SOIL SURVEY
CAMP LEJEUNE, NORTH CAROLINA

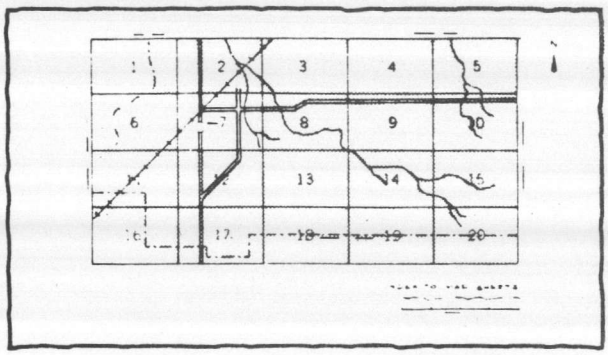
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

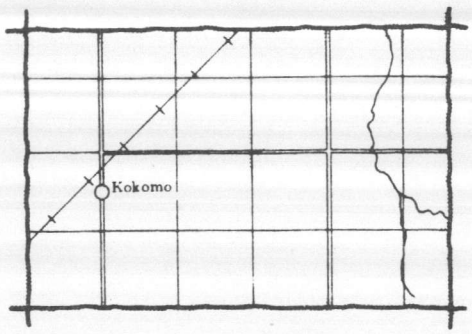
IN COOPERATION WITH

UNITED STATES MARINE CORPS

HOW TO USE THIS SOIL SURVEY

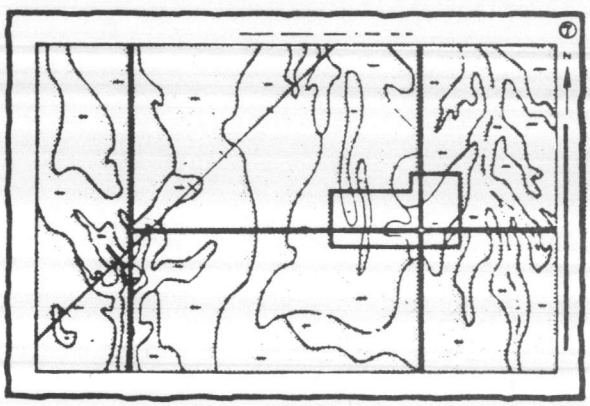
1. Locate your area of interest on the "Index to Map Sheets". If joining maps, disregard map margin notes and refer to the Index to Map Sheets.

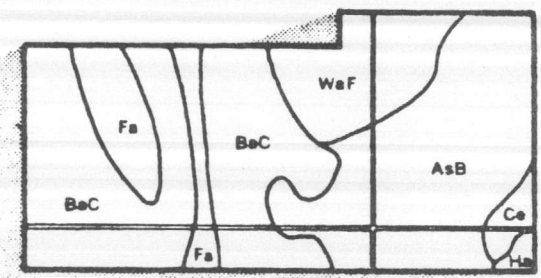




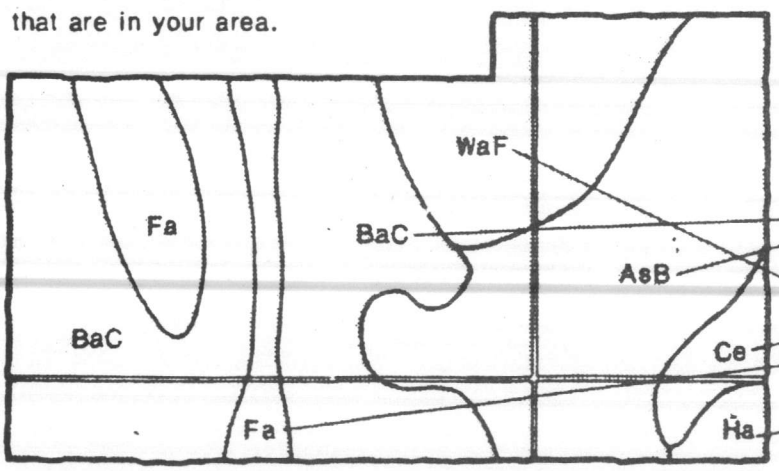
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

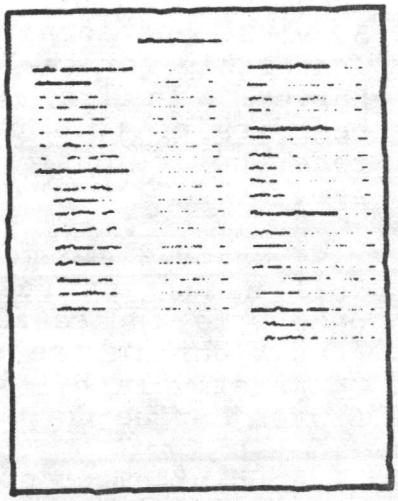


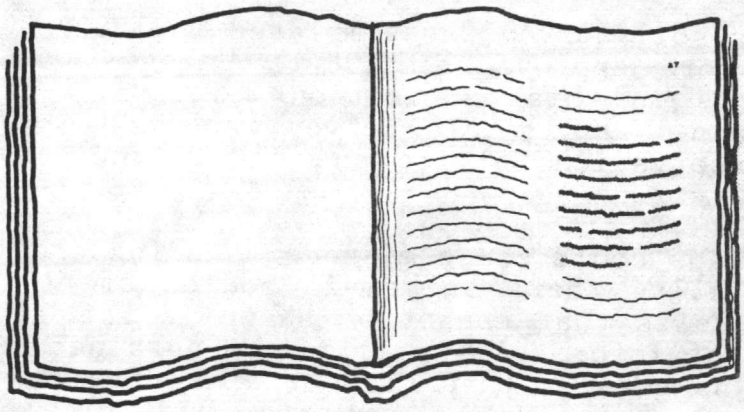
Symbols

AsB
BaC
Ce
Fa
Ha
WaF

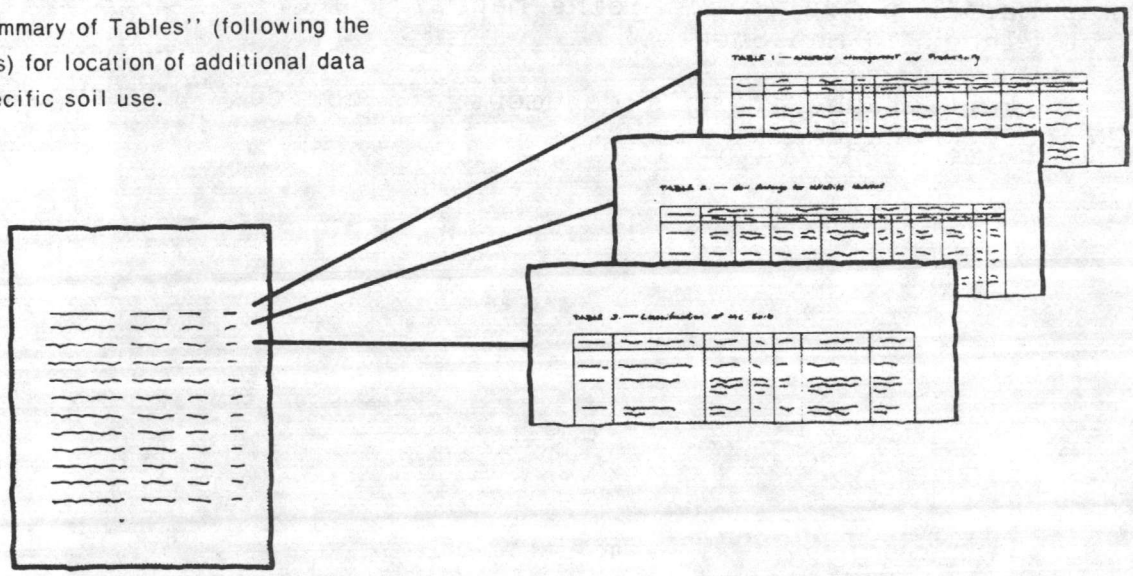
HOW TO USE THIS SOIL SURVEY

5. Turn to "Contents" or "Index to Soil Mapping Units" which lists the name of each mapping unit and the page where that mapping unit is described.





6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the North Carolina Agricultural Research Service, and local agencies. 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, regardless of race, color, national origin, sex, religion, martial status, or age.

Major field work for this soil survey was completed in 1982. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service and the United States Marine Corps.

Enlargement of the soil maps could cause misunderstanding of the detail of mapping. Typically, there are small bodies of contrasting soils within map units that cannot be shown at the publication scale. The level of information that can be obtained from an enlarged map will be no greater than that obtained from the published map. If enlarged, the maps may imply a level of accuracy that isn't justified.

When considering which maps adjoin one-another disregard the map margin notes (i.e. "joins map 17", etc.). Refer instead to the "Index to Map Sheets."

Photographs in this document are courtesy of Camp Lejeune Resource Management.

Cover photo: U.S. Marines on maneuvers at Camp Lejeune

Contents

Soil Series

Issued December 1984

Index to map units

Summary of Tables

SOIL SURVEY OF CAMP LEJEUNE, NORTH CAROLINA

By W. L. Barnhill, Soil Conservation Service

Soils Surveyed By W. L. Barnhill and D. C. Clapp,
Soil Conservation Service; and V. E. Lewis,
North Carolina Department of Natural Resources and
Community Development

Foreword

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

This soil survey is designed for a variety of users and expands earlier resource management plans (6). The Marine Corps can use it to evaluate the potential of the soil and the management needed for maximum training uses. Foresters can use the soil maps to evaluate the management needed for maximum forest production. Planners, engineers, and builders can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, instructors, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic 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. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

General Nature of Camp Lejeune's Land Area

The Camp Lejeune land area originated in a marine or coastal environment similar to that along the present Atlantic Coast. Changes in sea level due to glacial fluctuations and/or slight crustal movements have caused the alternating emergence and submergence of portions of this surface at irregular intervals (4). When submerged, the area collected deposits of continental and marine sediments. Each successive emergence resulted in shoreline modifications upon the newly emerged coastal area. The Coastal Sand Ridge that approximately parallels the present shoreline is a beach deposit that formed during these cycles of emergence.

The base area includes parts of three geomorphic surfaces, representing three periods of geologically recent land emergence (Fig. 1). The Pamlico surface lies at elevations of 0 to 25 feet in a 2-mile-wide strip near the coast and narrower areas along New River and other streams (3). Most of Camp Lejeune is on the Talbot surface, which lies at elevations of about 25 to 45 feet. The Wicomico surface, represented by a few areas south of Jacksonville, lies at elevations of 45 to 70 feet.

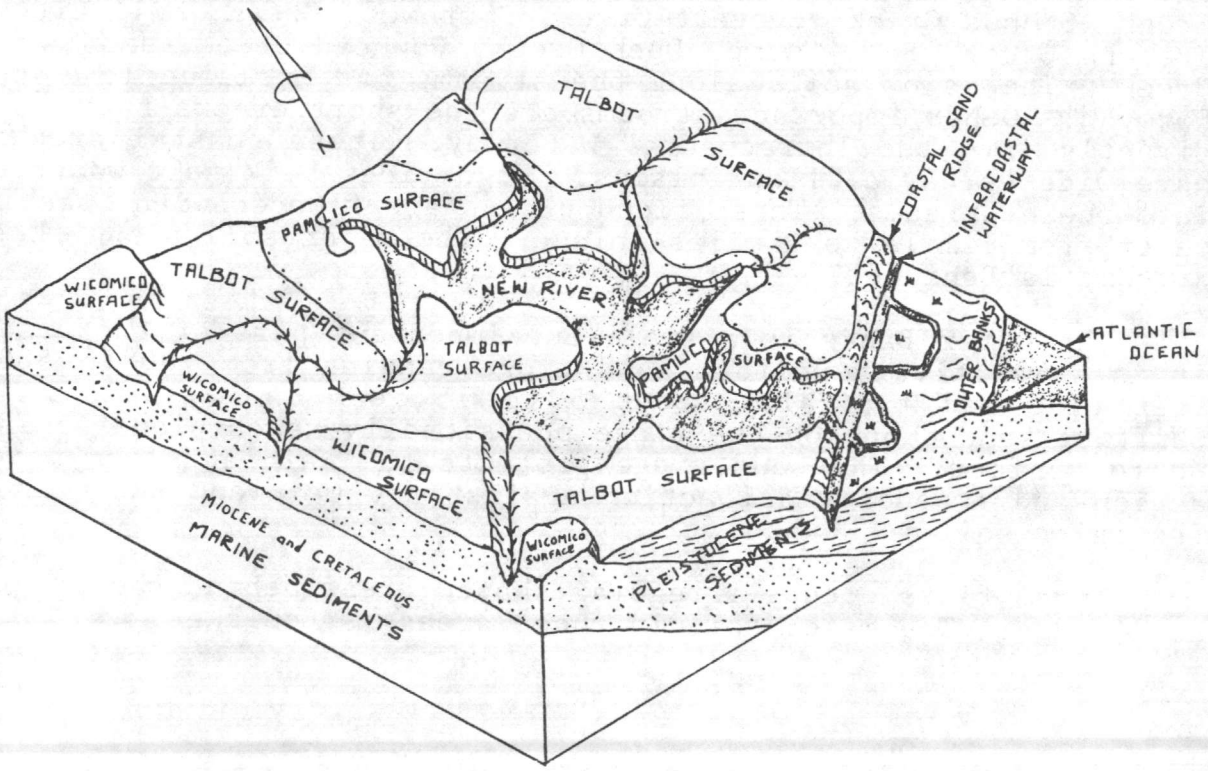


Figure 1. Elevations of geomorphic surfaces of the Camp Lejeune area: Pamlico 0-25 feet, Talbot 25-45 feet, Wicomoco 45-70 feet.

This area of the Coastal Plain is underlain by hundreds of feet of unconsolidated to weakly consolidated sediments ranging from Cretaceous to Miocene age. Generally, these formations are covered with a 5- to 30-feet thick layer of Pleistocene sediments. The sediments are mostly clean sand and clayey sand, interlayered with deposits of clay and marine shells. Outcroppings of the Miocene Yorktown Formation occur on the banks of large streams. The Yorktown Formation consists of clay, sand, and shell marl beds similar to the younger surficial deposits.

Most of Camp Lejeune is nearly level with wide, undissected divides. These areas have minimal relief and water movement is slow. Consequently, the soils are somewhat poorly drained, poorly drained, or very poorly drained. The major soils of these areas are Torhunta, Murville, Woodington, Leon, Rains, and Stallings. A few small oval depressions have developed thick mantles of organic matter. The soil in these depressions is Croatan.

The well drained Baymeade and the moderately well drained Marvyn soils are on side slopes near drainageways.

The main streams draining Camp Lejeune are tributaries of the New River. These tributaries are Northeast Creek, Wallace Creek, Stones Creek, Everett Creek, Southwest Creek, Mill Creek, Frenchs Creek, Bell Swamp, Duck Creek, Cowhead Creek, and Lewis Creek. The major soils along the streams are Muckalee loam and Dorovan. Other important streams are the short creeks that drain directly into the Intracoastal Waterway. These coastal creeks have wide estuarial flood plains. High tides back salt water up into these streams. These flood plains are flooded with brackish water from 1 mile to 3 miles inland. The major soil along these streams is Bohicket.

The Outer Banks is a small but important part of the Base. It is a relatively uniform sand ridge ranging from 200 to 500 feet wide and typically about 5 to 15 feet in elevation. Shifting sand dunes on the ridge occasionally reach elevations of up to 40 feet. The sand ridge protects the mainland from wave action and impedes tidal action against the mainland shoreline. The major soil is Newhan.

Tidal flats occupy irregular shaped areas behind the coastal sand ridge. The major soil in these areas is Bohicket.

