of U.S. Highway 421 in bay area:

Oi—0 to 3 inches, very dark brown (10YR 2/2) fibric material; 75 percent fiber content after rubbing; friable; fiber consists of roots, twigs, and leaves; extremely acid; gradual wavy boundary.
Oa1—3 to 14 inches, very dark brown (10YR 2/2) sapric material; 30 percent fiber content; less than 16 percent rubbed; 15 percent mineral content; friable, slightly sticky; noncolloidal; common stumps, logs, and large roots; extremely acid; clear smooth boundary.
Oa2—14 to 36 inches, black (N 2/0) sapric material; 30 percent fiber content; 5 to 10 percent rubbed; about 35 percent mineral content; slightly sticky; common logs, stumps, and large roots; extremely acid; gradual wavy boundary.
IIC1g—36 to 48 inches, very dark grayish brown (10YR 3/2) sand; single grained; loose; very strongly acid; clear smooth boundary.
IIC2g—48 to 60 inches, gray (10YR 5/1) sand; single grained; loose; very strongly acid.

The Oi horizon is black or very dark brown. Fiber content ranges from 60 to 70 percent when rubbed. The Oa horizon is black, very dark brown, or very dark grayish brown. Fiber content is less than 33 percent when unrubbed and less than 16 percent when rubbed. The IICg horizon is gray, brown, or very dark grayish brown.

Pantego series

The Pantego series consists of very poorly drained, moderately permeable soils that formed in marine sediment. The Pantego soils are in nearly level areas and in slightly depressional areas. Slopes are less than 2 percent.

Typical pedon of Pantego loam 2 5/8 miles northeast of Wrightsboro on State Road 1318, northwest 7/16 mile on paved road and farm road, and 50 feet west of road in a cultivated field:

Ap—0 to 6 inches, black (10YR 2.5/1) loam; weak medium granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.
A1—6 to 16 inches, black (10YR 2.5/1) loam; weak medium granular structure; very friable; few medium roots; strongly acid; abrupt wavy boundary.
B21tg—16 to 30 inches, gray (10YR 5/1) sandy clay loam; weak medium subangular blocky structure; friable; few fine root channels with yellowish brown (10YR 5/6) lining channels; very strongly acid; clear wavy boundary.
B22tg—30 to 50 inches, gray (10YR 5/1) sandy clay loam; weak medium subangular blocky structure; friable; few fine root channels with yellowish brown (10YR 5/6) lining channels and few fine sand lenses of light gray (10YR 7/1); very strongly acid; clear wavy boundary.
IIB23tg—50 to 100 inches, gray (10YR 6/1) clay loam; few fine distinct yellowish brown and brownish yellow mottles; weak medium subangular blocky structure; firm; very strongly acid.

The Ap or A1 horizon commonly is black or very dark gray loam but ranges to fine sandy loam or sandy loam. The Bt horizon is chiefly gray or light gray sandy clay loam but ranges to clay loam or sandy loam. The C horizon is commonly light gray or light brownish gray sand but ranges to loam.

Rains series

The Rains series consists of poorly drained, moderately permeable soils that formed in fluvial and marine sediment. These nearly level soils are on flats, in slight depressions, and around the heads of intermittent drainageways. Slopes are less than 2 percent.

Typical pedon of Rains fine sandy loam 0.7 mile northwest from Masonboro on State Road 1515 and about 650 feet north of State Road 1515, 250 feet west of farm road in woods:

O1 – 1 inch to 0, partially decomposed pine straw and roots.
A1—0 to 5 inches, black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable, slightly sticky; many medium and large roots; very strongly acid; abrupt wavy boundary.
B1g—5 to 8 inches, gray (10YR 6/1) fine sandy clay loam; weak medium subangular blocky structure; friable; common bodies of A1 material; common medium and large roots; very strongly acid; clear wavy boundary.
B21tg—8 to 22 inches, gray (10YR 5/1) clay loam with pockets of sandy clay loam; few medium faint brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; firm, sticky, plastic; few thin discontinuous clay films on faces of peds; common medium and large roots; very strongly acid; gradual wavy boundary.
B22tg—22 to 40 inches, gray (10YR 6/1) clay loam, common medium and coarse prominent red (2.5YR 5/8) mottles and common medium and coarse distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, sticky, very plastic; few medium and large roots; very strongly acid; abrupt smooth boundary.
B23tg—40 to 64 inches, light gray (10YR 7/1) clay; common coarse prominent red (2.5YR 5/8) mottles and few fine faint strong brown mottles; massive and weak coarse angular blocky structure; very firm, very sticky, very plastic; very strongly acid; gradual wavy boundary.
Cg—64 to 68 inches, light gray (10YR 7/1) fine sandy loam with pockets of sandy clay loam; common medium distinct brownish yellow mottles; massive; friable; very strongly acid.

The A1 or Ap horizon is black or dark gray fine sandy loam or loam. Where present, the A2 horizon is light gray fine sandy loam or loamy fine sand. The B horizon is gray, light gray, or dark gray fine sandy clay loam, clay loam, sandy clay, or clay. The C horizon is fine sandy loam, sandy loam, sandy clay loam, or sand.

Rains soils have an A horizon that is slightly thinner and are slightly more clayey in the lower part of the Bt horizon than is defined as within the range for the series. These differences, however, do not significantly alter the usefulness or behavior of these soils.

Rimini series

The Rimini series consists of excessively drained, moderately permeable soils that formed in marine sediment. The Rimini soils are on rims around "Carolina Bays" and on broad smooth divides. Slopes range from 1 to 6 percent.

Typical pedon of Rimini sand, 1 to 6 percent slopes, south of Wilmington, on west side of North Carolina Highway 132, about 10 feet to south edge of Pine Valley development:

A1—0 to 3 inches, dark gray (10YR 4/1) sand; many clean white grains; weak granular structure; very friable; common fine and medium roots; strongly acid; abrupt smooth boundary.
A2—3 to 56 inches, light gray (10YR 7/1) sand; single grained; loose; few medium roots; strongly acid; clear irregular boundary.
B21h—56 to 64 inches, dark reddish brown (5YR 3/2) sand with streaks and pockets of light gray (10YR 7/1) sand; massive; weakly cemented; strongly acid.
B22h—64 to 80 inches, dark brown (7.5YR 4/2) sand with pockets of light gray (10YR 7/1) sand; massive; very friable; strongly acid.

The A1 horizon is dark gray or gray. The A2 horizon is light gray or white. The Bh horizon is black, dark reddish brown, dark brown, or very dark gray. The C horizon, where present, is very pale brown, light gray, or white sandy or loamy material.

Seagate series

The Seagate series consists of somewhat poorly drained, moderately permeable soils that formed in marine sediment. Seagate soils are in nearly level flatwood areas. Slopes generally are less than 2 percent but are as much as 3 percent.

Typical pedon of Seagate fine sand 0.4 mile north of junction of North Carolina Highway 132 and U.S. Highway 421, 300 yards west of U.S. 421, 20 feet north of field road:

Ap—0 to 8 inches, dark gray (10YR 4/1) fine sand; single grained; very friable; many fine roots; many clean sand grains; slightly acid; abrupt smooth boundary.

A2—8 to 12 inches, light gray (10YR 7/1) fine sand; single grained; loose; few medium roots; medium acid; clear wavy boundary.

B21h—12 to 23 inches, dark brown (7.5YR 3/2) fine sand; massive; friable, weakly cemented; many sand grains coated with organic matter; few clean sand grains; strongly acid; abrupt irregular boundary.

B22h—23 to 28 inches, brown (10YR 5/3) fine sand; single grained; loose; few fine weakly cemented concretions; many sand grains coated with organic matter; strongly acid; clear wavy boundary.

A'2—28 to 36 inches, light gray (10YR 7/2) fine sand; single grained; loose; few fine and medium brown (10YR 5/3) concretions; medium acid; clear smooth boundary.

B'1t—36 to 40 inches, brownish yellow (10YR 6/6) sandy loam; many medium distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; sand grains are coated and bridged with clay; few patchy clay films on faces of peds; strongly acid; clear wavy boundary.

B'2tg—40 to 66 inches, light gray (10YR 7/1) clay loam; weak medium subangular blocky structure; firm, plastic, sticky; very strongly acid.

The Ap or A1 horizon is very dark gray, dark gray, or gray loamy fine sand, fine sand, or sand. The Bh horizon is black, dark brown, very dark reddish brown, dark yellowish brown, or brown sand, fine sand, or loamy sand. The B'2t horizon is brownish yellow, yellowish brown, light brownish gray, light gray, or very pale brown sandy clay loam, sandy loam, or clay loam. The C horizon is gray or light gray clayey to sandy material.

Stallings series

The Stallings series consists of somewhat poorly drained, moderately rapidly permeable soils that formed in marine sediment. The Stallings soils are on nearly level interstream divides. Slopes are less than 3 percent.