Climate

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

Climate is a major determinant of the kinds of plants and animals living in and on the soil. The climate of Camp Lejeune is warm and humid. Summers are long and hot, and winters are short and mild. Mild temperatures and abundant rainfall promote rapid decomposition of organic matter, hasten chemical reactions, speed leaching of soluble bases, and increase translocation of the less soluble fine particles in the soil profile. Consequently, the soils, except for those that formed in marl, are acid, strongly leached, and low in natural fertility. The soils have a higher content of clay in the B horizon than in the A or C horizon, except for the soils that formed in sand and recent alluvium.

Camp Lejeune is hot and humid in summer, but the coast is frequently cooled by sea breezes. Winter is cool, with occasional, brief cold spells. Rains occur throughout the year and are fairly heavy; snowfall is rare. Annual precipitation is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Camp Lejeune for the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 45 degrees F, and the average daily minimum temperature is 32 degrees F. The lowest temperature on record, which occurred at Camp Lejeune on February 1, 1965, is 2 degrees F. In summer, the average temperature is 76 degrees F., and the average daily maximum temperature is 87 degrees F. The highest recorded temperature, which occurred on June 28, 1954, is 103 degrees F.

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

The total annual precipitation is 56 inches. Of this, 60 percent usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 27

inches. The highest 1-day rainfall during the period of record was 15.25 inches at Camp Lejeune on September 19, 1955. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 4 inches. On the average, no days have 1 inch of snow on the ground.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in early spring.

Every few years a hurricane crosses the area.

How This Survey Was Made

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

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic

class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

Detailed Soil Map Units

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

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

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

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

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

Some map units are made up of 2 or more major soils. These map units are called soil complexes. A soil complex consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Baymeade-Urban Land complex, 0 to 6 percent slopes, is an example.

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

This survey includes miscellaneous areas. Pits is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

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

Soil Descriptions

AnB--Alpin fine sand, 1 to 6 percent slopes. This is an excessively drained soil on undulating uplands near the coast and in a few areas on stream terraces of the New River. Mapped areas generally are about as broad as long and range from 50 to 250 acres in size. Most of the acreage is in woodland. A few unsurfaced roads for tracked and heavy-wheeled vehicles are routed through these areas. Alpin soil is also used for off-road maneuvers and bivouac.

Figure 2. A typical pedon of Alpin fine sand, 1 to 6 percent slopes.

Infiltration is rapid and surface runoff is slow. Permeability is very rapid and available water capacity is very low. The soil ranges from very strongly acid to medium acid throughout the profile. The seasonal high water table is below a depth of 6 feet.

Included with this soil in mapping are small areas of Kureb, Baymeade, Pactolus, Leon, and Muckalee soils. The Kureb soil is similar and small areas may be intermingled in this unit. The well drained Baymeade, somewhat poorly drained Pactolus, and poorly drained Leon soils are in narrow depressions, and the poorly drained Muckalee soil is in narrow, wet drainageways. The included soils make up 15 percent of this map unit.

The dominant native trees are loblolly pine, longleaf pine, turkey oak, bluejack oak, blackjack oak, and sassafras. The understory includes pineland threawn, panicum grasses, oaks, and American beautyberry. Some large areas of this soil have been cleared, bedded, and planted to loblolly pine. Seedling mortality is a limitation because of droughtiness. Areas of Alpin soil are used as habitat for deer, turkey, rabbit, turkey, fox, quail, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Tracked vehicles disturb layers so that large, deep holes develop. Holes increase in depth and size with regular use without maintenance. Poor traction on the sandy surface is a problem in the use of this soil for foot traffic and light vehicle traffic. In the absence of ground cover, the soil is susceptible to accelerated erosion on trails. Caving of trench walls is a limitation in the use of this soil for bivouac.

If Alpin soil is used for urban development, caving of ditchbanks and trench walls and seepage are the main limitations. The thick, sandy surface provides a good support base for most structures. Unprotected sandy surfaces are subject to wind erosion. Revegetating disturbed areas around construction and road sites as soon as possible helps to control soil blowing. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Irrigation, addition of organic matter, and frequent fertilization will increase growth of lawns and shrubs on this sandy soil. Sandiness and summer droughtiness are the main limitations for recreational development. Wind and water erosion and sedimentation can be minimized by maintaining or regenerating adequate plant cover.

BmB--Baymeade fine sand, 0 to 6 percent slopes. This well drained soil is on uplands. It is extensive and occurs in large areas with moderately convex slopes near major drainageways. The individual areas are irregular in shape and range from 25 to about 300 acres in size. Most of the acreage is in woodland. The woodland areas are used extensively for tracked and heavy-wheeled vehicle traffic. Baymeade soil is also used for off-road maneuvers and bivouac.

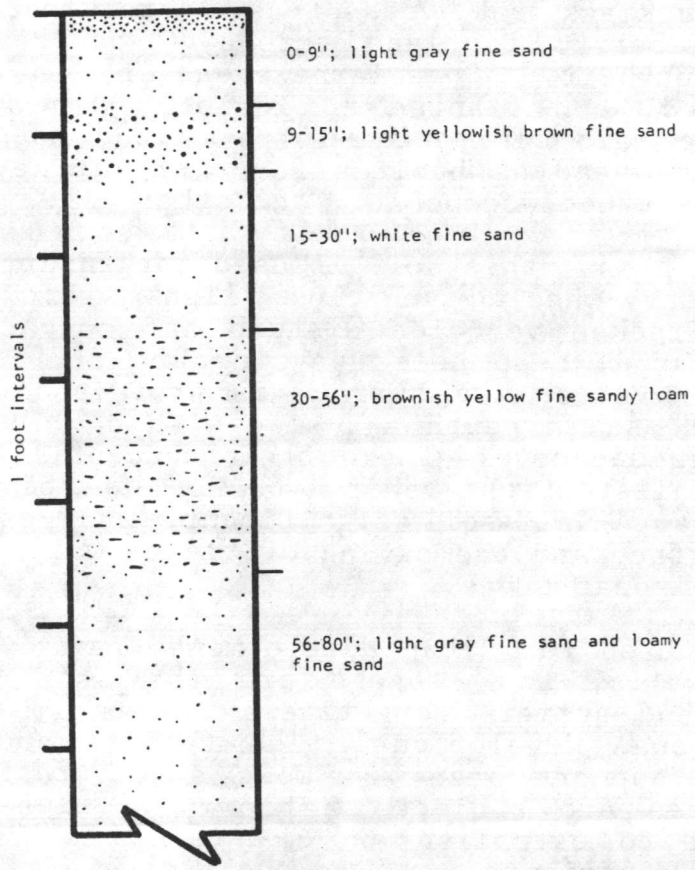


Figure 3. A typical pedon of Baymeade fine sand, 0 to 6 percent slopes.

Infiltration is rapid and surface runoff is slow. Permeability is moderately rapid and available water capacity is low. The soil is strongly acid or medium acid throughout the profile except for the surface layer in areas that have been limed. The seasonal high water table ranges from 4 to 5 feet below the surface.

Included with this soil in mapping are small areas of the sandier Alpin, Kureb, Pactolus, and Leon soils; the moderately well drained Foreston soil; and the poorly drained Muckalee soil. Alpin and Kureb soils are on small, slightly higher ridges and Foreston, Leon, and Pactolus soils are in narrow depressions. Muckalee soil is in narrow drainageways. The included soils make up about 15 percent of this map unit.

The major canopy trees are longleaf pine, loblolly pine, southern red oak, white oak, and hickory. The major understory includes turkey oak, blackjack oak, sassafras, persimmon, flowering dogwood, huckleberry, pineland threeawn, panicum grasses, and American beautyberry. Some large areas of this soil have been cleared, bedded, and planted to loblolly pine. Seedling mortality is the main limitation for woodland uses. Areas of Baymeade soil are used as habitat for deer, turkey, rabbit, fox, quail, red cockaded woodpecker, and other wildlife.

In military training areas, this soil is used for unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Tracked vehicles disturb and compact surface layers so that large, deep holes develop and surface water collects (fig. 4). Unless the surface is protected or maintained the holes increase in depth and size with continued use. In the absence of ground cover, the soil is susceptible to accelerated erosion on trails. Light vehicle traffic and bivouac do not disturb and compact this soil significantly. Poor traction on the sandy surface and the caving of trench walls are moderate limitations in bivouac areas.

If Baymeade soil is used for urban development, caving of ditchbanks and trench walls, and seepage are the main limitations. Sandiness and summer droughtiness are the main limitations for recreational development. The thick, sandy surface provides a good support base for most structures. Unprotected sandy surfaces are subject to blowing. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Irrigation, addition of organic matter, and frequent fertilization will improve growth of lawns.

Figure 4. Tank trails on Baymeade fine sand, 0 to 6 percent slopes. Tank tracks have caused large, shallow holes.

BaB--Baymeade-Urban land complex, 0 to 6 percent slopes. About 50 percent of this unit is the well drained Baymeade soil. About 30 percent is covered by buildings, streets, and parking lots. The remaining 20 percent includes soil that was disturbed during urbanization. The remaining undisturbed areas are small and it was not practical to map them separately.

Infiltration is rapid and surface runoff is slow on Baymeade soil. Permeability is moderately rapid and available water capacity is low. The soil ranges from strongly acid to medium acid throughout the profile unless the surface layer has been limed. The seasonal high water table ranges from 4 to 5 feet below the surface in Baymeade soil.

The Urban land portion of this map unit 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 apartment complexes, 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. 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.

Small areas of Norfolk, Craven, Marvyn, and Onslow soils are included in this unit. The well drained Norfolk soil occurs near the main drainageways. The moderately well drained, clayey Craven soil and the well drained Marvyn soil occur on side slopes of drainageways. Small areas of Onslow soil occur intermittently throughout the area.

The open parts of this unit are used for parks, future building sites, lawns, gardens, trees, and shrubs. Caving of ditchbanks and trench walls and seepage are the main limitations for urban uses. The thick, sandy surface provides a good support base for most structures. However, unprotected sandy surfaces are subject to blowing. Revegetating disturbed areas around construction and road sites, as soon as possible, helps to control wind erosion. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Irrigation, addition of organic matter, and frequent fertilization will improve growth of lawns and shrubs on this sandy soil. On-site investigation is generally needed to properly evaluate and plan the development of specific areas.

Bo--Bohicket silty clay loam. This nearly level, very poorly drained soil is on tidal flats at elevations less than 3 feet above sea level. Locally, this unit is referred to as "mud flats". The areas are broad and are generally dissected by shallow, narrow waterways. Mapped areas commonly range from 50 to 300 acres in size. The areas are generally inaccessible and observations were not as detailed as in most other map units. These areas are used by marine and wetland wildlife.

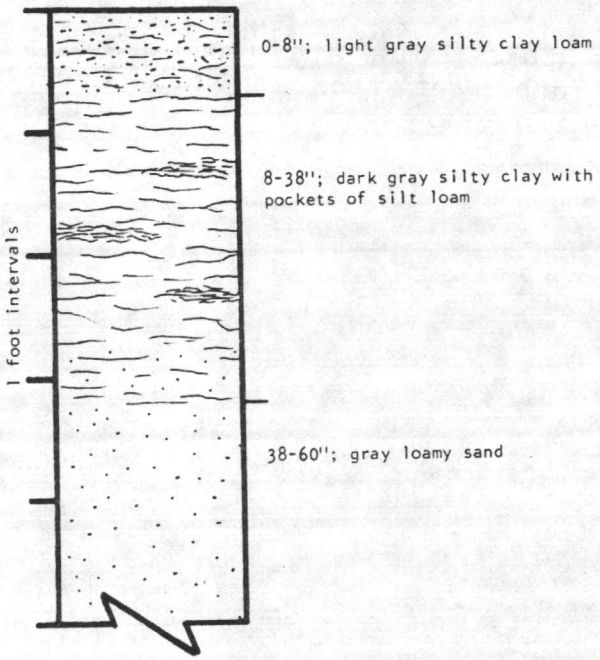


Figure 5. A typical pedon of Bohicket silty clay loam.

Internal drainage is very slow and shrink swell potential is high. This soil is flooded daily with the rise and fall of the tide. The soil ranges from slightly acid to moderately alkaline throughout the profile.

Included with this soil in mapping are narrow areas of a sandy soil that is adjacent to waterways. Small areas of Lafitte soil is also intermingled in this unit. The included soils make up about 20 percent of this unit.

The dominant vegetation is short saltmarsh cordgrass and black needlerush. The high silt and organic matter content of this soil will not support the weight of large animals. However, the edges of these tidal marshes are important as habitat for raccoons, deer, river otters, and marsh rabbits. Birds using the tidal marsh areas are clapper rail, sara rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. Water animals using these areas during high tides include crab, shrimp, and fish such as flounder, minnows, mullet, and menhaden. Reptiles such as American alligators and young sea turtles also use these areas.

The characteristics of this soil are unfavorable for military training areas and urban or recreational development because of daily flooding and low strength.

Co--Corolla fine sand. This nearly level, moderately well drained to somewhat poorly drained soil is on the Outer Banks adjacent to undulating ridges. The areas are long and narrow and range from 5 to 20 acres in size. This soil is mostly in native vegetation. Some small areas are used for vehicle parking, small buildings, and recreation.

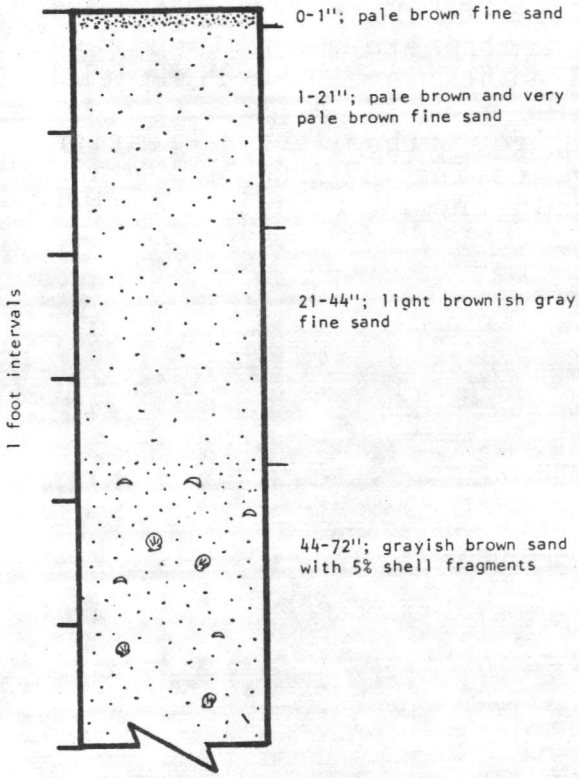


Figure 6. A typical pedon of Corolla fine sand.

Infiltration is rapid and surface runoff is slow. Permeability is very rapid and available water capacity is low. The soil ranges from medium acid to moderately alkaline throughout the profile. The seasonal high water table ranges from 1.5 to 3 feet below the surface. This soil is subject to rare flooding.

Some small areas of Duckston soil are intermingled throughout this unit. Also included are small areas of Newhan soil on small ridges. The included soils make up 20 percent of this unit.

This soil is mostly in native vegetation consisting of live oak, eveningprimrose, saltmeadow cordgrass, wild olive, bitter panicum, sea rocket, waxmyrtle, saltwort, and Yaupon holly. Commercial tree production is not feasible on this soil. Corolla is important habitat for loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

The use of this soil for military training areas is limited by its Outer Banks location and by wetness and poor traction on the sandy surface. If used for vehicle traffic, large, deep holes will develop unless the trails are maintained regularly. Caving of ditchbanks and trench walls is also a limitation.

If Corolla soil is used for urban or recreational development, wetness, flooding, caving of ditchbanks and trench walls, summer droughtiness, and sandy material are the main limitations.

CrB--Craven fine sandy loam, 1 to 4 percent slopes. This moderately well drained soil is on uplands. It occupies slightly convex divides near large drainageways. Areas of this soil are oblong with irregular widths and range from 25 to about 50 acres in size. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. It is also used for off-road maneuvers and bivouac.