Typical pedon of Stallings fine sand north of Wilmington on Horticulture Crops Research Station, along farm road 1650 feet east of station office, and 50 feet north of road in blueberry field:

A1—0 to 8 inches, dark gray (10YR 4/1) fine sand; weak medium granular structure; very friable; medium acid; clear wavy boundary.

A2—8 to 14 inches, light yellowish brown (2.5Y 6/4) fine sand; few fine distinct pale brown mottles; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

B21t—14 to 24 inches, light yellowish brown (2.5Y 6/4) fine sandy loam; common medium distinct light gray (10YR 7/2) and yellowish brown (10YR 5/6) mottles; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

B22tg—24 to 30 inches, light gray (10YR 7/1) fine sandy loam; common medium distinct very pale brown (10YR 7/3) and yellowish brown (10YR 5/6) mottles; weak medium and fine granular structure; very friable; very strongly acid; gradual wavy boundary.

B23tg—30 to 54 inches, light brownish gray (10YR 6/2) fine sandy loam; common coarse distinct light gray (10YR 7/1) mottles; weak medium and fine granular structure; very friable; very strongly acid; gradual wavy boundary.

B3—54 to 68 inches, pale yellow (2.5Y 7/4) loamy fine sand and fine sandy loam; common coarse distinct light brownish gray (2.5Y 6/2) mottles; weak medium and fine granular structure; single grained; loose; very strongly acid.

The A1 or Ap horizon is very dark gray, dark gray, or dark grayish brown loamy fine sand, fine sand, or fine sandy loam. The A2 horizon is very pale brown, light yellowish brown, and light brownish gray loamy sand, loamy fine sand, or fine sand. The B2t horizon is light yellowish brown, yellow, or pale yellow. The B2tg horizon is light brownish gray, grayish brown, or light gray. The B2t and B2tg horizons are sandy loam or fine sandy loam. The B3 horizon is loamy sand, loamy fine sand, or fine sandy loam.

Torhunta series

The Torhunta series consists of very poorly drained, moderately rapidly permeable soils that formed in stratified marine and fluvial sediment. These nearly level soils are in slightly depressional areas. Slopes are less than 2 percent.

Typical pedon of Torhunta loamy fine sand north of Wilmington and east of Wrightsboro along State Road 1322, 1.68 miles from the intersection of U.S. Highway 117 and State Road 1322, north 0.5 mile along path, and 60 feet east of path in sparsely wooded area:

A11—0 to 8 inches, black (10YR 2.5/1) loamy fine sand; weak medium granular structure; very friable; many fine roots; extremely acid; gradual wavy boundary.

A12—8 to 20 inches, very dark gray (10YR 3/1) loamy fine sand; weak fine granular structure; very friable; few fine roots; very strongly acid; gradual wavy boundary.

B—20 to 47 inches, light gray (10YR 7/2) fine sandy loam; weak fine granular structure; common fine yellowish brown mottles; very friable; very strongly acid; gradual wavy boundary.

C1g—47 to 64 inches, light gray (10YR 7/1) fine sand; common medium faint brownish yellow (10YR 6/6) and pale brown (10YR 6/3) mottles; single grained; loose; very strongly acid.

The A horizon is black, very dark gray, or very dark grayish brown fine sandy loam, loam, or loamy fine sand. The B horizon is gray, light gray, dark gray, grayish brown, or light brownish gray sandy loam or fine sandy loam. The C horizon is fine sandy loam, loamy fine sand, or fine sand. Its color is about the same as that of the B horizon.

Wakulla series

The Wakulla series consists of somewhat excessively drained, rapidly permeable soils that formed in marine, fluvial, or eolian sediment. These soils are nearly level to gently sloping and occur on broad stream terraces and on uplands. Slopes range from 0 to 6 percent.

Typical pedon of Wakulla sand, 1 to 8 percent slopes, 0.56 mile north of the junction of State Road 1544 and State Road 1148, 330 feet east and 660 feet north, on west side of road in urban area:

A1—0 to 2 inches, grayish brown (10YR 5/2) sand; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

A2—2 to 30 inches, light yellowish brown (10YR 6/4) sand; weak fine granular structure; loose; strongly acid; clear wavy boundary.

B2t—30 to 48 inches, strong brown (7.5YR 5/6) loamy sand; weak medium granular structure; very friable; sand grains coated and bridged with clay; medium acid; clear wavy boundary.

C—48 to 64 inches, strong brown (7.5YR 5/6) sand; single grained; loose; medium acid.

The Ap or A1 horizon is dark grayish brown or grayish brown sand or loamy sand. The A2 horizon is brownish yellow or light yellowish brown. The Bt horizon is strong brown, yellowish red, and yellowish brown. The C horizon is reddish yellow, yellow, very pale brown, strong brown, or light gray.

Woodington series

The Woodington series consists of poorly drained, moderately rapidly permeable soils that formed in marine sediment. These soils are nearly level and occur on smooth interstream divides. Slopes are less than 2 percent.

Typical pedon of Woodington fine sandy loam 0.6 mile west of North Carolina Highway 132 and State Road 1322 intersection, on edge of wooded area on north side of road:

A1—0 to 7 inches, very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; few fine and medium roots; medium acid; clear wavy boundary.

B21tg—7 to 34 inches, light brownish gray (10YR 6/2) fine sandy loam; common medium faint white (10YR 8/1) mottles; weak fine subangular blocky structure; friable; few fine and medium roots; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22tg—34 to 48 inches, gray (10YR 6/1) fine sandy loam; common medium faint very pale brown (10YR 7/3) and white (10YR 8/2) mottles; weak medium and fine subangular blocky structure; friable; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3g—48 to 65 inches, very pale brown (10YR 7/3) fine sandy loam; many medium faint light gray (10YR 7/2) and white (10YR 8/1) mottles; weak fine granular structure; very friable; strongly acid.

The Ap or A1 horizon is dark gray or very dark gray sandy loam or fine sandy loam. The A2 horizon, where present, is light gray or light brownish gray fine sandy loam or loamy fine sand. The B21t horizon is light brownish gray, light gray, or gray, and the B22t horizon is gray or light gray. The C horizon, where present, is gray to very pale brown loamy fine sand, sand, or fine sand.

Wrightsboro series

The Wrightsboro series consists of moderately well drained, moderately permeable soils that formed in stratified marine sediment. These soils are nearly level and occur on interstream divides. Slopes range from 0 to 2 percent.

Typical pedon of Wrightsboro fine sandy loam, 0 to 2 percent slopes, 3.5 miles north of Wilmington on U.S. Highway 117, 100 feet west of U.S. Highway 117 and 50 feet north of State Road 1329:

Ap—0 to 6 inches, grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; medium acid; clear smooth boundary.

A2—6 to 9 inches, very pale brown (10YR 7/4) fine sandy loam; weak medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

B21t—9 to 24 inches, brownish yellow (10YR 6/6) sandy clay loam; few fine distinct light gray mottles below depth of 19 inches; weak medium subangular blocky structure; friable; few patchy clay films on faces of peds and pore walls; strongly acid; gradual wavy boundary.

B22t—24 to 36 inches, brownish yellow (10YR 6/6) sandy clay loam; common medium distinct light gray (10YR 7/2) and very pale brown (10YR 7/3) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few patchy clay films on faces of peds and on walls of root channels; very strongly acid; gradual wavy boundary.

B23t—36 to 48 inches, brownish yellow (10YR 6/6) sandy clay loam; many medium distinct light gray (10YR 7/1) mottles and common medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; prominent clay films on faces of peds; few pockets of sandy loam; very strongly acid; clear smooth boundary.

IIB3g—48 to 65 inches, light gray (10YR 7/2) clay; many coarse distinct yellow (10YR 7/8) mottles and common prominent reddish yellow (5YR 6/6) mottles; weak fine angular blocky structure and massive; very firm, very sticky, very plastic; few fine flakes of mica; reddish yellow mottles commonly surround fine root channels; some very fine sand and silt coatings between layers; strongly acid.

The A1 or Ap horizon is gray, grayish brown, olive gray, dark grayish brown, very dark gray, or brown. The A2 horizon is light gray, very pale brown, pale yellow, yellow, light brownish gray, pale brown, or light yellowish brown. The A horizon is fine sandy loam, sandy loam, loamy fine sand, or loamy sand. The Bt horizon is yellowish brown, brownish yellow, yellow, olive yellow, light yellowish brown, or pale brown. In some pedons, the B23t horizon is light brownish gray, gray, grayish brown, or light gray. Mottles of high contrast are common in the lower part of the Bt horizon. The B21t and B22t horizons are sandy clay loam or clay loam. The B23t horizon is sandy clay loam or sandy loam. Clay content averages 24 to 35 percent and silt content is less than 30 percent in the upper 20 inches of the Bt horizon. Transitional B1 and B3 horizons of sandy loam are present in some pedons. A clayey IIB horizon is present between depths of 40 and 80 inches. It is gray or light gray and has mottles of high contrast. Lenses or bodies of fine sand or silt are common.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*5*). Readers interested in further details about the system should refer to the latest literature available (*6*).

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the bases for classification are the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17 the soils of the survey area are classified according to the system. Classes of the system are briefly discussed in the following paragraphs.