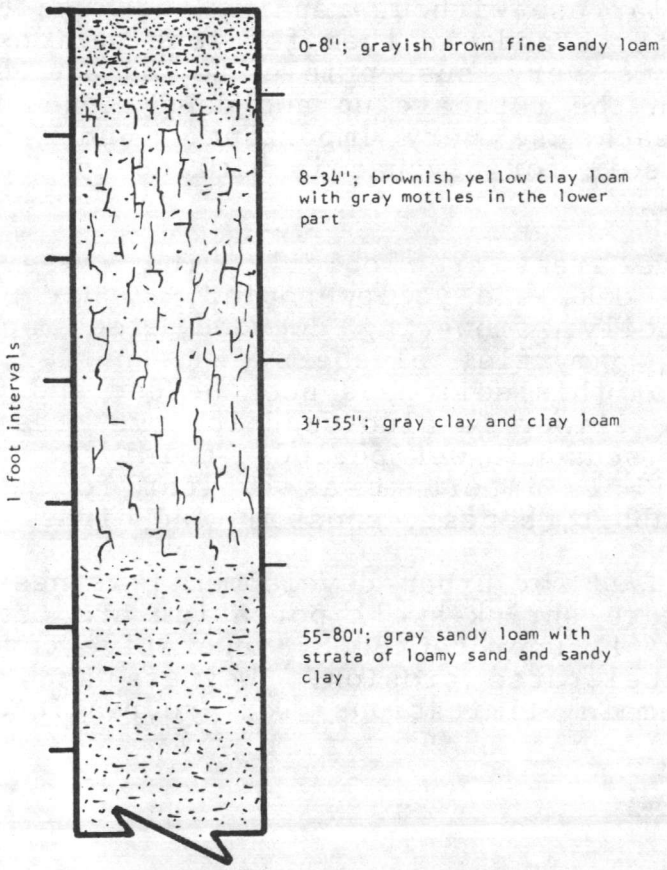


Figure 7. A typical pedon of Craven fine sandy loam, 1 to 4 percent slopes.

Infiltration is moderately slow and surface runoff is medium. Permeability is slow, the available water capacity is medium, and shrink swell potential is moderate. The soil is very strongly acid or strongly acid throughout the profile, unless the surface layer has been limed. The seasonal high water table ranges from 2 to 3 feet below the surface.

Included with this soil in mapping are a few areas of Craven soil that have a loam surface layer. Also included are small areas of the Goldsboro soil, the somewhat poorly drained Lenoir soil, and the well drained Norfolk soil. Goldsboro soil is intermingled throughout the mapped areas. Lenoir soil is at the outer edges of mapped areas near interstream areas. Norfolk soil is intermingled with Craven soil near drainageways.

The use of this soil for military training areas is limited during wet seasons. Vehicles easily make ruts under wet conditions. Under regular use without repair, the ruts become deeper and wider and water stands in them for long periods after rainstorms. The soil is very susceptible to damage by accelerated erosion when the ruts are up and down slope, making repair of ruts after each use very important. Under wet conditions, use of the soil for bivouac is limited by the slow permeability of the soil.

The dominant native trees are loblolly pine, sweetgum, southern red oak, white oak, and yellow-poplar. Other native species are American holly, flowering dogwood, red maple, hickory, dwarf azalea, waxmyrtle, blueberry, greenbrier, and persimmon. Some areas of this soil have been bedded and planted with loblolly pine. Fertilizer is also used in some areas. The use of equipment during seasonal wet periods, mainly in winter, is limited. Craven soil is important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, and birds.

If Craven soil is used for urban development, wetness, slow permeability, and moderate shrink-swell potential are the main limitations. This soil, if unprotected by vegetative cover, is very susceptible to accelerated erosion. Wetness and slow permeability are the main limitations for recreational development.

CrC--Craven fine sandy loam, 4 to 8 percent slopes. This moderately well drained soil is on uplands. It is near large drainageways and on short side slopes. Areas of this soil are long and narrow. They range from 5 to about 50 acres in size. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. Craven soil is also used for off-road maneuvers and bivouac.

Except for the differences in slope, a typical pedon of Craven fine sandy loam, 4 to 8 percent slopes, is very similar to that of Craven fine sandy loam, 1 to 4 percent slopes.

Infiltration is slow and surface runoff is rapid. Permeability is slow, available water capacity is medium, and shrink swell potential is moderate. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 2 to 3 feet below the surface.

Included with this soil in mapping are small areas of similar soils such as Marvyn and Goldsboro. Also included are some areas that have slopes greater than 8 percent, a few areas of Craven soil that have a clay loam surface layer, and some areas of Muckalee soil in narrow drainageways. Included soils make up about 20 percent of this map unit.

The dominant native trees are loblolly pine, southern red oak, white oak, and yellow-poplar. Other native trees are American holly, sweetgum, red maple, flowering dogwood, hickory, black cherry, and persimmon. Some small areas of this soil have been bedded and planted with loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during seasonal wet periods, mainly in winter. Areas of Craven soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, and birds.

The use of this soil for military training areas is limited during wet seasons. Vehicle traffic easily makes ruts under wet conditions. Under regular use without repair, the ruts become deeper and wider and water stands in them for long periods. The soil is very susceptible to damage by accelerated erosion when the ruts run up and down slope. Use of the soil for bivouac is limited by the slow permeability of the soil.

If Craven soil is used for urban development, wetness, slow permeability, and moderate shrink-swell potential are the main limitations. This soil, if unprotected by vegetative cover, is very susceptible to accelerated erosion. Slope is the main limitation for recreational development.

Ct--Croatan muck. This nearly level, very poorly drained soil is generally in oval depressions on broad interstream areas on uplands. Mapped areas range from 20 to about 200 acres in size. Nearly all of the acreage is in woodland.

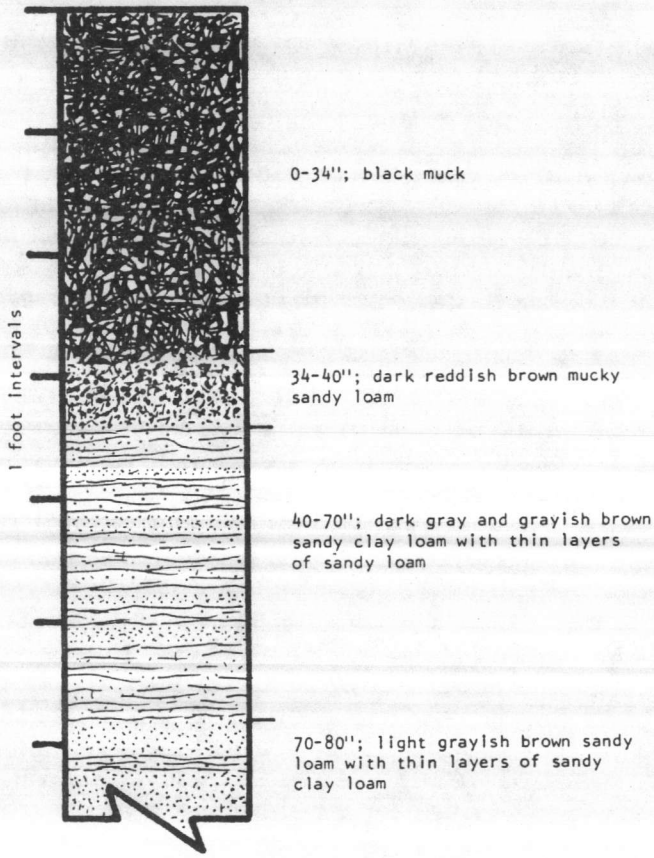


Figure 8. A typical pedon of Croatan muck.

Infiltration is moderate and surface runoff is very slow. Permeability is moderate and available water capacity is high. This soil has high organic matter content in the surface layer and has high volume change when it dries. The organic layers are extremely acid or very strongly acid throughout. The underlying mineral soil ranges from extremely acid to slightly acid throughout. The seasonal high water table is at or near the surface. This soil is subject to rare flooding.

Small areas of similar soils such as the very poorly drained Pantego, Torhunta, and Murville soils are intermingled in this unit. The included soils make up about 20 percent of this map unit.

Croatan soil is mostly in native forest. The major canopy trees are pond pine, baldcypress, Atlantic white-cedar, swamp tupelo, and red maple. Important understory species are titi, loblolly bay, gallberry, huckleberry, greenbrier, switchcane, giant cane, blueberry, redbay, sweetbay, and swamp cyrilla. The use of equipment is limited and seedling mortality is a limitation. Areas of Croatan soil are important as habitat for deer, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

A few areas of this soil have ditches around rectangular tracts within which the soil is bedded and planted to loblolly pine. Fertilizer is being used in some of these tracts.

The characteristics of this soil are unfavorable for military training areas because of wetness, ponding, low strength for vehicles, and very dense vegetation.

Croatan soil generally is not used for urban or recreational development. Wetness, flooding, and low strength are the main limitations.

Da--Dorovan muck. This nearly level, very poorly drained soil is on flood plains. These areas are poorly accessible and observations were not as detailed as in most other map units. The individual areas are long with irregular widths. Nearly all of the acreage is in woodland.

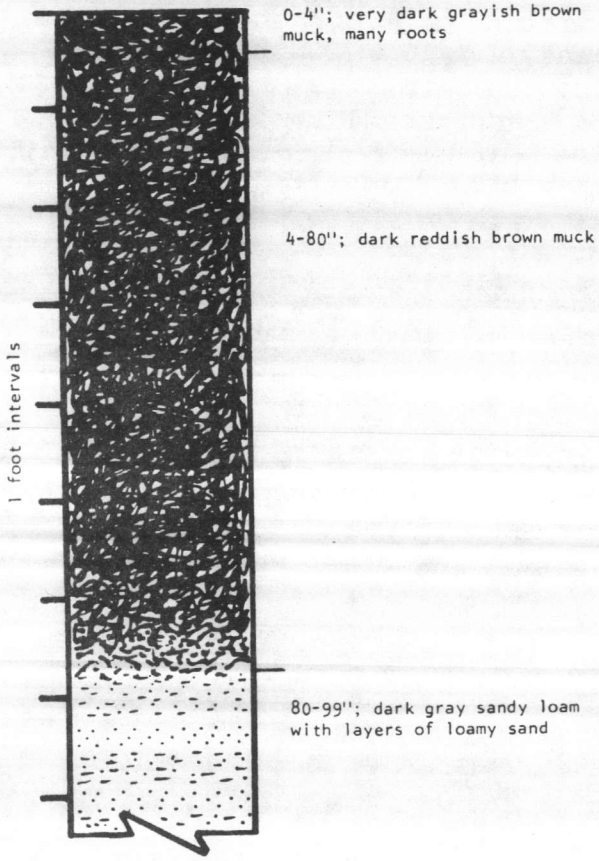


Figure 9. A typical pedon of Dorovan muck.

Infiltration is moderate and surface runoff is very slow. Permeability is moderate and available water capacity is high. The soil is very strongly acid or strongly acid in the organic layers. This soil has a high organic matter content and undergoes a high volume change when it dries. The seasonal high water table is at or near the surface throughout the year. This soil is frequently flooded.

Included with this soil are narrow areas of Muckalee soil near stream banks. The included soils make up about 10 percent of the unit.

The major canopy trees are baldcypress, red maple, sweetgum, swamp tupelo, black willow, sweetbay, and Atlantic white-cedar. Important understory species include gallberry, greenbrier, titi, waxmyrtle, and sphagnum moss. The use of equipment is restricted and seedling mortality is a limitation. Areas of Dorovan soil are important as habitat for deer, raccoon, fox, rabbit, bobcat, opossum, mink, otter, black bear, birds, and other wildlife.

The characteristics of this soil are unfavorable for military training areas because of wetness, frequent flooding, and low strength of the organic surface layer.

This soil generally is not used for residential or recreational development because of wetness, low strength, and flooding.

Dc--Duckston fine sand. This nearly level, poorly drained soil is on the inland side of the Outer Banks. Elevation is less than 5 feet above sea level. Mapped areas are small and generally long and narrow. They range from 5 to 150 acres in size. Nearly all of the acreage is in native maritime vegetation.

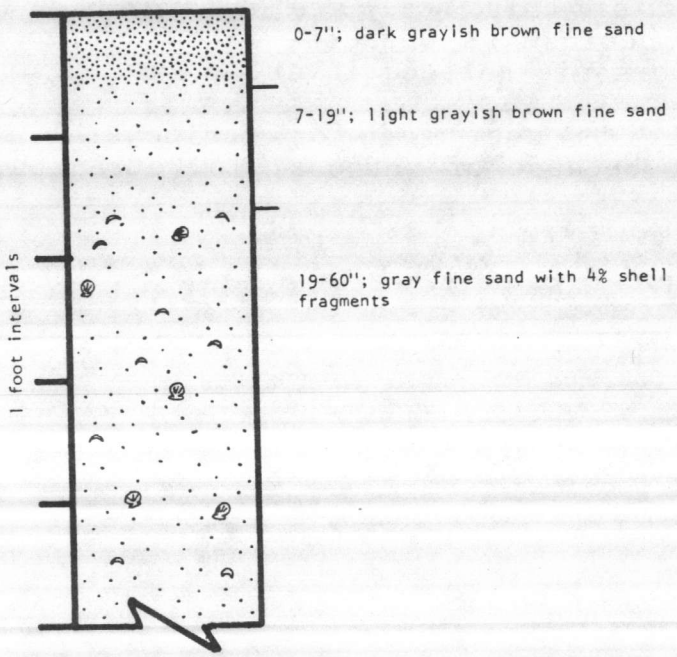


Figure 10. Duckston fine sand.

Infiltration is very rapid and surface runoff is slow. Permeability is very rapid and available water capacity is low. The soil ranges from medium acid to moderately alkaline. The water table fluctuates with tides and is generally at or near the surface. This soil is frequently flooded following intense rains and storm tides.

Included with this soil in mapping are small areas of Corolla soil on higher parts of the landscape. The included soil makes up about 10 percent of this map unit.

The dominant vegetation consists of waxmyrtle, black willow, black highbush blueberry, saltmeadow cordgrass, marsh elder, groundsel tree, beachgrass, dotted smartweed, Virginia buttonweed, pennywort, sea blite, and sphagnum moss. Commercial tree production on this soil is not feasible. Areas of Duckston soil are habitat for whitetail deer, raccoon, cottontail rabbit, loggerhead turtle, cattle egret, American egret, great blue heron, and crabs.

Use of this soil for military training areas is limited by flooding, wetness, and by its Outer Banks location. If used as unsurfaced roads for vehicle traffic, large holes will develop unless regularly maintained.

This soil generally is not used for recreational or urban development. Wetness and flooding are the main limitations.

FoA--Foreston loamy fine sand, 0 to 2 percent slopes. This moderately well drained soil is on uplands. It is on slightly convex divides. Individual areas of this soil are irregular in shape and range from 10 to 350 acres in size. Most of the acreage is in woodland. A few unsurfaced roads for tactical vehicles are routed through these areas. Foreston soil is also used for off-road maneuvers and bivouac.

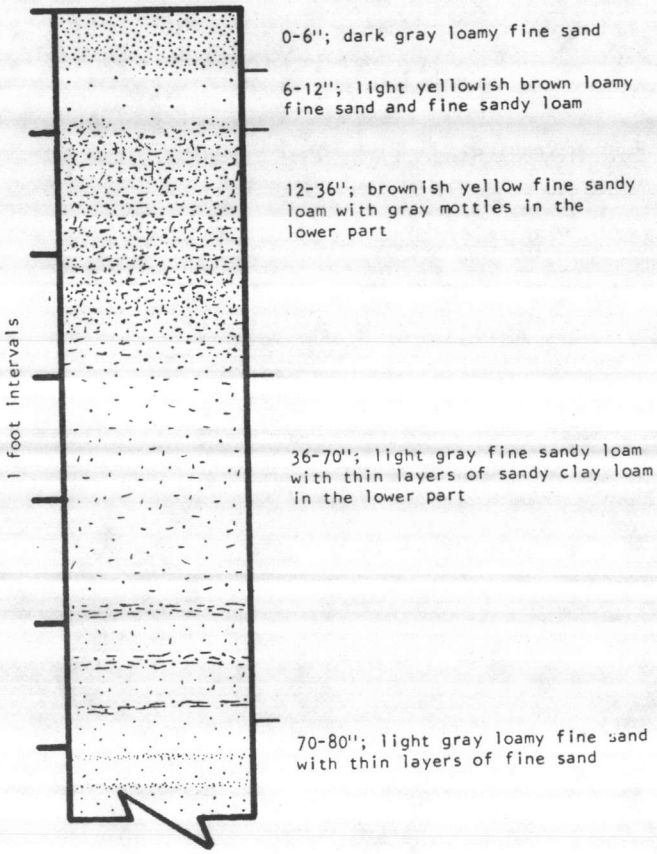


Figure 11. A typical pedon of Foreston loamy fine sand, 0 to 2 percent slopes.