ORDER: Ten soil orders are recognized. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER: Each order is divided into suborders based primarily on properties that influence soil genesis and that are important to plant growth or that were selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquult (*Aqu*, meaning water, 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. The name of a great group ends with the name of a suborder. A prefix added to the name suggests something about the properties of the soil. An example is Paleaguults (*Pale*, meaning horizons that have more than normal development, plus *aquults*, the suborder of Ultisols that have an aquic moisture regime).

SUBGROUP: Each great group is divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades that have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. The names of subgroups are derived by placing one or more adjectives before the name of the great group. The adjective *Typic* is used for the subgroup that is thought to typify the great group. An example is Typic Paleaquults.

FAMILY: Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, siliceous, thermic Typic Paleaquults.

SERIES: The series consists of a group of soils that are formed from a particular kind of parent material and have horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Formation of the Soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Plant and Animal Life

Before the county was settled, the native vegetation consisted of many kinds of hardwoods and several kinds of conifers. This vegetation had a major influence on the development of the soils. In addition, the activities of micro-organisms, earthworms, larvae, and other forms of animal life were important in the cycle of decay and regeneration of plants.

The activity of fungi and micro-organisms and the soil mixing carried on by earthworms and other small invertebrates are mainly confined to the upper few inches of the soil.

Trees and other plants take up minerals from the soil and store them in their roots, stems, and leaves. When these plants or parts of them decay, the minerals re-enter the soil and are used again by other plants. Unless disturbed, this cycle continues indefinitely.

Soil development is also affected by plant roots, which penetrate soil material to various depths and generally increase its porosity. Organic acids produced by plants and the decay of these organic acids react on basic minerals in the parent material. Minerals taken into solution or suspension may be leached from a soil or translocated within it.

Plants and animals for the most part determine the kinds of organic matter added to the soil and the way in which it is incorporated with the soil. They transfer nutrient elements from one horizon to another and in many places transport soil material from one horizon to another. Plants and animals also affect the gains and losses in organic matter, nitrogen, and other plant nutrients. Soil structure and porosity are also altered by plant and animal life.

Climate

Climate affects the physical, chemical, and biological relationship in the soil, mainly through the influence of precipitation and temperature. Water dissolves minerals, is necessary for biological activity, and transports minerals and organic residue through the soil profile. The amount of water that actually percolates through the soil is dependent mainly on the amount and duration of rainfall, relative humidity, evapotranspiration, length of the frost-free period, and soil characteristics. Temperature influences the kind and growth of organisms and the speed of physical and chemical reaction in the soils.

The climate of New Hanover County is warm and humid. Precipitation is well distributed. The relatively mild temperatures and the abundant moisture cause rapid decomposition of organic matter and speed up chemical reactions in the soil. The high rainfall leaches out large amounts of soluble bases, and less soluble, fine materials are moved deeper in the soil.

Variations of climate in the county are small and probably are not the cause of local differences in the soils.

Parent Material

Parent material is the unconsolidated rock from which a soil is formed. It is the soil forming factor that is mainly responsible for the chemical and mineralogical composition of the soil. It is the most important factor that has caused differences among the soils of New Hanover County. Some of the differences, such as texture, color, or depth, are easily determined in the field.

Minor differences in mineralogical composition are determined by laboratory analysis.

The parent materials of the soils of New Hanover County are of two basic kinds. The first is unconsolidated rock material, sand, silt, and clay that make up the marine and fluvial sediments of the Coastal Plain province. The second basic kind is the aeolian sand deposits.

Many of the differences among the soils of the county reflect the varying geologic materials are:

1. Soils that formed in sediment that has a high percentage of sand are Kureb, Lakeland, Newhan, Kenansville, Leon, Lynn Haven, Murville, Stallings, Rimini, Torhunta, Wakulla, and Baymeade soils.
2. Soils that formed in loamy sediment are Wrightsboro, Norfolk, Lynchburg, Onslow, and Pantego soils.
3. Soils that formed in clayey sediment are Bayboro and Craven soils.
4. Soils that formed in sediment of mixed textures are Johnston soils and Tidal Marsh.
5. Soils that formed on continuously wet flood plains and have high organic-matter content are Dorovan and Pamlico soils.

Relief

Relief has been an important factor in soil formation in this county. It strongly influences drainage, aeration, runoff, erosion, and exposure to sun and wind. Relief largely governs natural drainage. Soils of New Hanover County range from level to gently sloping. The upland soils in higher areas, such as Norfolk, Kensansville, Lakeland, Baymeade, Kureb, and Wakulla soils, are well drained or excessively drained and are relatively low in content of organic matter. Soils in depressions where water stands for a significant length of time, such as Bayboro, Pantego, Johnston, and Torhunta soils, are very poorly drained and have a dark-colored or black surface horizon. In marshy areas, which are almost constantly covered by water, soils that have a large accumulation of organic matter, such as Dorovan and Pamlico soils, may develop.

Time

The length of the time required for a soil to develop depends on the other factors of soil formation. Less time is required in a warm, humid region where vegetation is dense than in a cold, dry region where vegetation is sparse. In the same environment, less time is required for a soil to develop from coarse-textured material.

The age of soils varies considerably. Old soils generally have better defined horizons than young soils. In New Hanover County, older soils on the smoother uplands have well defined horizons. In contrast, the young alluvial soils and those in dune areas have not been in place long enough to develop well defined horizons.

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(4) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplement replacing pp. 173-188 issued May 1962]

(5) -------------------- 1960. Soil classification, a comprehensive system, 7th approximation. Soil Conserv. Serv., 265 pp., illus. [Supplements issued March 1967, September 1968, April 1969.]

(6) -------------------- No date. Soil taxonomy of the national cooperative soil survey. A basic system for making and interpreting soil surveys.

Glossary

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficuty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probaable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:
O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.
A horizon.—The mineral horizon, formed or forming 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.
A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.
R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Low strength. Inadequate strength for supporting loads.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

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).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Piping. Formation by moving water of subsurface tunnels or pipelike cavities.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface that 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.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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*, *silt loam*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

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

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

APPENDIX

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]: Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--: Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days[2]	Precipitation[1]: Average	2 years in 10 will have--: Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F		In	In	In		In
January----	55.9	35.3	45.6	77	17	57	3.41	1.94	4.61	7	.4
February---	58.3	37.1	47.7	79	19	69	3.66	2.40	4.80	7	1.0
March------	64.3	43.0	53.7	84	26	180	4.09	2.25	5.58	8	.3
April------	73.7	51.6	62.7	91	34	381	3.07	1.36	4.46	5	.0
May--------	80.8	60.1	70.5	95	43	636	4.09	2.27	5.57	6	.0
June-------	86.2	67.2	76.7	99	53	801	5.63	2.84	7.89	8	.0
July-------	89.0	71.2	80.1	98	61	933	7.72	4.47	10.36	10	.0
August-----	88.3	70.5	79.4	98	60	911	6.80	4.10	9.21	9	.0
September--	83.7	65.2	74.5	94	50	735	5.55	2.66	7.90	6	.0
October----	75.5	54.6	65.0	89	33	465	3.16	1.07	4.84	5	.0
November---	66.5	43.7	55.1	82	25	162	3.19	1.28	4.73	5	.0
December---	59.1	37.4	48.3	78	18	115	3.17	1.59	4.44	6	.4
Year-----	73.4	53.1	63.3	99	15	5,445	53.54	47.28	59.60	82	2.1

[1]Recorded in the period 1952-74 at Wilmington, N.C.

[2]A growing degree day is an index of the amount 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

Probability	Minimum temperature[1]		
	24 F or lower	28 F or lower	32 F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 11	Mar. 26	Apr. 2
2 years in 10 later than--	Mar. 1	Mar. 17	Mar. 28
5 years in 10 later than--	Feb. 10	Feb. 27	Mar. 19
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 20	Nov. 9	Oct. 31
2 years in 10 earlier than--	Nov. 29	Nov. 15	Nov. 4
5 years in 10 earlier than--	Dec. 16	Nov. 26	Nov. 13

[1]Recorded in the period 1952-74 at Wilmington, N.C.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F	Higher than 28 F	Higher than 32 F
	Days	Days	Days
9 years in 10	271	237	220
8 years in 10	283	249	226
5 years in 10	307	271	238
2 years in 10	332	292	250
1 year in 10	349	304	256

[1]Recorded in the period 1952-74 at Wilmington, N.C.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ba	Bayboro loam	330	0.3
Be	Baymeade fine sand, 1 to 6 percent slopes	6,405	5.4
Bh	Baymeade-Urban land complex, 1 to 6 percent slopes	2,176	1.8
Bp	Borrow pits	110	.1
Cr	Craven fine sandy loam, 1 to 4 percent slopes	8,804	7.4
DO	Dorovan soils	8,766	7.4
JO	Johnston soils	4,426	3.7
Ke	Kenansville fine sand, 0 to 3 percent slopes	3,875	3.3
Kr	Kureb sand, 1 to 8 percent slopes	8,337	7.1
Ku	Kureb-Urban land complex, 1 to 8 percent slopes	889	.8
La	Lakeland sand, 1 to 8 percent slopes	2,595	2.2
Le	Leon sand	7,953	6.7
Lo	Leon-Urban land complex	1,084	.9
Ls	Lynchburg fine sandy loam	810	.7
Ly	Lynn Haven fine sand	4,767	4.0
Mp	Mine Pits	1,323	1.1
Mu	Murville fine sand	14,351	12.1
Nh	Newhan fine sand	3,961	3.3
No	Norfolk fine sandy loam, 0 to 4 percent slopes	841	.7
On	Onslow loamy fine sand	2,171	1.8
Pm	Pamlico muck	958	.8
Pn	Pantego loam	2,182	1.8
Ra	Rains fine sandy loam	682	.6
Rm	Rimini sand, 1 to 6 percent slopes	1,936	1.6
Se	Seagate fine sand	7,172	6.0
Sh	Seagate-Urban land complex	495	.4
St	Stallings fine sand	1,896	1.6
TM	Tidal Marsh	8,304	7.1
To	Torhunta loamy fine sand	2,460	2.1
Ur	Urban land	3,936	3.3
Wa	Wakulla sand, 1 to 8 percent slopes	2,029	1.7
Wo	Woodington fine sandy loam	682	.6
Wr	Wrightsboro fine sandy loam, 0 to 2 percent slopes	1,950	1.6
	Total	118,656	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS

[All yields were estimated for a high level of management in 1974. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Soybeans	Tobacco	Peanuts
	Bu	Bu	Lb	Lb
Bayboro: Ba	---	---	---	---
Baymeade: Be, [1]Bh	60	---	---	2,100
Borrow pits: Bp.				
Craven: Cr	105	40	2,500	2,800
Dorovan: [1]DO	---	---	---	---
Johnston: [1]JO	---	---	---	---
Kenansville: Ke	70	---	2,000	2,400
Kureb: Kr	---	---	---	---
[1]Ku	---	---	---	---
Lakeland: La	55	20	1,700	2,000
Leon: Le, [1]Lo.				
Lynchburg: Ls	115	45	2,800	--
Lynn Haven: Ly	70	---	---	---
Mine pits: Mp.				
Murville: Mu	---	---	---	---
Newhan: Nh	---	---	---	---
Norfolk: No	100	35	2,900	3,700
Onslow: On	115	40	2,700	3,000
Pamlico: Pm	---	---	---	---
Pantego: Pn	---	---	---	---
Rains: Ra	---	---	---	---
Rimini: Rm	---	---	---	---

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Corn	Soybeans	Tobacco	Peanuts
	Bu	Bu	Lb	Lb
Seagate:				
Se	75	30	1,800	2,400
[1]Sh	---	---	---	---
Stallings:				
St	100	35	2,500	---
Tidal marsh:				
TM.				
Torhunta:				
To	---	---	---	---
Urban land:				
Ur.				
Wakulla:				
Wa	45	20	1,700	---
Woodington:				
Wo	---	---	---	---
Wrightsboro:				
Wr	125	45	---	3,000

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Bayboro:									
Ba	2w	Slight	Severe	Severe	--------	--------	Loblolly pine	95	Slash pine,
							Sweetgum	94	loblolly pine,
							Slash pine	95	sweetgum,
							Yellow-poplar	---	water tupelo.
							Southern red oak	---	
							White oak	---	
Baymeade:									
Be, [1]Bh	3s	Slight	Moderate	Moderate	--------	--------	Loblolly pine	80	Loblolly pine,
							Slash pine	80	slash pine,
							Longleaf pine	65	longleaf pine.
Craven:									
Cr	3w	Slight	Moderate	Slight	--------	--------	Loblolly pine	81	Loblolly pine,
							Longleaf pine	67	slash pine.
							Water oak	80	
Dorovan:									
[1]DO	4w	Slight	Severe	Severe	--------	--------	Blackgum	70	(2)
							Sweetbay	---	
Johnston:									
[1]JO	1w	Slight	Severe	Severe	--------	--------	Loblolly pine	97	(2)
							Sweetgum	111	
							Water oak	103	
Kenansville:									
Ke	3s	Slight	Moderate	Moderate	--------	--------	Loblolly pine	80	Loblolly pine,
							Longleaf pine	65	slash pine.
Kureb:									
Kr	5s	Slight	Severe	Severe	--------	--------	Longleaf pine	50	Longleaf pine,
							Slash pine	60	slash pine.
							Sand pine	---	
[1]Ku:									
Kureb part	5s	Slight	Severe	Severe	--------	--------	Longleaf pine	50	Longleaf pine,
							Slash pine	60	slash pine.
							Sand pine	---	
Urban land part.									
Lakeland:									
La	3s	Slight	Moderate	Moderate	Slight	Slight	Slash pine	80	Slash pine,
							Loblolly pine	80	loblolly pine.
							Longleaf pine	70	
Leon:									
Le	4w	Slight	Moderate	Moderate	--------	--------	Loblolly pine	75	Loblolly pine
							Slash pine	75	slash pine.
							Longleaf pine	70	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--continued

Soil name and map symbol	Symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	
Leon:									
[1]Lo:									
Leon part	4w	Slight	Moderate	Moderate	---------	---------	Loblolly pine Slash pne Longleaf pine	75 75 70	Loblolly pine, slash pine.
Urban land part.									
Lynchburg:									
Ls	2w	Slight	Moderate	Slight	---------	---------	Slash pine Loblolly pine Longleaf pine Yellow-poplar Sweetgum Southern red oak White oak Blackgum	91 86 74 92 90 --- --- ---	Slash pine, loblolly pine, American sycamore, sweetgum.
Lynn Haven:									
Ly	3w	Slight	Moderate	Moderate	Slight	Moderate	Slash pine Loblolly pine Longleaf pine Pond pine	80 80 70 70	Slash pine, loblolly pine.
Murville:									
Mu	2w	Slight	Severe	Severe	---------	---------	Loblolly pine Slash pine	90 90	Loblolly pine, slash pine.
Norfolk:									
No	2o	Slight	Slight	Slight	---------	---------	Loblolly pine Longleaf pine Slash pine	86 68 86	Slash pine, loblolly pine.
Onslow:									
On	2w	Slight	Slight	Slight	---------	---------	Loblolly pine Slash pine Longleaf pine	76 80 67	Slash pine, loblolly pine.
Pamlico:									
Pm	4w	Slight	Severe	Severe	---------	---------	Slash pine Pond pine Baldcypress Water tupelo	70 55 --- ---	Slash pine, loblolly pine, water tupelo.
Pantego:									
Pn	1w	Slight	Severe	Severe	---------	---------	Loblolly pine Slash pine Pond pine Baldcypress Water tupelo Water oak	98 95 73 --- --- ---	Loblolly pine, slash pine, sweetgum, American sycamore, water tupelo.
Rains:									
Ra	2w	Slight	Severe	Severe	---------	---------	Loblolly pine Slash pine Sweengum	94 91 90	Loblolly pine, slash pine, sweetgum, American sycamore.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	
Rimini:									
Rm	5s	Slight	Severe	Severe	--------	--------	Loblolly pine	65	Slash pine,
							Slash pine	65	longleaf pine.
							Longleaf pine	55	
Seagate:									
Se	3w	Slight	Moderate	Moderate	--------	--------	Slash pine	80	Slash pine,
							Loblolly pine	80	loblolly pine.
							Longleaf pine	70	
[1]Sh:									
Seagate part	3w	Slight	Moderate	Moderate	--------	--------	Slash pine	80	Slash pine,
							Loblolly pine	80	loblolly pine.
							Longleaf pine	70	
Urban land part.									
Stallings:									
St	2w	Slight	Moderate	Slight	--------	--------	Loblolly pine	90	Loblolly pine,
							Slash pine	90	slash pine,
							Longleaf pine	75	yellow-poplar,
							Sweetgum	90	American sycamore,
							Yellow-poplar	100	sweetgum.
							Water oak	90	
Torhunta:									
To	2w	Slight	Severe	Severe	--------	--------	Loblolly pine	90	Loblolly pine,
							Slash pine	86	sweetgum,
							Sweetgum	90	slash pine,
							Water tupelo	---	American sycamore.
Wakulla:									
Wa	3s	Slight	Moderate	Moderate	--------	--------	Loblolly pine	80	Loblolly pine,
							Slash pine	80	slash pine,
							Longleaf pine	65	longleaf pine.
Woodington:									
Wo	2w	Slight	Severe	Severe	--------	--------	Slash pine	93	Slash pine,
							Loblolly pine	90	loblolly pine,
							Sweetgum	90	American sycamore,
							White oak	90	water tupelo,
							Southern red oak	71	water oak,
							Water tupelo	---	sweetgum.
Wrightsboro:									
Wr	2w	Slight	Moderate	Slight	Slight	Severe	Loblolly pine	90	Loblolly pine,
							Slash pine	90	slash pine,
							Longleaf pine	75	American sycamore,
							Sweetgum	90	yellow-poplar,
									sweetgum.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Commercial management is not favorable on these soils unless they are drained. Because of their position in the landscape and difficulty in producing drainage, it is not practical to manage these soils for commercial timber production.