Infiltration is moderate and surface runoff is slow. Permeability is moderately rapid and available water capacity is medium. The soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 2.5 to 3.5 feet below the soil surface.

Small areas of similar soils such as Goldsboro, Onslow, and Pactolus are included in this unit. They are intermingled throughout the mapped areas with Foreston soil. Also included are small intermingled areas of the somewhat poorly drained Stallings soil. The well drained Baymeade soil occurs along the outer edges of mapped areas near drainageways. The included soils make up about 20 percent of this map unit.

The major canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, red maple, hickory, willow oak, and water oak. The understory includes American holly, gallberry, dwarf azalea, flowering dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. Some large areas of this soil have been bedded and planted to loblolly pine. Fertilizer is being used in some areas. Areas of Foreston soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Under wet conditions vehicle traffic causes ruts and compaction, and water stands for short periods after rains. Ruts up and down slopes cause accelerated erosion that is very damaging to the soil, and makes repair of vehicle trails after each use very important. Use of this soil for bivouac is limited by wetness and caving of trench walls.

If Foreston soil is used for urban development, wetness, caving of trench walls, and seepage are the main limitations. There are no major limitations in using this soil for recreational development.

GoA--Goldsboro fine sandy loam, 0 to 2 percent slopes. This moderately well drained soil is on uplands. It is on slightly convex divides. Areas of this soil are long with irregular widths. They range from 15 to about 100 acres in size. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. Goldsboro soil is also used for off-road maneuvers and bivouac.

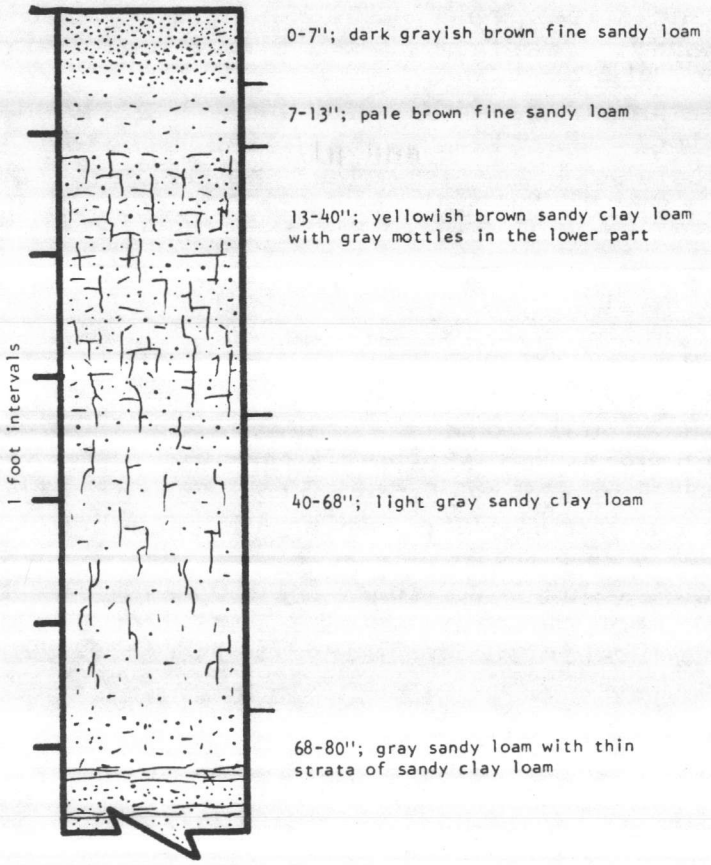


Figure 12. A typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes.

Infiltration is moderate and surface runoff is slow. Permeability is moderate and available water capacity is medium. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 2 to 3 feet below the surface.

Included with this soil in mapping are small areas of Goldsboro soil that have a loamy fine sand surface layer. Small areas of Onslow, Foreston, and Craven soils are intermingled throughout the mapped areas. Also included are some areas of the well drained Norfolk soil and the somewhat poorly drained Lynchburg soil. The Norfolk soil is near side slopes and the Lynchburg soil is near interstream areas in slight depressions. The included soils make up about 10 percent of this map unit.

The dominant native trees are loblolly pine, yellow-poplar, sweetgum, and American sycamore. Other native trees are American holly, flowering dogwood, hickory, black cherry, persimmon, red oak, and white oak. Common understory species include American holly, gallberry, dwarf azalea, flowering dogwood, huckleberry, persimmon, waxmyrtle, blueberry, and greenbrier. Some large areas of this soil have been bedded and planted to loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods, particularly in winter. Areas of Goldsboro soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, and birds.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. During wet conditions, vehicle traffic causes ruts and compaction. Compaction of these loamy soils makes them nearly impervious, so that water stands in ruts for short periods after rainstorms. Under regular use without repair, ruts become deeper and wider. The soil is very susceptible to damage by accelerated erosion when the ruts are up and down slope making repair of ruts after each use very important. During winter months and following rains, use of the soil is limited for bivouac because of wetness.

If Goldsboro soil is used for urban and recreational development, wetness is the main limitation.

GpB--Goldsboro-Urban land complex, 0 to 5 percent slopes. This moderately well drained soil is on uplands. About 50 percent of this unit is Goldsboro soil, about 30 percent is Urban land, and the remaining 20 percent is soil which was disturbed during urbanization.

Infiltration is moderate and surface runoff is slow on Goldsboro soil. Permeability is moderate and available water capacity is medium. The soil is very strongly acid or strongly acid throughout unless the surface has been limed. The seasonal high water table ranges from 2 to 3 feet below the surface during periods of high rainfall and in most winter months.

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 apartment complexes, 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, but in the process of smoothing, high areas have been cut down and low areas have been filled.

Small areas of fill material and areas where surface layers were removed by cutting and grading are included in this unit. Also included are areas of Onslow, Foreston, Lynchburg, and Stallings soils that are intermingled with Goldsboro soil. Small depressions and intermittent drainageways are included that contain wet soils such as Rains and Muckalee. Also included in mapping are areas of Baymeade, Marvyn, Craven, and Norfolk soils. The well drained Baymeade and Norfolk soils are near main drainageways. The well drained Marvyn soil and the moderately well drained Craven soil are on side slopes of drainageways.

Goldsboro soil is used for parks, lawns, gardens, and planting trees and shrubs. Wetness is the main limitation for some urban and recreational development. The loamy surface layer is easy to till but plant nutrients leach readily. Large amounts of fertilizer, particularly nitrogen, are needed to establish and maintain lawns, and vegetable and flower gardens. Erosion is a hazard if the surface layer is not protected.

An on-site investigation generally is needed to properly evaluate and plan the development of specific sites.

KuB--Kureb fine sand, 1 to 6 percent slopes. This excessively drained soil is on uplands. It is near large drainageways and on undulating convex divides. Areas of this soil have irregular shapes. They range from 5 to 200 acres in size. Nearly all of the acreage is in woodland. Some unsurfaced roads for tactical vehicles are routed through these areas. They are also used for off-road maneuvers and bivouac.

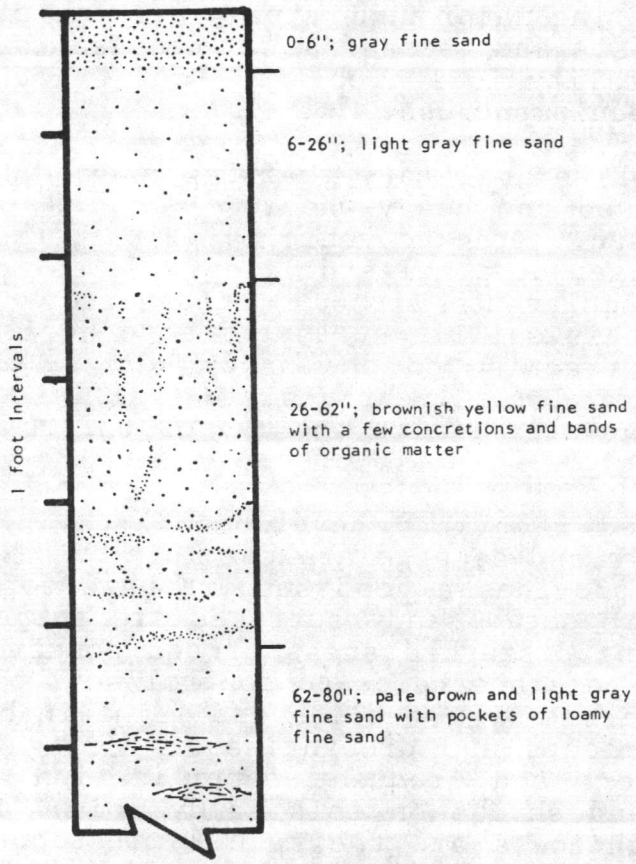


Figure 13. A typical pedon of Kureb fine sand, 1 to 6 percent slopes.

Infiltration is rapid and surface runoff is slow. Permeability is rapid and available water capacity is very low. The soil ranges from very strongly acid to neutral throughout the profile. The seasonal high water table is below 6 feet.

Small areas of similar soils such as Alpin and Wando are included in this unit. They are intermingled throughout the mapped areas with Kureb soil. Also included are small areas of Baymeade, Leon, and Murville soils. The well drained Baymeade and poorly drained Leon soils are in narrow depressions and the very poorly drained Murville soil is in narrow, wet drainageways. The included soils make up about 15 percent of this map unit.

Most of the acreage is in sparse native vegetation adapted to droughty conditions. The native trees are longleaf pine, turkey oak, and live oak. The major understory includes pineland threeawn, panicum grasses, and sassafras. Because of droughtiness seedling mortality is a problem. Poor traction on the sandy surface limits equipment use.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Tracked vehicles disturb the sandy surface layers so that large, deep holes develop. Holes increase in depth and size under regular use without maintenance. In the absence of ground cover, this soil is susceptible to accelerated erosion on trails. Poor traction on the sandy surface is a problem in the use of the soil for light vehicle traffic and foot traffic. Caving of trench walls limits the use of this soil for bivouac.

If Kureb soil is used for urban development, caving of ditchbanks and trench walls and seepage are the main limitations. The thick, sandy surface provides a good support base for most structures. However, unprotected sandy surfaces are subject to wind erosion. Revegetating disturbed areas around construction and road sites as soon as possible helps to control soil blowing. Lawns and shrubs are difficult to establish and maintain because of leaching of plant nutrients and droughtiness. Irrigation, addition of organic matter, and frequent fertilization will improve growth of lawns and shrubs on this sandy soil. Sandy material and summer droughtiness are the main limitations for recreational development. Wind and water erosion and sedimentation can be minimized by maintaining adequate plant cover.

La--Lafitte muck. This nearly level, very poorly drained soil is on estuarial flood plains of the White Oak River at elevations less than 5 feet above sea level. The areas are long with irregular widths and range from 20 to 50 acres in size. These areas are poorly accessible and observations were not as detailed as in other map units. This soil is used for marine and wetland wildlife.

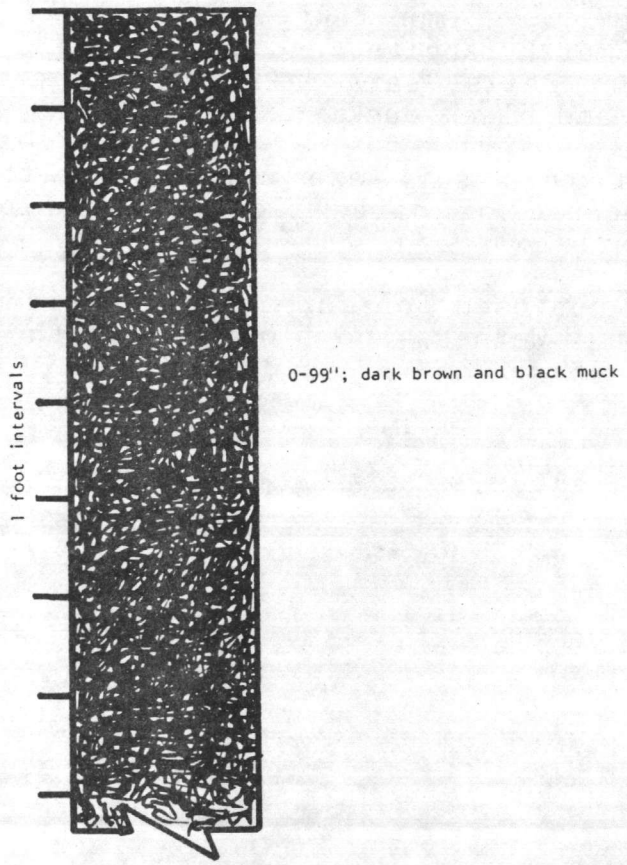


Figure 14. A typical pedon of Lafitte muck.

Infiltration is moderate and surface runoff is very slow. Permeability is moderate and available water capacity is high. Organic matter content of the surface layer is very high. The organic layers range from extremely acid to mildly alkaline throughout the profile. The soil floods daily with brackish water and the water table remains at or near the surface most of the time.

Included with this soil in mapping are narrow areas of a sandy soil near stream banks and small areas of a soil that has a thinner organic layer. These included soils make up about 10 percent of this unit.

All of the acreage is in native vegetation consisting of big cordgrass, cattail, sweet pepperbush, sheep sorrel, rose pogonia, grass-pink, common rush, and sphagnum moss. Sparse stands of baldcypress, water tupelo, and redbay grow near the edges joining the upland. Commercial tree production is not feasible on this soil. Areas of Lafitte soil are important as habitat for raccoon, deer, river otter, marsh rabbits, and alligators. Birds using these areas are clapper rails, sara rails, cattle egret, American egret, blue heron, and black duck.

The characteristics of this soil are unfavorable for military training areas because of daily flooding and low strength of the organic material.

This soil generally is not used for forestry or residential and recreational development. Wetness and flooding are the main limitations.

Le--Lenoir loam. This nearly level, somewhat poorly drained soil is on interstream areas on uplands. This soil occurs in a small area on the air station.

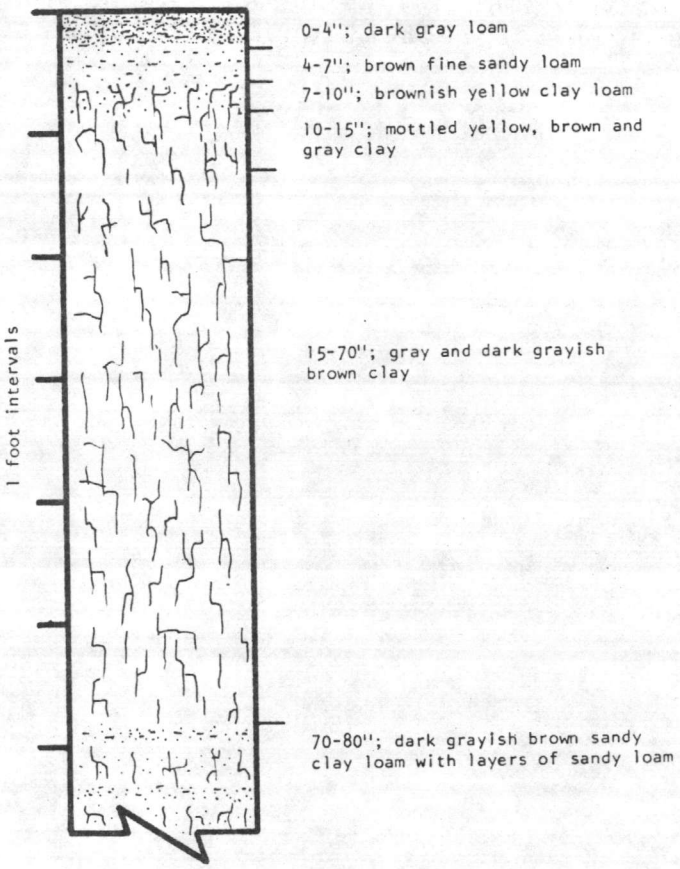


Figure 15. A typical pedon of Lenoir loam.