TABLE 7.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Bayboro:					
Ba	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Baymeade:					
Be, [1]Bh	Moderate: cutbanks cave.	Slight	Moderate: wetness.	Moderate: wetness.	Moderate: low strength.
Borrow pits:					
Bp.					
Craven:					
Cr	Severe: too clayey.	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Moderate: shrink-swell.
Dorovan:					
[1]DO	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.
Johnston:					
[1]JO	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Kenansville:					
Ke	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Kureb:					
Kr	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
[1]Ku:					
Kureb part	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Urban land part.					
Lakeland:					
La	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Leon:					
Le, [1]Lo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lynchburg:					
Ls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, corrosive.	Moderate: wetness.
Lynn Haven:					
Ly	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: corrosive, wetness.	Severe: wetness.
Mine pits:					
Mp.					

See footnotes at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Murville:					
Mu	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Newhan:					
Nh	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Norfolk:					
No	Slight	Slight	Slight	Slight	Slight.
Onslow:					
On	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Slight.
Pamlico:					
Pm	Severe: floods, wetness.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.
Pantego:					
Pn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Rains:					
Ra	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, corrosive.	Severe: wetness, floods.
Rimini:					
Rm	Moderate: cutbanks cave.	Slight	Slight	Slight	Slight.
Seagate:					
Se	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
[1]Sh:					
Seagate part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
Stallings:					
St	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
Tidal Marsh: TM.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Torhunta:					
To	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Wakulla:					
Wa	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Woodington:					
Wo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wrightsboro:					
Wr	Severe: wetness.	Slight	Moderate: wetness.	Moderate: wetness.	Severe: low strength.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 8.--SANITARY FACILITIES

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bayboro:					
Ba	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, floods.
Baymeade:					
Be, [1]Bh	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too sandy.
Borrow pits:					
Bp.					
Craven:					
Cr	Severe: percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: too clayey.
Dorovan:					
[1]DO	Severe: wetness, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Poor: wetness, floods, excess humus.
Johnston:					
[1]JO	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Kenansville:					
Ke	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Kureb:					
Kr	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
[1]Ku:					
Kureb part	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
Urban land part.					
Lakeland:					
La	Slight[2]	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
Leon:					
Le, [1]Lo	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, wetness.
Lynchburg:					
Ls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.
Lynn Haven:					
Ly	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
Mine pits:					
Mp.					

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Murville: Mu	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Newhan: Nh	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.
Norfolk: No	Slight	Moderate: seepage.	Slight	Slight	Good.
Onslow: On	Severe: wetness.	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Good.
Pamlico: Pm	Severe: wetness, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, excess humus, hard to pack.
Pantego: Pn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Rains: Ra	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, floods.
Rimini: Rm	Slight[2]	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Seagate: Se	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer, seepage.
[1]Sh: Seagate part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: thin layer, seepage.
Urban land part.					
Stallings: St	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.
Tidal marsh: TM.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, floods.
Torhunta: To	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Urban land: Ur.					
Wakulla: Wa	Slight[2]	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy.

See footnotes at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Woodington:					
Wo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wrightsboro:					
Wr	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Contamination of nearby water supplies is a hazard if the soils are used for sewage disposal.

TABLE 9.--CONSTRUCTION MATERIALS

["Excess fines" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Road fill	Sand	Gravel	Topsoil
Bayboro:				
Ba	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Baymeade:				
Be, [1]Bh	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Borrow pits:				
Bp.				
Craven:				
Cr	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Dorovan:				
[1]DO	Poor: wetness, excess humus.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, excess humus.
Johnston:				
[1]JO	Poor: wetness, excess humus.	Poor: excess fines.	Poor: excess fines.	Poor: wetness.
Kenansville:				
Ke	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Kureb:				
Kr	Good	Good	Unsuited: excess fines.	Poor: too sandy.
[1]Ku:				
Kureb part	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Urban land part.				
Lakeland:				
La	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Leon:				
Le, [1]Lo	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Lynchburg:				
Ls	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Lynn Haven:				
Ly	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy, wetness.
Mine pits:				
Mp.				
Murville:				
Mu	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnotes at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Road fill	Sand	Gravel	Topsoil
Newhan:				
Nh	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Norfolk:				
No	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Onslow:				
On	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Pamlico:				
Pm	Poor: wetness, excess humus.	Poor: excess humus.	Unsuited: excess humus.	Poor: wetness.
Pantego:				
Pn	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Rains:				
Ra	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Rimini:				
Rm	Good	Good	Unsuited: excess fines.	Poor: too sandy.
Seagate:				
Se	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
[1]Sh:				
Seagate part	Fair: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Urban land part.				
Stallings:				
St	Fair: wetness.	Poor: excess fines.	Unsuited: excess fines.	Good.
Tidal marsh: TM.	Poor: wetmess.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Torhunta:				
To	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Urban land: Ur.				
Wakulla:				
Wa	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Woodington:				
Wo	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
Wrightsboro:				
Wr	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 10.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Bayboro:							
Ba	Slight	Moderate: shrink-swell.	Slight	Percs slowly, floods.	Wetness, floods.	Not needed	Not needed.
Baymeade:							
Be, [1]Bh	Severe: seepage.	Moderate: piping.	Severe: deep to water.	Not needed	Fast intake, droughty.	Too sandy	Droughty.
Borrow pits:							
Bp.							
Craven:							
Cr	Slight	Moderate: piping.	Severe: deep to water, slow refill.	Percs slowly	Erodes easily, percs slowly.	Percs slowly	Percs slowly.
Dorovan:							
[1]DO	Severe: seepage.	Severe: unstable fill, excess humus.	Severe: excess humus.	Floods	Floods	Not needed	Not needed.
Johnston:							
[1]JO	Severe: seepage.	Severe: piping.	Slight	Poor outlets, floods.	Wetness, floods.	Not needed	Not needed.
Kenansville:							
Ke	Severe: seepage.	Moderate: seepage.	Severe: deep to water.	Not needed	Fast intake, droughty.	Too sandy	Droughty.
Kureb:							
Kr	Severe: seepage.	Severe: seepage.	Severe: no water.	Not needed	Fast intake, seepage.	Too sandy	Droughty.
[1]Ku:							
Kureb part	Severe: seepage.	Severe: seepage.	Severe: no water.	Not needed	Fast intake, seepage.	Too sandy	Droughty.
Urban land part.							
Lakeland:							
La	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed	Droughty, seepage, fast intake.	Not needed	Not needed.
Leon:							
Le, [1]Lo	Severe: seepage.	Severe: seepage, piping, erodes easily.	Moderate: deep to water.	Cutbanks cave, wetness.	Wetness	Not needed	Not needed.

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Lynchburg: Ls	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Favorable	Wetness	Not needed	Not needed.
Lynn Haven: Ly	Severe: seepage.	Severe: seepage, piping, erodes easily.	Slight	Cutbanks cave, wetness.	Wetness	Not needed	Not needed.
Mine pits: Mp.							
Murville: Mu	Severe: seepage.	Severe: seepage.	Slight	Poor outlets, floods.	Wetness, floods.	Not needed	Not needed.
Newhan: Nh	Severe: seepage.	Severe: seepage.	Severe: deep to water.	Not needed	Fast intake, droughty.	Not needed	Not needed.
Norfolk: No	Moderate: seepage.	Slight	Severe: deep to water.	Not needed	Favorable	Favorable	Favorable.
Onslow: On	Moderate: seepage.	Moderate: piping.	Severe: deep to water.	Favorable	Wetness	Not needed	Not needed.
Pamlico: Pm	Severe: seepage.	Severe: piping.	Slight	Floods, poor outlets.	Wetness, floods.	Not needed	Not needed.
Pantego: Pn	Moderate: seepage.	Slight	Slight	Poor outlets	Wetness	Not needed	Not needed.
Rains: Ra	Moderate: seepage.	Slight	Moderate: deep to water.	Wetness, floods.	Wetness, floods.	Not needed	Not needed.
Rimini: Rm	Severe: seepage.	Severe: seepage, unstable fill.	Severe: no water.	Not needed	Droughty, seepage.	Too sandy	Droughty.
Seagate: Se	Severe: seepage.	Moderate: piping.	Slight	Wetness	Favorable	Not needed	Not needed.
[1]Sh: Seagate part	Severe: seepage.	Moderate: piping.	Slight	Wetness	Favorable	Not needed	Not needed.
Urban land part.							

See footnotes at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
Stallings: St	Severe: seepage.	Moderate: piping.	Moderate: deep to water.	Cutbanks cave	Wetness	Not needed	Not needed.
Tidal marsh: TM.							
Torhunta: To	Severe: seepage.	Moderate: piping.	Slight	Poor outlets, cutbanks cave.	Wetness	Not needed	Not needed.
Urban land: Ur.							
Wakulla: Wa	Severe: seepage.	Severe: seepage.	Severe: no water.	Not needed	Fast intake, seepage.	Too sandy	Not needed.
Woodington: Wo	Severe: seepage.	Moderate: piping.	Moderate: deep to water.	Cutbanks cave	Wetness	Not needed	Not needed.
Wrightsboro: Wr	Slight	Moderate: low strength.	Moderate: deep to water.	Wetness	Wetness	Wetness	Wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Bayboro:				
Ba	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Baymeade:				
Be, [1]Bh	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy.	Severe: too sandy.
Borrow pits:				
Bp.				
Craven:				
Cr	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Dorovan:				
[1]DO	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.
Johnston:				
[1]JO	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Kenansville:				
Ke	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Kureb:				
Kr	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
[1]Ku:				
Kureb part	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Urban land part.				
Lakeland:				
La	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Leon:				
Le, [1]Lo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lynchburg:				
Ls	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Lynn Haven:				
Ly	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Mine pits:				
Mp.				
Murville:				
Mu	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.

See footnotes at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Newhan:				
Nh	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Norfolk:				
No	Slight	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Onslow:				
On	Moderate: too sandy, wetness.	Moderate: too sandy, wetness.	Moderate: too sandy, wetness.	Moderate: too sandy.
Pamlico:				
Pm	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Pantego:				
Pn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Rains:				
Ra	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Rimini:				
Rm	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Seagate:				
Se	Moderate: too sandy, wetness.	Moderate: too sandy, wetness.	Severe: too sandy.	Severe: too sandy.
[1]Sh:				
Seagate part	Moderate: too sandy, wetness.	Moderate: too sandy, wetness.	Severe: too sandy.	Severe: too sandy.
Urban land part.				
Stallings:				
St	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Tidal marsh: TM.				
Torhunta:				
To	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Wakulla:				
Wa	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Woodington:				
Wo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wrightsboro:				
Wr	Slight	Slight	Slight	Slight.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Bayboro:										
Ba	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Baymeade:										
Be, [1]Bh	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Borrow pits:										
Bp.										
Craven:										
Cr	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Dorovan:										
[1]DO	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Johnston:										
[1]JO	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Kenansville:										
Ke	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kureb:										
Kr	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
[1]Ku:										
Kureb part	Very poor.	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Urban land part.										
Lakeland:										
La	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Leon:										
Le, [1]Lo.										
Lynchburg:										
Ls	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Lynn Haven:										
Ly	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair.
Mine pits:										
Mp.										
Murville:										
Mu	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Newhan:										
Nh	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Norfolk:										
No	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnotes at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Onslow: On	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Pamlico: Pm	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Pantego: Pn	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Rains: Ra	Very poor.	Very poor.	Very poor.	Fair	Fair	Good	Good	Very poor.	Poor	Good.
Rimini: Rm	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Seagate: Se	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
[1]Sh: Seagate part	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
Urban land part.										
Stallings: St.										
Tidal marsh: TM.										
Torhunta: To	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Urban land: Ur.										
Wakulla: Wa	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Woodington: Wo	Poor	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair	Fair.
Wrightsboro: Wr	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Bayboro:											
Ba	0-16	Loam	CL, ML	A-6, A-7	0	100	100	85-100	60-80	30-42	11-22
	16-72	Clay loam, sandy clay loam.	CL, CH	A-7	0	100	100	85-100	55-90	41-70	20-40
Baymeade:											
Be, [1]Bh	0-36	Fine sand	SM, SP-SM	A-2, A-3	0	100	100	51-70	5-15	---	[2]NP
	36-49	Fine sandy loam	CL, CL-ML, SC, SM-SC	A-2, A-4	0	100	100	60-90	30-55	10-20	5-9
	49-78	Loamy fine sand, fine sand.	SM, SP-SM	A-2, A-3	0	100	100	51-75	5-30	---	NP
Borrow pits:											
Bp.											
Craven:											
Cr	0-8	Fine sandy loam	ML, CL-ML	A-4	0	100	100	75-100	51-70	<25	NP-7
	8-64	Clay loam, clay, sandy clay loam.	CH, MH	A-7	0	100	100	90-100	70-95	51-60	18-35
Dorovan:											
[1]DO	0-64	Muck	Pt	---	0	---	---	---	---	---	---
Johnston:											
[1]JO	0-42	Loam, sandy loam	ML, CL, SM, SC	A-2, A-4	0	100	100	60-95	30-75	<35	NP-10
	42-64	Sand	SM, SP-SM	A-2, A-4	0	100	100	50-85	5-12	---	NP
Kenansville:											
Ke	0-33	Fine sand	SM	A-1, A-2	0	100	95-100	45-60	10-25	<25	NP-3
	33-50	Fine sandy loam	SM, SC, SM-SC	A-2	0	100	95-100	50-65	20-35	<30	NP-10
	50-80	Loamy fine sand	SP-SM, SM	A-1, A-2, A-3	0	100	95-100	40-60	5-30	---	NP
Kureb:											
Kr	0-89	Sand	SP	A-3	0	100	100	60-95	0-5	---	NP
[1]Ku:											
Kureb part	0-89	Sand	SP	A-3	0	100	100	60-95	0-5	---	NP
Urban land part.											
Lakeland:											
La	0-48	Sand	SP-SM	A-3, A-2-4	0	90-100	90-100	60-100	5-12	---	NP
	48-80	Sand	SP, SP-SM	A-3, A-2-4	0	90-100	90-100	50-100	1-12	---	NP
Leon:											
Le, [1]Lo	0-6	Sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	6-64	Sand	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Lynchburg: Ls	0-6	Fine sandy loam	SM, SM-SC	A-2, A-4	0	100	100	75-100	25-50	<30	NP-7
	6-64	Sandy clay loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	70-100	25-60	15-40	4-18
Lynn Haven: Ly	0-24	Fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	24-64	Sand	SM, SP-SM	A-3, A-2-4	0	100	100	80-100	5-20	---	NP
	64-75	Sandy clay, sandy loam.	SP, SP-SM, SM, SM-SC	A-3, A-2-4	0	100	100	80-100	2-30	<30	NP-7
Mine pits: Mp.											
Murville: Mu	0-8	Fine sand	SP-SM, SM	A-2, A-3	0	100	100	95-100	5-20	---	NP
	8-56	Fine sand	SM, SP-SM	A-2	0	100	100	95-100	12-20	---	NP
	56-60	Sandy clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	70-95	30-55	20-40	4-2
	60-70	Fine sand	SP-SM	A-2, A-3	0	100	100	95-100	5-12	---	NP
Newhan: Nh	0-72	Fine sand, sand	SP	A-3	0	95-100	95-100	60-75	0-5	---	NP
Norfolk: No	0-12	Fine sandy loam, loamy fine sand.	SM, SM-SC, SC	A-2	0	95-100	95-100	50-91	15-33	<25	NP-14
	12-85	Sandy loam, sandy clay loam, clay.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-55	20-40	4-20
Onslow: On	0-17	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	95-100	60-85	5-30	---	NP
	17-64	Sandy clay loam, sandy loam, clay loam.	SM, CL, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	60-90	30-55	<30	NP-12
Pamlico: Pm	0-36	Muck	Pt	---	0	---	---	---	---	---	---
	36-60	Sand	SM, SP-SM	A-2, A-3	0	100	100	70-95	5-20	---	NP
Pantego: Pn	0-16	Loam	SM, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<30	NP-12
	16-99	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	100	95-100	80-100	36-80	25-40	8-16
Rains: Ra	0-8	Fine sandy loam, fine sandy clay loam.	SM, SM-SC	A-2, A-4	0	100	95-100	50-85	25-50	<35	NP-10
	8-64	Clay loam, clay	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	100	98-100	65-98	30-70	18-40	4-18
	64-68	Fine sandy loam	SM, SC, ML, CL, CL-ML, SM-SC	A-2, A-4, A-6	0	100	95-100	60-95	30-60	<35	NP-7