Infiltration is slow and surface runoff is slow. Permeability is slow and shrink-swell potential is moderate. Available water capacity is medium. The soil is very strongly acid or strongly acid throughout unless the surface has been limed. The seasonal high water table ranges from 1 foot to 2.5 feet below the surface during wet periods from December to May.

Included with this soil in mapping are small areas of the similar Lynchburg soil. Also included are a poorly drained, clayey soil in small, shallow depressions, and the moderately well drained Craven soil near drainageways. The included soils make up about 15 percent of this map unit.

This soil is of minor extent; the only mapped area is located near a runway. Therefore, it will not be included within a military training area.

Wetness, moderate shrink-swell potential of the clayey subsoil, and slow permeability are the main limitations in using Lenoir soil for urban development. Wetness is the main limitation in using this soil for recreational development.

Ln--Leon fine sand. This nearly level, poorly drained soil is on uplands. The largest areas occur on broad interstream divides. Individual areas are irregular in shape and range from 20 to 800 acres in size. Nearly all of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed through these areas. Leon soil is also used for off-road maneuvers.

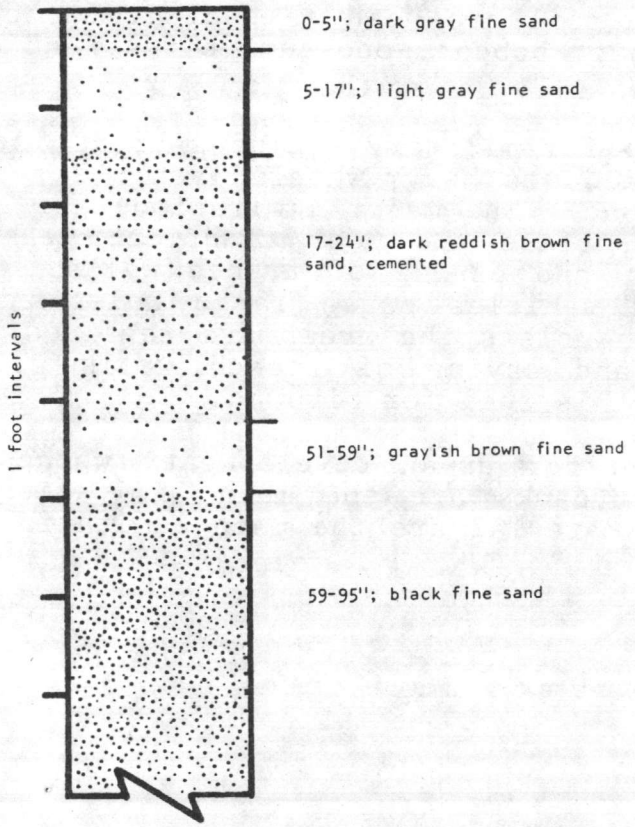


Figure 16. A typical pedon of Leon fine sand.

Infiltration is rapid and surface runoff is slow. Permeability is rapid in the surface layer and moderate in the subsoil. Available water capacity is low. The humus coated sand grains of the subsoil are weakly cemented when wet and become hard and brittle upon drying. The cemented subsoil retards root growth. The soil is extremely acid or very strongly acid throughout the profile unless the surface has been limed. The seasonal high water table is at or near the surface.

Included with this soil are small areas of a similar soil that has better drainage and the very poorly drained Murville soil in depressions. Small areas of Pactolus and Stallings soils occur in this unit on low, narrow ridges. The included soils make up about 15 percent of this unit.

The dominant native trees are loblolly and longleaf pines. Important understory includes pineland threeawn, panicum, bluestem, American holly, gallberry, huckleberry, waxmyrtle, blueberry, and greenbrier. The use of equipment during seasonal wet periods is limited and seedling mortality is the main limitation. Areas of Leon soil are used as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. The major limitations for these uses are wetness, sandy surface and poor traction, weakly cemented subsoil, seepage, and caving of trench walls. The tracked and heavy-wheeled vehicles cause large holes that increase in size and depth unless the areas are repaired on a regular basis. Wetness and caving of trench walls are limitations in the use of this soil for bivouac.

If Leon soil is used for urban development, wetness, seepage, and caving of cutbanks are the main limitations. Wetness and sandy surface material are the main limitations for recreational development.

Ly--Lynchburg fine sandy loam. This nearly level, somewhat poorly drained soil is on uplands. It is on broad interstream areas near shallow drainageways and in shallow depressions on slightly convex divides. The areas of this soil range from 5 to 25 acres in size. Most of the acreage is in woodland.

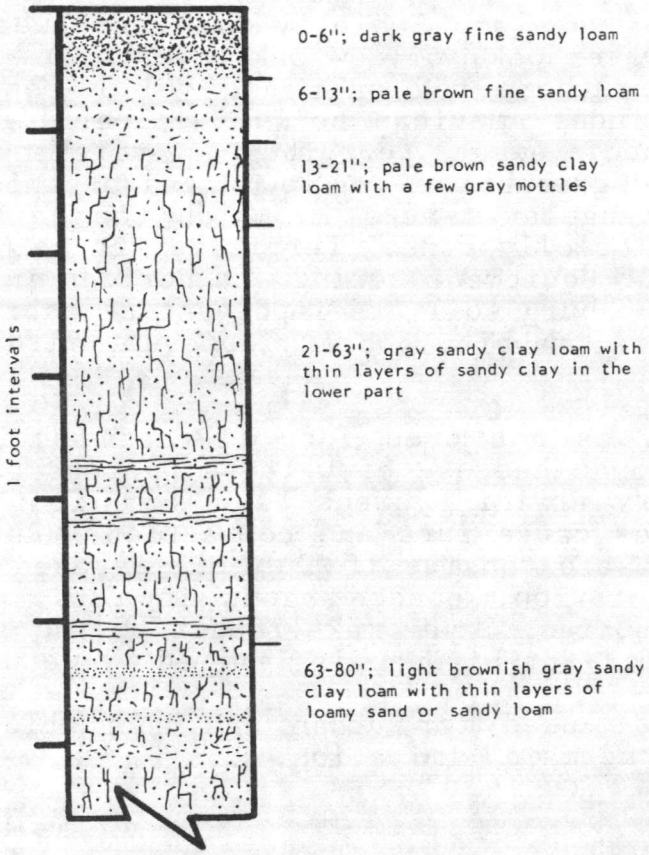


Figure 17. A typical pedon of Lynchburg fine sandy loam.

Infiltration is moderate and surface runoff is slow. Permeability is moderate and available water capacity is medium. The soil ranges from extremely acid to strongly acid throughout unless the surface has been limed. The seasonal high water table ranges from 0.5 foot to 1.5 feet below the surface.

Included with this soil in mapping are areas of Lynchburg soil that have a sandy loam surface layer. Small areas of similar soils such as Stallings and Lenoir are also intermingled in this unit. Some mapped areas contain small areas of moderately well drained Goldsboro soil and poorly drained Rains soil. The Goldsboro soil is on the outer edges of mapped areas near drainageways and the Rains soil is away from the stream. Included soils make up about 15 percent of this map unit.

The dominant native trees are loblolly pine and sweetgum. Other native trees are water oak, willow oak, red maple, white oak, eastern redcedar, southern red oak, and yellow-poplar. Important understory includes American holly, gallberry, dwarf azalea, flowering dogwood, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. A few areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted with loblolly pine. Fertilizer is being used in some areas. The use of equipment during wet periods in winter is limited. Areas of Lynchburg soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers or bivouac because of wetness. Areas of this soil that are in military training areas have some foot and vehicle traffic. Vehicles cause ruts and compaction. Ruts are deepest and compaction most extensive if the soil is used during wet periods. Dense vegetation, ponded water in ruts, and compaction of the loamy surface layer make repair of the surface difficult. Use of the soil for bivouac is limited by wetness.

If Lynchburg soil is used for urban and recreational development, wetness is the main limitation.

MaC--Marvyn loamy fine sand, 6 to 15 percent slopes. This well drained soil is on short side slopes near large drainageways. Individual mapped areas are long and narrow and range from 15 to about 300 acres in size. Most of the acreage is in woodland. Roads for tactical vehicles are routed through these areas. They are also used for off-road maneuvers and bivouac.

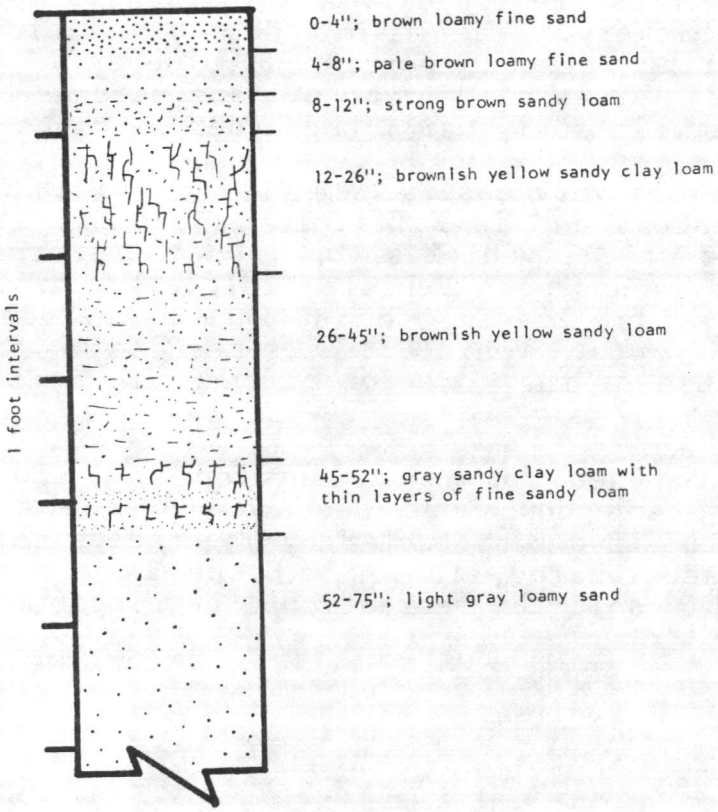


Figure 18. A typical pedon of Marvyn loamy fine sand, 6 to 15 percent slopes.

Infiltration is moderate and surface runoff is medium. Permeability is moderate and available water capacity is medium. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 3 to 5 feet below the surface.

Included with this soil in mapping are some areas that have short slopes greater than 15 percent and small areas that are eroded. Some areas of a similar soil that has a thicker surface layer are included in this unit. The poorly drained Muckalee soil is in narrow drainageways and small areas of Muckalee and the clayey Craven soil are intermingled in some of the mapped areas. The included soils make up about 20 percent of this mapping unit.

The major canopy trees are loblolly and longleaf pines, red and white oaks, and hickory. The main understory includes American holly, flowering dogwood, persimmon, blueberry, black cherry, and greenbrier. Areas of Marvyn soil are used as habitat for deer, turkey, squirrel, fox, quail, and other wildlife.

Although this soil is very easily damaged by vehicle traffic in military training areas and is difficult to repair, it is often necessary for tactical vehicles to cross these areas in order to traverse the landscape. Vehicle traffic up and down slopes destroys vegetation, leaving the surface vulnerable to erosion and gullying in ruts. Vehicle trails need to be repaired on a regular basis. Use of the soil for bivouac is limited by slope.

If Marvyn soil is used for urban development, slope, moderate permeability, and downslope seepage are the main limitations. This soil, if not protected by vegetative cover, is very susceptible to accelerated erosion. Slope is the main limitation in using this soil for recreational development.

Mk--Muckalee loam. This nearly level, poorly drained soil is on flood plains. Individual mapped areas are narrow and long and usually are more than 100 acres in size. Observations of the soil in this unit were not as detailed as in other units that were relatively accessible. Nearly all the acreage is in woodland.

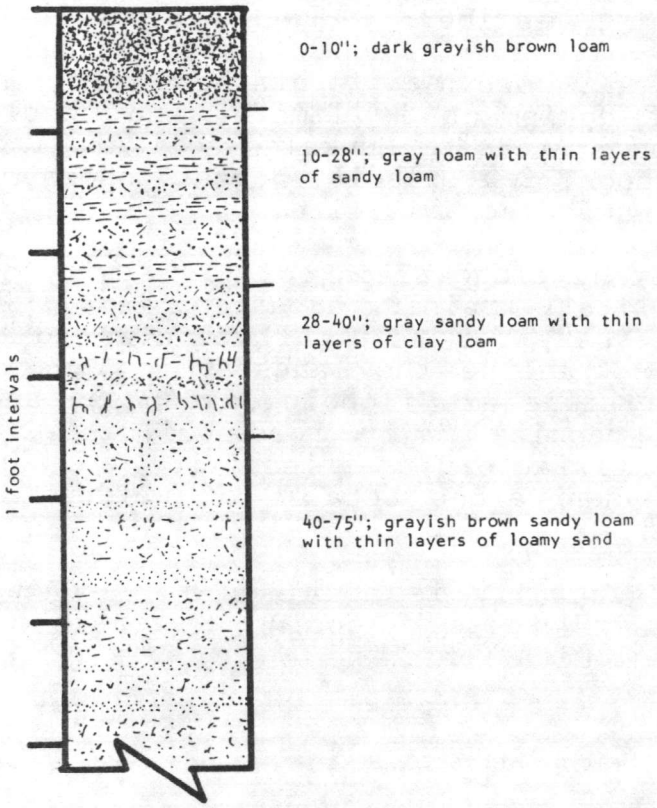


Figure 19. A typical pedon of Muckalee loam.

Infiltration is moderate and surface runoff is very slow. Permeability is moderate and available water capacity is medium. The organic matter content in the surface layer varies from high to low. The surface layer is strongly acid and the underlying material ranges from medium acid to moderately alkaline. The seasonal high water table ranges from 0.5 foot to 1.5 feet below the surface. This soil is frequently flooded for brief periods and water ponds in low areas on the wider flood plains for long periods during the winter.

Included with this soil in mapping are small areas of a sandier soil near the stream banks and a soil with a mucky fine sand surface layer at the foot of side slopes. The included soils make up about 25 percent of this unit.

The dominant native trees are loblolly pine and sweetgum. Other native trees are water oak, willow oak, red maple, swamp tupelo, and baldcypress. Important understory includes redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, honeysuckle, Virginia chain-fern, cinnamon fern, poison-ivy, bracken fern, and greenbrier. The use of equipment is limited and seedling mortality is a limitation. Areas of Muckalee soil are important as habitat for deer, raccoon, fox, rabbit, bobcat, opossum, mink, otter, squirrels, birds, and other wildlife.

Although this low-lying flood plain soil is easily damaged by vehicle traffic in military training areas and is difficult to repair, it is often necessary for tactical vehicles to cross these areas in order to traverse the landscape. The major limitations to vehicle traffic are flooding, wetness, and low strength. These areas require major road building and maintenance to achieve satisfactory trafficability. The soil is unsuited for use as bivouac areas because of wetness and flooding.

The Muckalee soil generally is not used for urban and recreational development. Wetness, flooding, cutbanks caving, and seepage are the main limitations.

Mu--Murville fine sand. This nearly level, very poorly drained soil is in depressions and on upland interstream areas. The mapped areas are generally long with irregular widths and range in size from 20 to 200 acres. Nearly all the acreage is in woodland.

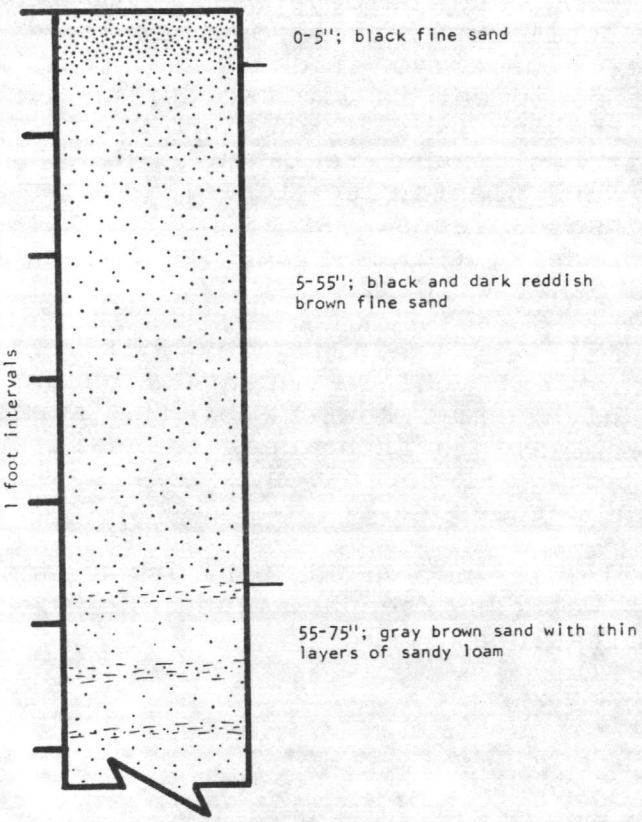


Figure 20. A typical pedon of Murville fine sand.

Infiltration is rapid and surface runoff is slow. Permeability is rapid in the surface layer and moderately rapid in the subsoil. Available water capacity is medium. The sand grains in the subsoil are coated with humus. When this zone drys out it becomes hard and brittle. This soil ranges from extremely acid to strongly acid throughout the profile. Organic matter content in the surface layer is high. The seasonal high water table is at or near the surface and water ponds on the surface during the winter.

Included with this soil in mapping are small areas of similar soils such as Murville with a mucky fine sand surface layer and Torhunta soil. The included soils are in small intermingled areas and make up about 15 percent of this map unit.

The dominant native trees are pond pine, loblolly pine, and water tupelo. Other native trees are water oak, willow oak, red maple, loblolly bay, sweetbay, and baldcypress. Important understory includes redbay, gallberry, titi, southern bayberry, sweet pepperbush, waxmyrtle, blueberry, pitcherplant (Fig. 21), and greenbrier. The use of equipment is limited during seasonal wet periods and seedling mortality is a limitation. A few large areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted to loblolly pines. Fertilizer is being used in some places. Areas of Murville soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

Where this soil is in military training areas, it generally is not used for off-road tactical vehicle maneuvers because of ponding of surface water, high humus content of the surface layer, and because the water table is at or near the soil surface most of the year. Use of this soil for bivouac is also limited by very dense vegetation and wetness.

Murville soil generally is not used for urban and recreational development. Wetness, seepage, and caving of ditchbanks are the main limitations.

Figure 21. Pond pine and pitcherplants growing on Murville fine sand.

NeE--Newhan fine sand, 0 to 30 percent slopes. This excessively drained soil is on ridges between the ocean beach and the nearly level inland side of the Outer Banks. The ridge joining the beach has nearly vertical slopes that have been cut by wave action at high tide. Elevation ranges from 5 to 30 feet. Individual areas are long with variable widths and range in size from 5 to 500 acres. Most of this soil is covered with salt-tolerant grasses and shrubs. Some areas are used for vehicle parking and service buildings.

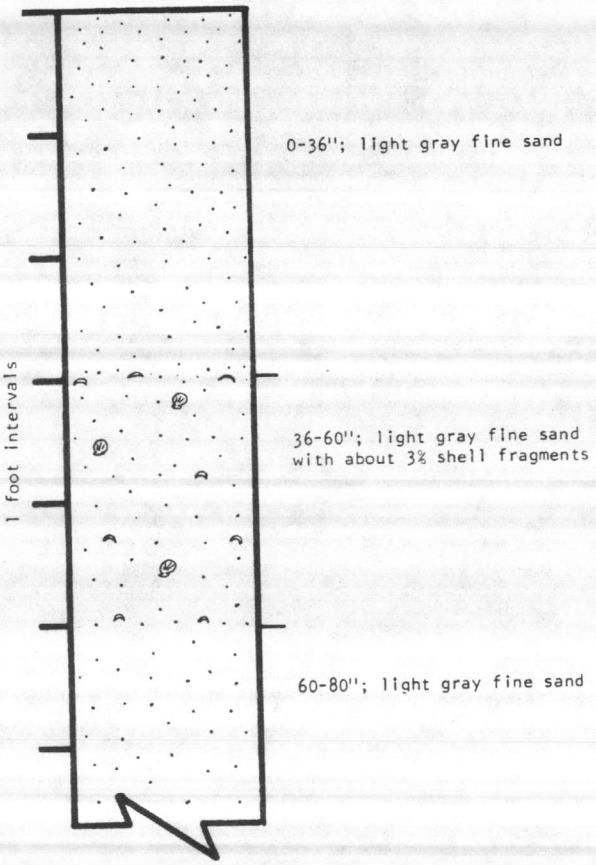


Figure 22. A typical pedon of Newhan fine sand, 0 to 30 percent slopes.

The infiltration is very rapid and surface runoff is slow. Permeability is very rapid and available water capacity is very low. The soil is neutral or mildly alkaline throughout the profile. The seasonal high water table is below 6 feet.

Included with this soil in mapping are small areas of Corolla soil in depressions and a narrow, smooth strip of beach. Also included are a few small areas of dunes. The included soils make up about 25 percent of this map unit.

The dominant vegetation is American beachgrass (Fig. 23), seashore elder, sea rocket, sea oats, smooth cordgrass, bitter panicum, bluestem, and other species adapted to the effects of salt spray, blowing sand, and droughty soil conditions. Tree growth is minimal and timber production is not feasible. The wildlife species that occasionally use areas of Newhan soil are deer, raccoon, loggerhead turtle, cottontail rabbit, eastern brown pelican, least tern, and bobwhite quail.

Figure 23. American beachgrass stabilizing a frontal dune adjoining the beach.

If this soil is in a military training area, it generally is not used for off-road tactical vehicle maneuvers and bivouac because of poor traction on the sandy surface, slope, and its Outer Banks location. Vehicles crossing this soil destroy the fragile vegetation leaving the sandy surface vulnerable to wind

erosion. Traffic across this soil is restricted to designated areas to minimize destruction of the dunes. If used for bivouac, sandiness, slope, and caving of cutbanks are the main limitations.

If Newhan soil is used for urban development, caving of ditchbanks and trench walls, seepage, and slope are the main limitations. Areas that do not have vegetative cover are subject to severe soil blowing. Revegetating disturbed areas around construction and road sites as soon as possible helps to control wind erosion. Some areas are subject to erosion by ocean waves. Vegetative cover is difficult to establish because of droughtiness, leaching of plant nutrients, and salt spray.

Slope, sandy surface material, and summer droughtiness are the main limitations in using this soil for recreational development. Wind and water erosion and sedimentation can be minimized by maintaining or regenerating adequate plant cover. Selecting drought and salt-tolerant plant species is essential.

NfC--Newhan fine sand, dredged, 2 to 10 percent slopes. This excessively drained soil material is deposited by dredging operations along the Intracoastal Waterway. Small areas of this soil are cone-shaped and large areas are irregular in shape with a dike surrounding the dredge spoil. These large areas are undulating inside the dike and slope steeply around the outside edges. The areas range in size from 3 to 50 acres. Most of the acreage is in sparse vegetation.

A typical pedon of Newhan fine sand, dredged, 2 to 10 percent slopes, is similar to Newhan fine sand, 0 to 30 percent slopes.

Infiltration is rapid and surface runoff is slow. Available water capacity is low and permeability is rapid. The soil is neutral or mildly alkaline throughout. The seasonal high water table remains below a depth of 6 feet.

Included with this soil in mapping are areas that have thin strata of clay and areas of thin, sandy dredge spoil overlying the clayey Bohicket soil. Small areas of a wetter soil are included around the outer edges of mapped areas. The included soils make up about 20 percent of this unit.

Natural vegetation is sparse. A few shrubs, weeds, and grasses grow around the outer edges. Older dredge spoil areas grow eastern redcedar, live oak, myrtle oak, Yaupon holly, and longleaf pine. Seedling mortality and problems in use of equipment are the main limitations in the use and management of this soil for woodland.

This soil generally is not used for off-road tactical vehicle maneuvers and bivouac because of poor traction on the sandy surface and because of its Outer Banks location. Vehicles crossing these areas destroy the fragile vegetation, leaving the sandy surface vulnerable to wind erosion.

If this soil is used for urban development, caving of ditchbanks and trench walls, seepage, and wind erosion are the main limitations. Areas that do not have vegetative cover are subject to severe soil blowing. Revegetating disturbed areas around construction and road sites as soon as possible helps to control wind erosion. Some areas are subject to erosion by ocean waves. Vegetative cover is difficult to establish and maintain because of droughtiness, leaching of plant nutrients, and salt spray. Sandy texture and summer droughtiness are the main limitations in using Newhan soil for recreational development. Wind and water erosion and sedimentation can be minimized by maintaining or regenerating adequate plant cover. Selecting drought and salt tolerant plant species is essential.

NoA--Norfolk loamy fine sand, 0 to 2 percent slopes. This well drained soil is on uplands. It is near large drainageways on slightly convex divides. Individual areas are oblong and range from 15 to about 50 acres in size. Most of the acreage of this soil is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. They are also used for off-road maneuvers and bivouac.

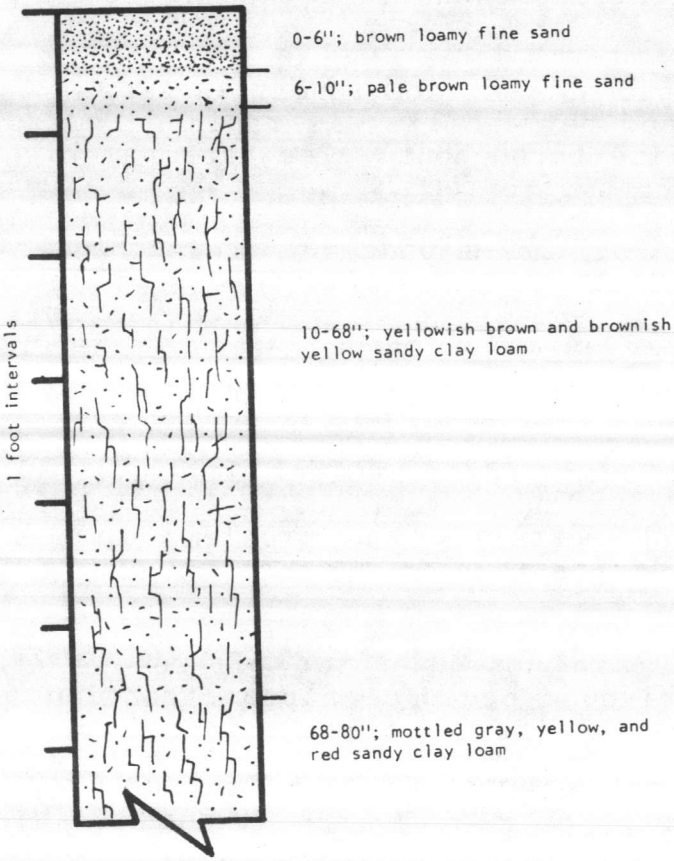


Figure 24. A typical pedon of Norfolk loamy fine sand, 0 to 2 percent slopes.

Infiltration is moderate and surface runoff is slow. Permeability is moderate and available water capacity is medium. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 3.5 to 6 feet below the surface.

Included with this soil in mapping are small areas that have slopes greater than 2 percent and a few small areas that have a fine sandy loam surface layer. Small areas of the moderately well drained Goldsboro and Foreston soils are intermingled in nearly level areas. The included soils make up about 15 percent of this map unit.

The dominant native trees are loblolly pine, hickory, red oak, and white oak. The main understory includes American holly, flowering dogwood, persimmon, blueberry, black cherry, and greenbrier. Areas of this soil are good habitat for deer, turkey, rabbit, fox, quail, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. During wet conditions, vehicle traffic makes ruts and continuous traffic causes compaction. Compaction of this loamy soil makes it nearly impervious, so that water stands in ruts for short periods. Under regular use without repair, ruts become deeper and wider. The soil is very susceptible to damage by accelerated erosion when the ruts are up and down slope, making repair of ruts after each use very important. The soil has slight limitations for use as bivouac areas.

If the Norfolk soil is used for urban development, an occasional high water table during wet periods can be a limitation. There are no limitations for recreational development.

NoB--Norfolk loamy fine sand, 2 to 6 percent slopes. This well drained soil is on uplands. It is near large drainageways on convex divides. Individual mapped areas are long with irregular widths and range in size from 15 to about 45 acres. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. Norfolk soil is also used for off-road maneuvers and bivouac.

Except for differences in slope, a typical pedon of Norfolk loamy fine sand, 2 to 6 percent slopes, is very similar to Norfolk loamy fine sand, 0 to 2 percent slopes.

Infiltration is moderate and surface runoff is medium. Permeability is moderate and available water capacity is medium. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 3.5 to 6 feet below the surface.

Included with this soil in mapping are small areas of Marvyn soil that have slopes greater than 6 percent and a few small areas that have a fine sandy loam surface layer. Small areas of the moderately well drained Craven, Goldsboro, and Foreston soils are also included in this unit. The Craven soil is in small areas near drainageways. The Goldsboro and Foreston soils are in shallow depressions. The poorly drained Muckalee soil is in narrow drainageways. The included soils make up about 15 percent of this map unit.

The major canopy trees are loblolly pine longleaf pine, red oak, white oak, and hickory. The main understory includes American holly, flowering dogwood, persimmon, blueberry, black cherry, and greenbrier. Areas of Norfolk soil are good habitat for deer, turkey, rabbit, fox, quail, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. During wet conditions, vehicle traffic causes ruts and compaction. Compaction of this loamy soil makes it nearly impervious. Ruts up and down slopes cause accelerated erosion and it is very important to repair them on a regular basis. The soil has slight limitations for bivouac areas.

If the Norfolk soil is used for urban development, an occasional high water table during wet periods can be a limitation. This soil, if not protected by vegetative cover, is very susceptible to accelerated erosion. There are no major limitations in using this soil for most recreational development.

On--Onslow loamy fine sand. This nearly level, moderately well drained and somewhat poorly drained soil is near shallow drainageways on uplands. The areas are nearly as broad as long and range from 20 to about 300 acres in size. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. Onslow soil is also used for off-road maneuvers and bivouac.