See footnotes at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Rimini:											
Rm----------------	0-56	Sand------------	SP, SP-SM	A-3	0	100	98-100	60-98	2-5	---	NP
	56-80	Sand------------	SP, SP-SM	A-3	0	100	98-100	75-100	3-10	---	NP
Seagate:											
Se----------------	0-12	Fine sand-------	SM, SP-SM	A-2, A-3	0	100	100	90-100	5-20	---	NP
	12-28	Fine sand-------	SM, SP-SM	A-2	0	100	100	90-100	10-25	---	NP
	28-36	Fine sand-------	SM, SP-SM	A-2	0	100	100	90-100	5-20	---	NP
	36-40	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	100	85-100	20-45	<30	NP-7
	40-66	Clay loam-------	CL	A-6, A-7	0	100	100	80-100	55-95	35-50	16-27
[1]Sh:											
Seagate part-----	0-12	Fine sand-------	SM, SP-SM	A-2, A-3	0	100	100	90-100	5-20	---	NP
	12-28	Fine sand-------	SM, SP-SM	A-2	0	100	100	90-100	10-25	---	NP
	28-36	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	90-100	5-20	---	NP
	36-40	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	100	85-100	20-45	<30	NP-7
	40-66	Clay loam-------	CL	A-6, A-7	0	100	100	80-100	55-95	35-50	16-27
Urban land part.											
Stallings:											
St----------------	0-14	Fine sand-------	SM	A-2	0	100	95-100	51-85	15-30	---	NP
	14-54	Fine sandy loam-	SM	A-2, A-4	0	100	95-100	51-95	20-50	<25	NP-3
	54-68	Fine sandy loam, loamy fine sand	SM, SP-SM	A-2, A-4	0	100	95-100	51-95	10-50	<25	NP-3
Tidal marsh: TM.											
Torhunta:											
To----------------	0-20	Loamy fine sand-	SM	A-2, A-4	0	100	95-100	70-85	20-49	---	NP
	20-47	Fine sandy loam-	SM	A-2, A-4	0	100	95-100	70-85	20-40	---	NP
	47-64	Fine sand-------	SM, SP-SM	A-2, A-3	0	100	95-100	65-85	5-25	---	NP
Urban land: Ur.											
Wakulla:											
Wa----------------	0-30	Sand------------	SM, SP-SM	A-2, A-3	0	100	100	75-90	5-15	---	NP
	30-48	Loamy sand------	SM, SP-SM	A-2	0	100	100	80-95	10-25	---	NP
	48-64	Sand------------	SM, SP-SM	A-2, A-3	0	100	100	75-80	5-15	---	NP
Woodington:											
Wo----------------	0-7	Fine sandy loam-	SM	A-2, A-4	0	100	95-100	50-95	20-50	<25	NP-3
	7-65	Fine sandy loam-	SM	A-2, A-4	0	100	95-100	50-95	20-50	<25	NP-3
Wrightsboro:											
Wr----------------	0-9	Fine sandy loam-	SM	A-2, A-4	0	98-100	95-100	51-95	20-50	<25	NP-3
	9-48	Sandy clay loam-	SC, CL	A-6, A-7	0	98-100	95-100	60-95	40-70	30-50	11-25
	48-65	Clay------------	CH	A-7	0	98-100	95-100	85-98	75-95	50-75	25-45

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Nonplastic.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In	In per hour	In per in of soil	pH			
Bayboro:							
Ba	0-16	0.6-2.0	0.15-0.20	4.5-5.5	Low	High	High.
	16-72	0.06-0.2	0.14-0.18	4.5-5.5	Moderate	High	High.
Baymeade:							
Be, [1]Bh	0-36	6.0-20	0.02-0.06	5.1-6.5	Low	Low	Moderate.
	36-49	2.0-6.0	0.10-0.14	5.1-6.5	Low	Low	Moderate.
	49-78	6.0-20	0.02-0.10	5.1-6.5	Low	Low	Moderate.
Borrow pits:							
Bp.							
Craven:							
Cr	0-8	0.6-2.0	0.12-0.18	4.5-6.0	Low	High	High.
	8-64	<0.2	0.12-0.15	4.5-5.5	Moderate	High	High.
Dorovan:							
[1]DO	0-4	<0.06	0.25-0.50	4.5-5.5	---	High	High.
	4-64	<0.06	0.25-0.50	4.5-5.5	---	High	High.
Johnston:							
[1]JO	0-42	2.0-6.0	0.10-0.20	4.5-5.5	Low	High	High.
	42-64	6.0-20	0.06-0.12	4.5-5.5	Low	High	High.
Kenansville:							
Ke	0-33	6.0-20	0.04-0.10	4.5-6.0	Low	Low	High.
	33-50	2.0-6.0	0.10-0.14	4.5-6.0	Low	Low	High.
	50-80	6.0-20	<0.05	4.5-6.0	Low	Low	High.
Kureb:							
Kr	0-89	6.0-20	<0.05	4.5-7.3	Low	Low	Low.
[1]Ku:							
Kureb part	0-89	6.0-20	<0.05	4.5-7.3	Low	Low	Low.
Urban land part.							
Lakeland:							
La	0-48	>20	0.05-0.08	4.5-6.0	Very low	Low	Moderate.
	48-80	>20	0.03-0.08	4.5-6.0	Very low	Low	Moderate.
Leon:							
Le, [1]Lo	0-6	6.0-20	0.02-0.05	3.6-5.5	Very low	High	High.
	6-30	0.6-6.0	0.05-0.10	3.6-5.5	Very low	High	High.
	30-80	>20	0.02-0.05	3.6-5.5	Very low	High	High.
Lynchburg:							
Ls	0-6	2.0-6.0	0.09-0.13	3.6-5.5	Low	High	High.
	6-64	0.6-2.0	0.12-0.16	3.6-5.5	Low	High	High.
Lynn Haven:							
Ly	0-24	6.0-20	0.02-0.05	3.6-5.5	Very low	High	High.
	24-64	0.6-6.0	0.05-0.10	3.6-5.5	Very low	High	High.
	64-75	>20	0.01-0.05	3.6-5.5	Very low	High	High.
Mine pits:							
Mp.							
Murville:							
Mu	0-8	6.0-20	0.05-0.09	3.6-5.5	Low	High	Moderate.
	8-60	2.0-6.0	0.05-0.09	3.6-5.5	Low	High	Moderate.
	60-70	6.0-20	0.04-0.07	3.6-5.5	Low	High	Moderate.

See footnotes at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In	In per hour	In per in of soil	pH			
Newhan:							
Nh	0-72	>20	<0.05	6.6-7.8	Low	High	Low.
Norfolk:							
No	0-12	2.0-6.0	0.06-0.10	4.5-6.0	Low	Moderate	High.
	12-85	0.6-2.0	0.10-0.15	4.5-5.5	Low	Moderate	High.
Onslow:							
On	0-17	>6.0	0.07-0.11	3.6-5.5	Low	High	High.
	17-64	0.6-2.0	0.12-0.17	3.6-5.5	Low	High	High.
Pamlico:							
Pm	0-36	0.6-2.0	0.24-0.26	3.6-4.4	----------	High	High.
	36-60	6.0-20	0.03-0.06	3.6-5.5	Low	High	High.
Pantego:							
Pn	0-16	2.0-6.0	0.10-0.20	4.5-5.5	Low	Moderate	High.
	16-99	0.6-2.0	0.12-0.20	4.5-5.5	Low	High	High.
Rains:							
Ra	0-8	2.0-6.0	0.08-0.12	4.5-6.5	Low	High	High.
	8-64	0.6-2.0	0.10-0.15	4.5-5.5	Low	High	High.
	64-68	0.6-2.0	0.10-0.15	4.5-5.5	Low	High	High.
Rimini:							
Rm	0-56	>20	0.02-0.05	3.6-5.5	Low	Low	Low.
	56-80	0.6-2.0	0.03-0.07	3.6-5.5	Low	Low	Low.
Seagate:							
Se	0-12	6.0-20.0	0.03-0.06	3.6-6.0	Low	High	High.
	12-28	6.0-20.0	0.05-0.12	3.6-6.0	Low	High	High.
	28-36	6.0-20.0	0.03-0.06	3.6-6.0	Low	High	High.
	36-40	0.6-2.0	0.12-0.20	3.6-6.0	Low	High	High.
	40-66	0.6-2.0	0.15-0.20	3.6-6.0	Low	High	High.
[1]Sh:							
Seagate part	0-12	6.0-20.0	0.03-0.06	3.6-6.0	Low	High	High
	12-28	6.0-20.0	0.05-0.12	3.6-6.0	Low	High	High.
	28-36	6.0-20.0	0.03-0.06	3.6-6.0	Low	High	High.
	36-40	0.6-2.0	0.12-0.20	3.6-6.0	Low	High	High.
	40-66	0.6-2.0	0.15-0.20	3.6-6.0	Low	High	High.
Stallings:							
St	0-14	6.0-20	0.06-0.11	3.6-5.5	Low	High	High.
	14-54	2.0-6.0	0.10-0.15	3.6-5.5	Low	High	High.
	54-68	2.0-20	0.06-0.15	3.6-5.5	Low	High	High.
Tidal marsh:							
TM.							
Torhunta:							
To	0-20	2.0-6.0	0.10-0.15	3.6-5.5	Low	High	High.
	20-47	2.0-6.0	0.10-0.15	3.6-5.5	Low	High	High.
	47-64	6.0-20	<0.05	3.6-5.5	Low	High	High.
Wakulla:							
Wa	0-30	6.0-20	<0.05	4.5-6.0	Low	Low	High.
	30-48	6.0-20	0.05-0.10	4.5-6.0	Low	Low	High.
	48-64	6.0-20	<0.05	4.5-6.0	Low	Low	High.
Woodington:							
Wo	0-7	2.0-6.0	0.10-0.15	3.6-5.5	Low	High	High.
	7-65	2.0-6.0	0.10-0.15	3.6-5.5	Low	High	High.
Wrightsboro:							
Wr	0-9	2.0-6.0	0.10-0.15	4.5-6.0	Low	Moderate	High.
	9-48	0.6-2.0	0.12-0.20	4.5-6.0	Low	Moderate	High.
	48-65	.06-0.2	0.18-0.20	4.5-6.0	Moderate	Moderate	High.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See Glossary for definition of flooding and the terms used to describe frequency and duration of flooding. The symbol < means less than; > means greater than]