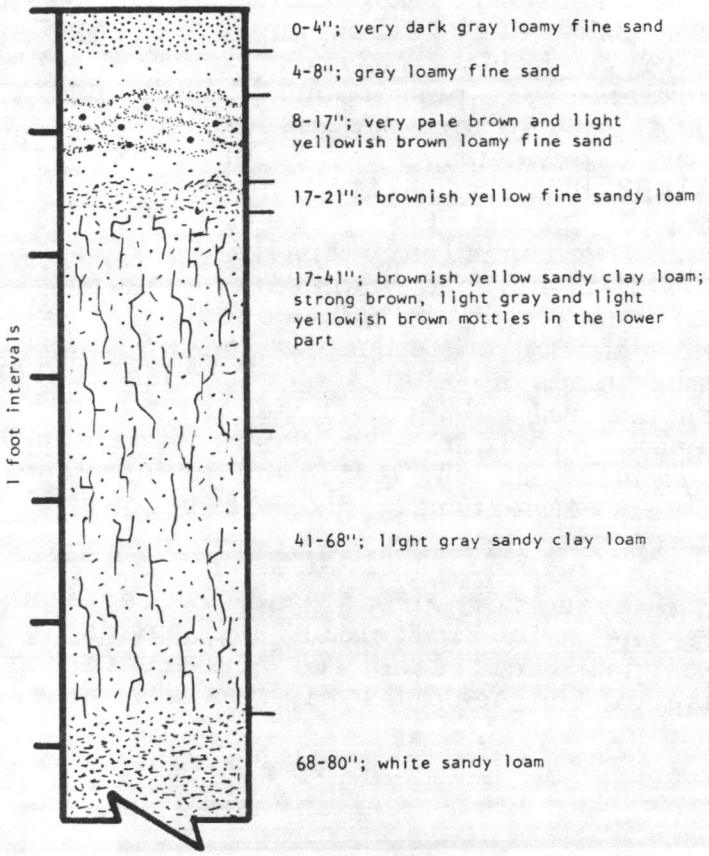


Figure 25. A typical pedon of Onslow loamy fine sand.

Infiltration is moderate and surface runoff is slow. The soil has moderate permeability and medium available water capacity. This soil is very strongly acid or strongly acid throughout the profile except for the surface layer in areas that have been limed. The seasonal high water table ranges from 1.5 to 3.0 feet below the surface.

Included with this soil in mapping are small areas of Onslow soil that have a fine sandy loam surface layer. Small areas of similar soils such as Goldsboro, Craven, and Foreston are intermingled in this unit. Also included are small areas of the coarser textured Baymeade soil near side slopes and somewhat poorly drained Stallings and Lynchburg soils in slight depressions. The included soils make up about 10 percent of this map unit.

The dominant native trees are loblolly pine, sweetgum, southern red oak, white oak, and yellow-poplar. Important understory includes American holly, gallberry, dwarf azalea, flowering dogwood, huckleberry, persimmon, black cherry, waxmyrtle, blueberry, and greenbrier. Areas of Onslow soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Under wet conditions vehicle traffic causes ruts and compaction. Compaction of this loamy soil makes it nearly impervious so that water stands in ruts for short periods after rainstorms. Under regular use without repair, ruts become deeper and wider. Ruts can cause accelerated erosion that is very damaging to the soil and makes repair of trails after each use very important. Use of this soil for bivouac is limited by wetness.

If Onslow soil is used for urban and recreational development, wetness is the main limitation. If roads, building foundations, or recreational facilities are constructed drainage may be necessary because of the seasonal high water table.

Pa--Pactolus fine sand. This nearly level, moderately well drained and somewhat poorly drained soil is on uplands and stream terraces. The largest areas are near the coast on broad interstream areas. Individual mapped areas are irregular in shape and range from 25 to 100 acres in size. Most of the acreage is in woodland. Unsurfaced roads for tactical vehicles are routed across these areas. Pactolus soil is also used for off-road maneuvers and bivouac.

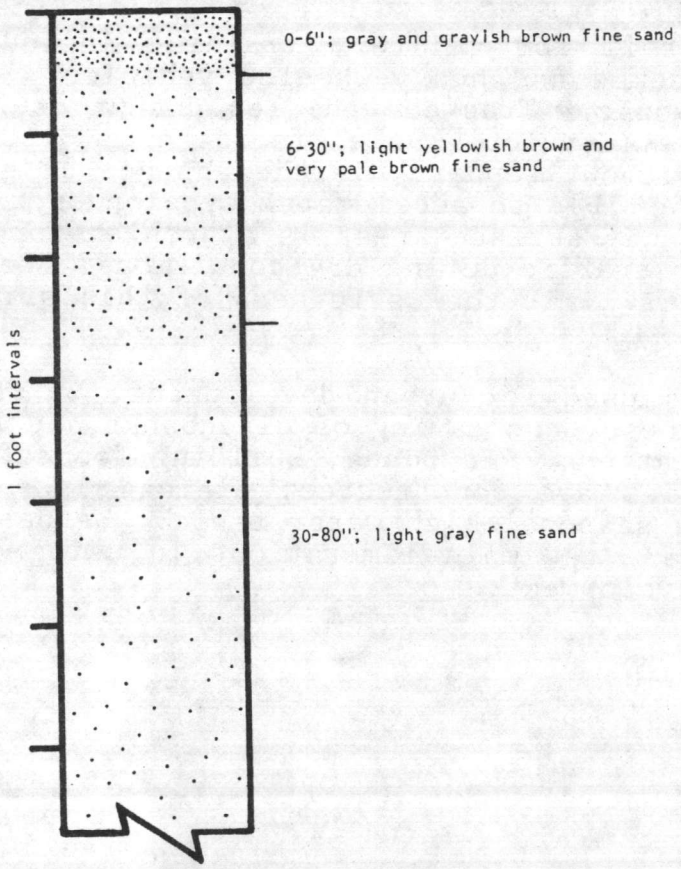


Figure 26. A typical pedon of Pactolus fine sand.

Infiltration is rapid and surface runoff is slow. Permeability is rapid and available water capacity is low. The soil ranges from very strongly acid to medium acid throughout the profile. The seasonal high water table ranges from 1.5 to 2.5 feet below the soil surface.

Included with this soil in mapping are small areas of Wando and Leon soils. The excessively drained Wando soil is on low ridges and the poorly drained Leon soil is in depressions. The included soils make up about 10 percent of this unit.

The dominant native trees are loblolly pine, sweetgum, water oak, willow oak, and red maple. Important understory includes dwarf azalea, American holly, gallberry, huckleberry, waxmyrtle, blueberry, and greenbrier. Areas of Pactolus soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

The uses of this soil for military training include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Tracked vehicles disturb surface layers so that large holes develop. Holes increase in depth and size under regular use without repair. In the absence of ground cover, this soil is susceptible to accelerated erosion on trails. Poor traction on bare, sandy surface areas is a problem for light vehicle traffic and foot traffic during dry conditions. Wetness and caving of trench walls limit the usefulness of this soil for bivouac.

If Pactolus soil is used for urban development, wetness, seepage, summer droughtiness, and caving of ditchbanks and trench walls are the main limitations. If roads, building foundations, or recreational facilities are constructed, drainage may be necessary because of the seasonal high water table. Wetness and sandy surface material are the main limitations in using this soil for recreational development.

Pn--Pantego mucky loam. This nearly level, very poorly drained soil is on broad, smooth flats on uplands. Individual areas are generally broad and range from 10 to about 50 acres in size. Most of the acreage is in woodland. Unsurfaced roads crossing this soil are used for base resource management.

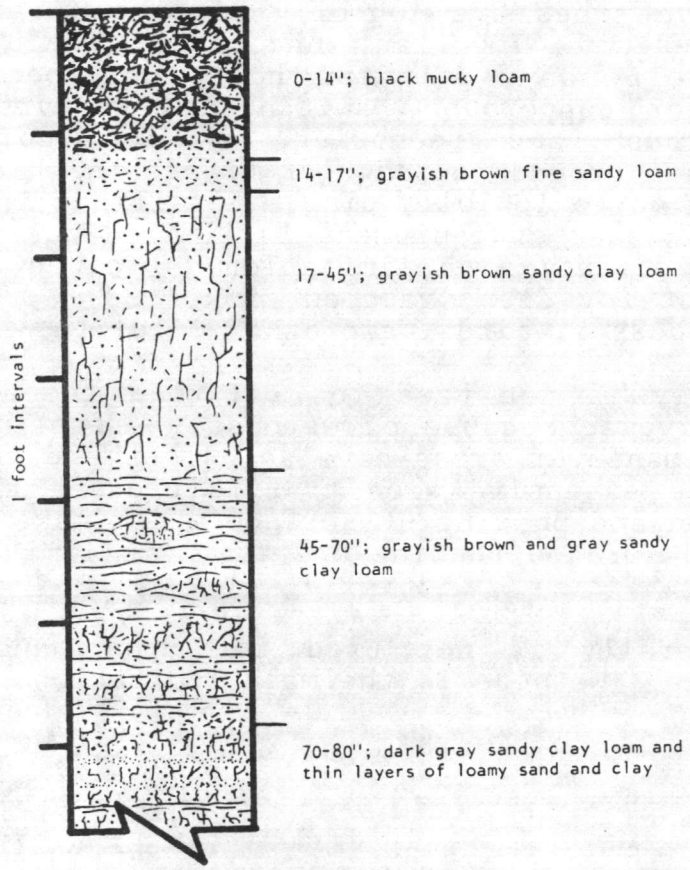


Figure 27. A typical pedon of Pantego mucky loam.

Infiltration is moderate and surface runoff is very slow. Permeability is moderate and available water capacity is high. The soil ranges from extremely acid to strongly acid throughout the profile unless the surface has been limed. Organic matter content of the surface layer is high. The seasonal high water table is at or near the surface and water ponds on the surface during the winter.

Included with this soil in mapping are areas of Pantego soil that have a fine sandy loam surface layer. Small areas of the sandier Torhunta and Murville soils are in this unit. Also included are a few areas of very poorly drained, organic Croatan soil in small depressions, and small areas of poorly drained Rains soil near shallow drainageways. These included soils make up about 10 to 20 percent of this map unit.

The dominant native trees are loblolly pine, pond pine, water tupelo, and sweetgum. Important understory includes redbay, sweetbay, loblolly bay, American holly, gallberry, southern bayberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, titi, fetterbush, and greenbrier. A few large areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted to loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods and seedling mortality is a limitation. Drained areas are important as habitat for deer, raccoon, fox, turkey, black bear, rabbit, bobcat, opossum, birds, and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers or bivouac because of wetness. Areas of the soil that occur within maneuver areas have some foot and vehicle traffic. Deep ruts are extensive when traffic crosses these areas. Dense vegetation and ponding of surface water make repair difficult. Wetness and surface ponding are the main limitations for bivouac uses.

Pantego soil generally is not used for urban and recreational development. Wetness is the main limitation.

Pt--Pits. This map unit consists of areas where the soil has been excavated. Excavated areas commonly range from 5 to 15 feet in depth.

Typically, these areas are subject to surface ponding for much of the year. The soil material is generally light gray and sandy. A few areas consist of black to reddish brown weakly cemented sand.

Vegetation typically is very sparse for the first few years following excavation. Later these areas support almost pure stands of loblolly pine.

On-site investigation is generally required to adequately evaluate or plan the development of specific areas.

Ra--Rains fine sandy loam. This nearly level, poorly drained soil is on uplands. The larger areas of this soil are on wide, smooth interstream areas and range from 50 to about 100 acres in size. The smaller areas are in narrow, shallow depressions on slightly convex divides and range from 5 to 20 acres in size. Most of the acreage is in woodland. Unsurfaced roads used for base resource management are routed across these areas.

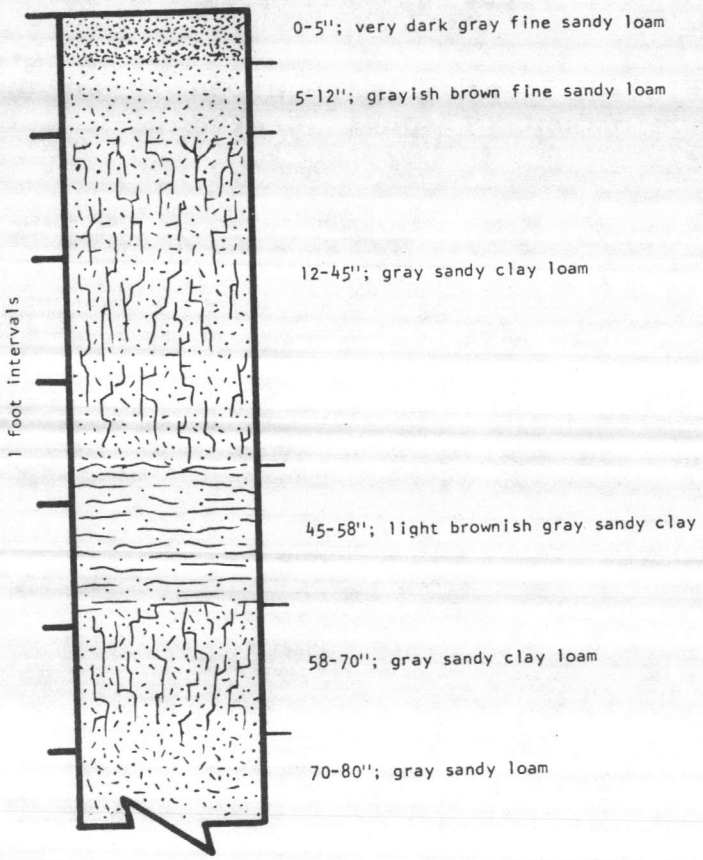


Figure 28. A typical pedon of Rains fine sandy loam.

Infiltration is moderate and surface runoff is slow. Permeability is moderate and the available water capacity is medium. This soil is very strongly acid or strongly acid throughout the profile unless the surface has been limed. The seasonal high water table is at or near the surface. The soil is subject to occasional ponding of surface water in low places.

Included with this soil in mapping are areas of Rains soil that have a loam surface layer. Small areas of the similar Woodington soil are intermingled throughout this unit. Also included are small intermingled areas of the somewhat poorly drained Lynchburg soil and the very poorly drained Pantego soil. The Lynchburg soil is in small areas near drainageways and Pantego soil is in small, shallow depressions. The included soils make up about 15 percent of this map unit.

The major canopy trees are loblolly pine, pond pine, sweetgum, blackgum, yellow-poplar, swamp chestnut oak, red maple, willow oak, and water oak. The understory is dense and includes redbay, sweetbay, American holly, gallberry, sweet pepperbush, switchcane, waxmyrtle, blueberry, fetterbush, and greenbrier. A few large areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted with loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods and seedling mortality is a limitation. Areas of Rains soil are important as habitat for deer, raccoon, fox, rabbit, bobcat, opossum, turkey, black bear, birds, and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers or bivouac areas because of wetness. Areas of the soil that are within maneuver areas have some foot and vehicle traffic. Deep ruts are extensive where traffic crosses these areas. Dense vegetation and ponding make repair difficult. Wetness is the main limitation in using this soil for bivouac.

Rains soil generally is not used for urban and recreational development. Wetness is the main limitation. If roads, building foundations, or recreational facilities are constructed, drainage will be necessary because of the seasonal high water table.

St--Stallings loamy fine sand. This nearly level, somewhat poorly drained soil is on uplands. The largest areas of this soil are on interstream areas and range from 20 to 80 acres in size. The smaller areas are in shallow depressions on slightly convex divides and are 5 to 20 acres in size. Most of the acreage is in woodland. Unsurfaced roads used for base resource management cross these areas.

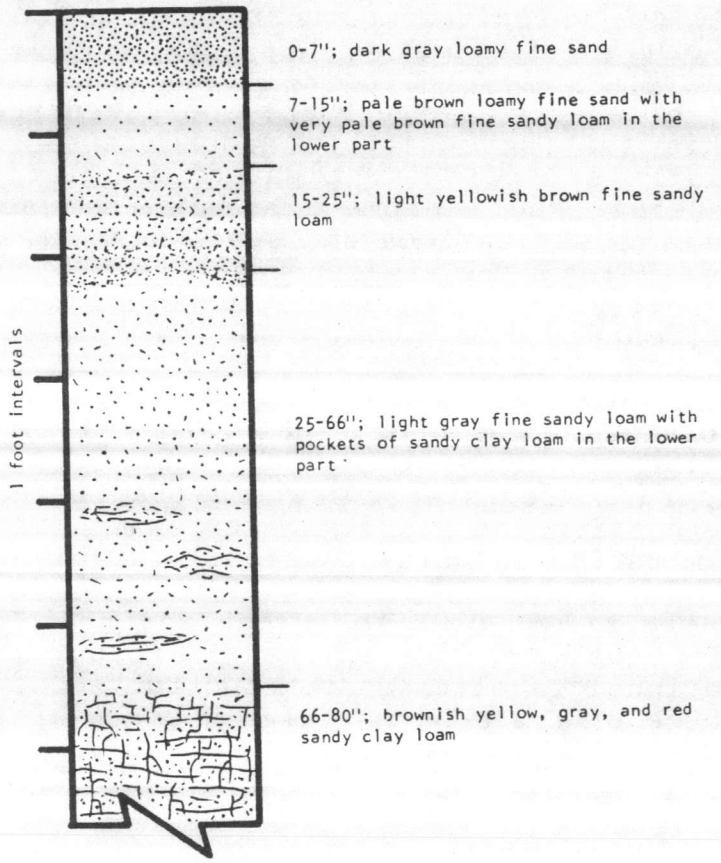


Figure 29. A typical pedon of Stallings loamy fine sand.