Soil name and map symbol	Flooding			High water table		
	Frequency	Duration	Months	Depth	Kind	Months
				Ft		
Bayboro:						
Ba	Common	Brief	Dec-Mar	0-0.5	Apparent	Dec-Apr
Baymeade:						
Be, [1]Bh	None	---	---	4.0-5.0	Apparent	Dec-Apr
Borrow pits:						
Bp.						
Craven:						
Cr	None	---	---	2.0-3.0	Apparent	Dec-Mar
Dorovan:						
[1]DO	Frequent	Very long	Jan-Dec	<0.5	Apparent	Jan-Dec
Johnston:						
[1]JO	Frequent	Long	Nov-Jul	([2])-1.5	Apparent	Nov-Jun
Kenansville:						
Ke	None	---	---	>6.0	---	---
Kureb:						
Kr	None	---	---	>6.0	---	---
[1]Ku:						
Kureb part	None	---	---	>6.0	---	---
Urban land part.						
Lakeland:						
La	None	---	---	>6.0	---	---
Leon:						
Le, [1]Lo	None	---	---	0-1.0	Apparent	Jun-Feb
Lynchburg:						
Ls	None	---	---	0.5-1.5	Apparent	Nov-Apr
Lynn Haven:						
Ly	Frequent	Brief	Jan-Mar	0-1.0	Apparent	Jun-Feb
Mine pits:						
Mp.						
Murville:						
Mu	Frequent	Brief	Nov-Jun	0-1.0	Apparent	Nov-Apr
Newhan:						
Nh	None to rare	---	---	>6.0	---	---
Norfolk:						
No	None	---	---	>6.0	---	---
Onslow:						
On	None	---	---	1.5-3.0	Apparent	Nov-Apr
Pamlico:						
Pm	Frequent	Very long	Nov-Jun	([2])-1.0	Apparent	Nov-Jul
Pantego:						
Pn	None to rare	Very brief	Nov-Feb	0-1.5	Apparent	Nov-Apr

See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Flooding			High water table		
	Frequency	Duration	Months	Depth	Kind	Months
				Ft		
Rains:						
Ra	Rare to common.	Brief	Dec-Mar	0-1.0	Apparent	Nov-Apr
Rimini:						
Rm	None	---	---	>6.0	---	---
Seagate:						
Se	None	---	---	1.5-2.5	Apparent	Nov-Apr
[1]Sh:						
Seagate part	None	---	---	1.5-2.5	Apparent	Nov-Apr
Urban land part.						
Stallings:						
St	None	---	---	1.5-2.5	Apparent	Dec-Mar
Tidal marsh:						
TM.						
Torhunta:						
To	Frequent	Long	Jan-Apr	([3])-1.5	Apparent	Nov-Apr
Urban land:						
Ur.						
Wakulla:						
Wa	None	---	---	>6.0	---	---
Woodington:						
Wo	None	---	---	0.5-1.0	Apparent	Dec-Mar
Wrightsboro:						
Wr	None	---	---	2.0-3.0	Apparent	Dec-Feb

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Water table is 1.0 foot above the surface of the soil.

[3]Water table is .5 foot above the surface of the soil.

TABLE 16.--ENGINEERING TEST DATA

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Percentage passing sieve--: No. 10	Percentage passing sieve--: No. 40	Percentage passing sieve--: No. 200	Percentage smaller than--: 0.05 mm	Percentage smaller than--: 0.02 mm	Percentage smaller than--: 0.005 mm	Percentage smaller than--: 0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO[4]	Classification: Unified[5]
			In		Pct	Pct								Pct			
Wrightsboro fine sandy loam (modal): 3.5 miles north of Wilmington to junction of U.S. Highway 117 and State Route 1329, 100 feet west of U.S. Highway 117 and 50 feet north of State Route 1329, in cultivated field.	Coastal Plain sediment.	6-1	0-6	Ap	119	9	100	86	42	30	13	4	2	--	[6]NP	A-4	SM
		6-4	24-36	B22t	111	16	100	88	61	54	43	32	28	44	24	A-7	CL
		6-6	48-65	IIC	105	17	100	97	86	74	59	46	42	55	34	A-7	CH
Kureb sand (modal): 1.75 miles south of junction of U.S. Highway 421 and South Carolina Highway 132 to Battle Park development, east to first paved street and then south to junction of next street, on east side of New Road.	Coastal Plain sediment.	5-2	3-26	A2	98	17	100	79	2	1	1	1	1	--	NP	A-3	NP
		5-3	26-51	C&Bh	102	15	100	77	2	1	1	1	1	--	NP	A-3	SP
Lynchburg fine sandy loam (modal): 100 feet southeast of northwest corner of New Hanover County Airport and 3 feet east of Airport property line at edge of cultivated field.	Coastal Plain sediment.	4-1	0-6	Ap	109	13	100	98	38	24	14	8	6	--	NP	A-4	SM
		4-4	33-46	B22tg	115	14	100	99	47	38	29	23	21	28	9	A-4	SC
		4-6	66-72	Cg	115	13	100	99	40	31	24	20	18	26	6	A-4	SC-SM

See footnotes at end of table.

TABLE 16.--ENGINEERING TEST DATA--Continued

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Percentage passing sieve--: No. 10	Percentage passing sieve--: No. 40	Percentage passing sieve--: No. 200	Percentage smaller than--: 0.05 mm	Percentage smaller than--: 0.02 mm	Percentage smaller than--: 0.005 mm	Percentage smaller than--: 0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO[4]	Classification: Unified[5]
			In		Pct	Pct								Pct			
Seagate sand (modal): 0.4 mile north of intersection of North Carolina 132 and U.S. highway 421, along north edge of field road, in cultivated field.	Coastal Plain sediment.	2-1	0-8	A1	100	15	100	99	5	4	3	1	1	--	NP	A-1	SP-SM
		2-3	12-23	B21h	107	13	100	100	15	11	8	5	4	--	NP	A-2	SM
		2-6	36-40	B'2t	116	13	100	100	25	23	20	16	15	22	1	A-2	SM
		2-7	40-64	IIC	107	17	100	100	89	73	52	37	33	47	27	A-7	CL
Murville loamy fine sand (modal): 0.5 mile north of junction of U.S. Highway 421 and North Carolina Highway 132 along North Carolina Highway 132, 1,600 feet east along canal, in wooded area.	Coastal Plain sediment.	1-1	0-8	A1	109	14	100	96	16	14	11	6	3	--	NP	A-2	SM
		1-2	8-45	B2h	114	11	100	96	14	13	11	7	5	--	NP	A-2	SM
		1-3	45-56	C1	102	16	100	100	4	4	3	2	1	--	NP	A-3	SP
		1-4	56-64	IIC2	112	14	100	100	78	53	26	12	8	23	4	A-4	CL-ML

[1]Tests performed by the North Carolina State Highway Commission in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO).

[2]Based on AASHTO Designation T 99, Method A. (1).

[3]Mechanical analyses according to the AASHTO Designation T 88 (1). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diamter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[4]Based on AASHTO Designation M 145-49 (1).

[5]Based on the Unified soil classification system (2).

[6]Nonplastic.

TABLE 17.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Bayboro	Clayey, mixed, thermic Umbric Paleaquults
Baymeade	Loamy, siliceous, thermic Arenic Hapludults
*Craven	Clayey, mixed, thermic Aquic Hapludults
Dorovan	Dysic, thermic Typic Medisaprists
Johnston	Coarse-loamy, siliceous, acid, thermic Cumulic Humaquepts
Kenansville	Loamy, siliceous, thermic Arenic Hapludults
Kureb	Thermic, uncoated Spodic Quartzipsamments
Lakeland	Thermic, coated Typic Quartzipsamments
Leon	Sandy, siliceous, thermic Aeric Haplaquods
*Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Lynn Haven	Sandy, siliceous, thermic Typic Haplaquods
Murville	Sandy, siliceous, thermic Typic Haplaquods
Newhan	Mixed, thermic Typic Udipsamments
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Onslow	Fine-loamy, siliceous, thermic Spodic Paleudults
Pamlico	Sandy or sandy-skeletal, siliceous, dysic, thermic Terric Medisaprists
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
*Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Rimini	Sandy, siliceous, thermic Grossarenic Entic Haplohumods
Seagate	Sandy over loamy, siliceous, thermic Typic Haplohumods
Stallings	Coarse-loamy, siliceous, thermic Aeric Paleaquults
Torhunta	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Wakulla	Sandy, siliceous, thermic Psammentic Hapludults
Woodington	Coarse-loamy, siliceous, thermic Typic Paleaquults
Wrightsboro	Fine-loamy, siliceous, thermic Aquic Paleudults

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