Infiltration is moderate and surface runoff is slow. Permeability is moderately rapid and available water capacity is medium. The soil ranges from extremely acid to strongly acid throughout the profile unless the surface has been limed. The seasonal high water table ranges from 1.5 to 2.5 feet below the soil surface.

Included with this soil in mapping are areas of Stallings soil that have a fine sandy loam surface layer. Also included are small, intermingled areas of Lynchburg and Pactolus soils. Small areas of Foreston, Woodington, and Onslow soils are also included. The moderately well drained Foreston and Onslow soils are along the outer edges of mapped areas near the drainageways. The poorly drained Woodington soil is in small depressions. The included soils make up about 20 percent of this map unit.

The major canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, red maple, willow oak, and water oak. Important understory includes American holly, gallberry, sweet pepperbush, dwarf azalea, flowering dogwood, switchcane, waxmyrtle, blueberry, and greenbrier. A few areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted with loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods, especially in winter. Areas of Stallings soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, birds, and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers and bivouac because of wetness. Areas of this soil that are within maneuver areas have some foot and vehicle traffic. Ruts and compaction are extensive when traffic crosses these areas under wet conditions. Dense vegetation, ponded water in ruts, and compaction of the loamy surface layer make repair difficult. Wetness, dense vegetation, and caving of trench walls are the main limitations for bivouac areas.

If Stallings soil is used for urban development, wetness, caving of ditchbanks and trench walls, and seepage are the main limitations. If roads, building foundations, or recreational facilities are constructed, drainage will be necessary because of the seasonal high water table. Wetness is the main limitation in using this soil for recreational development.

To--Torhunta fine sandy loam. This nearly level, very poorly drained soil is on broad interstream areas on uplands. The areas are generally wide and long, ranging in size from 25 to 300 acres. Nearly all of the acreage is in woodland. Unsurfaced roads used for base management cross these areas.

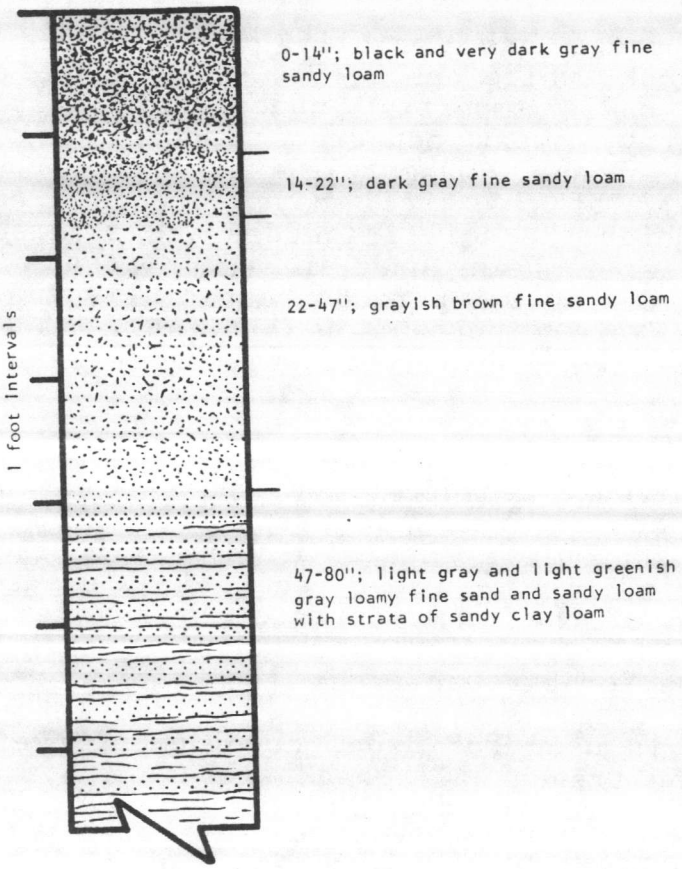


Figure 30. A typical pedon of Torhunta fine sandy loam.

Infiltration is moderate and surface runoff is slow. This soil has moderately rapid permeability and available water capacity is high. This soil is extremely acid or very strongly acid throughout the profile unless the surface has been limed. Organic matter content of the surface layer is high. The seasonal high water table is at or near the surface and water ponds on the surface during the winter.

Included with this soil in mapping are small areas of Torhunta soil that have a mucky fine sandy loam surface layer. Small areas of the very poorly drained Pantego and Murville soils are in this unit. Also included are small areas of Woodington soil on the outer edges of mapped areas near shallow drainageways. The included soils make up about 20 percent of this map unit.

The major canopy trees are loblolly pine, pond pine, sweetgum, water tupelo, yellow-poplar, swamp chestnut oak, red maple, willow oak, baldcypress, and water oak. Important understory includes redbay, sweetbay, American holly, southern bayberry, river birch, gallberry, fetterbush, sweet pepperbush, switchcane, waxmyrtle, blueberry, and greenbrier. A few large areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted with loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods and seedling mortality is a limitation.

Areas of Torhunta soil are important as habitat for deer, turkey, raccoon, fox, rabbit, bobcat, opossum, black bear, birds and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers or bivouac because of dense vegetation, ponding of surface water, high humus content of the surface layer, and wetness most of the year.

Torhunta soil generally is not used for urban and recreational development. Wetness, caving of cutbanks and trench walls, and seepage are the main limitations.

Ud--Udorthents, loamy. This map unit consists of areas of nearly level to gently sloping covered over landfills. Some landfills are currently active and have barren depressions that are covered over as waste materials are deposited. Other landfills are closed and have been revegetated. The covering layer is generally shaped for surface drainage. The mapped areas range from 10 to 60 acres in size and are generally rectangular in shape.

Infiltration is moderate and surface runoff is slow. The soil material is nearly void of organic matter, has low available water capacity, and moderate permeability. This soil is strongly acid or very strongly acid throughout unless the surface has been limed. The seasonal high water table is estimated to remain at least 4 feet below the surface.

These units are revegetating with native plants such as loblolly pine, broomsedge bluestem, and dogfennel.

The units are generally not used for urban or recreation.

Because of the highly variable nature of this unit, on-site investigation is generally needed to properly evaluate and plan the development of specific areas.

Ur--Urban land. This map unit consists of areas that are more than 85 percent covered by buildings, streets, parking lots, airports, railroad yards, and other urban uses. Because of extensive urbanization, the natural soil has been altered and the topography and original landscape have been changed. Slopes typically range from 0 to 6 percent.

Most of the urban land is in industrial areas. The mapped areas are irregular in shape and range from 5 to more than 150 acres in size.

Nearly all of the precipitation that falls on this unit runs off. This can increase the flood hazard in low-lying areas. There is a hazard of waterway and reservoir siltation from areas that are graded but not stabilized.

Recommendations for use and management of soil and water in this unit require on-site investigation.

WaB--Wando fine sand, 1 to 6 percent slopes. This excessively drained soil is on undulating uplands. Most of this soil is near the coast and ranges from 10 to 25 feet above sea level. Individual mapped areas are generally about as broad as long and range from 25 to 250 acres in size. Most of the acreage is in woodland. A few unsurfaced roads for tactical vehicles are routed across these areas. Wando soil is also used for off-road maneuvers and bivouac.

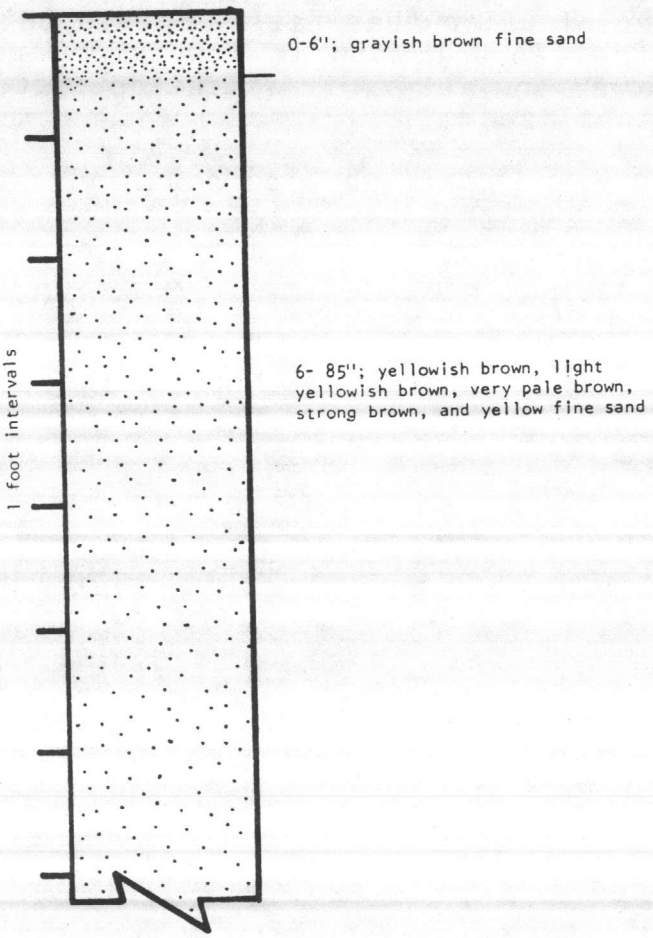


Figure 31. A typical pedon of Wando fine sand, 1 to 6 percent slopes.

Infiltration is rapid and surface runoff is slow. Permeability is rapid and available water capacity is very low. This soil ranges from medium acid to slightly acid throughout the profile. The seasonal high water table is below about 6 feet.

Small areas of Alpin, Kureb, and Baymeade soils are in this unit. Alpin and Kureb soils are intermingled throughout the mapped areas with the Wando soil. The Baymeade soil is on small, flat areas. Also included with this soil in mapping are small areas of the moderately well drained Pactolus soil in narrow depressions and the poorly drained Muckalee soil in narrow drainageways. The included soils make up about 15 percent of this map unit.

The major canopy trees are longleaf pine, loblolly pine, live oak, and blackjack oak. The major understory includes pineland threeawn, panicum grasses, waxmyrtle, scrub oaks, sassafras, and American beautyberry. Seedling mortality is a limitation because of droughtiness. Areas of Wando soil are used as habitat for deer, turkey, rabbit, fox, quail, and other wildlife.

The uses of this soil for military training areas include unsurfaced roads for tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac. Tracked and heavy-wheeled vehicles disturb surface layers so that large holes develop. Holes increase in depth and size under regular use without repair. In the absence of ground cover, this soil is subject to erosion on trails. Poor traction on the sandy surface is a problem in the use of this soil for light vehicle traffic and foot traffic. Caving of trench walls is a limitation in the use of this soil for bivouac.

If Wando soil is used for urban development, caving of ditch banks and trench walls and seepage are limitations. The thick sand provides a good support base for most structures. However, the unprotected sandy surface is subject to soil blowing. Revegetating disturbed areas around construction and road sites as soon as possible helps to control wind erosion. Lawns and shrubs are difficult to establish and maintain. Irrigating, fertilizing frequently, and adding organic matter will increase growth of lawns and shrubs on this sandy soil. Sandy surface material and summer droughtiness are the main limitations if this soil is used for recreational development. Wind and water erosion and sedimentation can be minimized by maintaining or regenerating adequate plant cover.

Wo--Woodington loamy fine sand. This nearly level, poorly drained soil is on uplands. The larger areas of this soil are on broad, smooth interstream areas and range from 25 to about 100 acres in size. The smaller areas are in shallow, narrow depressions on slightly convex divides and range in size from 5 to about 25 acres. Most of the acreage is in woodland. Unsurfaced roads used for base resource management cross these areas.

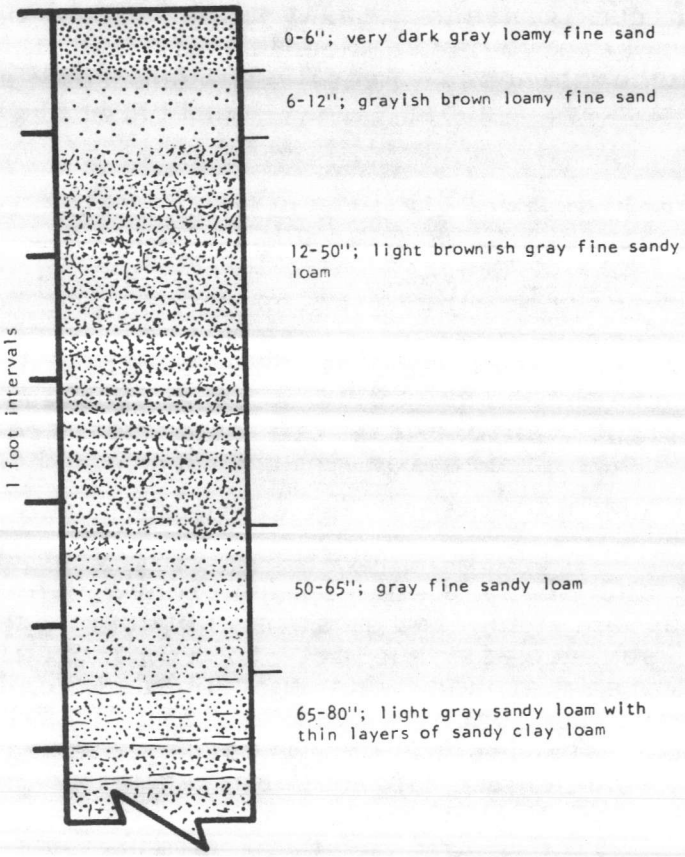


Figure 32. A typical pedon of Woodington loamy fine sand.

Infiltration is moderate and surface runoff is slow. Permeability is moderately rapid and available water capacity is medium. This soil ranges from extremely acid to strongly acid throughout the profile. The seasonal high water table ranges from 0.5 to 1.0 foot below the surface. This soil is subject to occasional ponding of surface water in low places.

Included with this soil in mapping are areas of Woodington soil that have a fine sandy loam surface layer. Typically, small areas of Rains soil are intermingled in this unit. Also included are small areas of the somewhat poorly drained Stallings soil and the very poorly drained Torhunta soil. Stallings soil is on the outer edges of mapped areas near drainageways and Torhunta soil is in small, shallow depressions. A few areas have a thin, patchy hardpan in the subsurface layer. The included soils make up about 15 percent of this map unit.

The major canopy trees are loblolly pine, pond pine, sweetgum, blackgum, yellow-poplar, swamp chestnut oak, red maple, willow oak, and water oak. Important understory includes redbay, sweetbay, American holly, gallberry, switchcane, waxmyrtle, blueberry, and greenbrier. A few large areas of this soil have ditches around rectangular tracts in which the soil is bedded and planted with loblolly pine. Fertilizer is being used in some places. The use of equipment is limited during wet periods in winter and seedling mortality is a limitation. Areas of Woodington soil are important as habitat for turkey, deer, raccoon, fox, rabbit, bobcat, opossum, black bear, birds, and other wildlife.

This soil generally is not used for off-road tactical vehicle maneuvers or bivouac because of wetness. This soil is used for some foot and vehicle traffic in maneuver areas. Ruts and compaction are extensive when traffic crosses these areas under wet conditions. Dense vegetation, ponded water in ruts, and compaction of the loamy surface layer make repair of the soil surface difficult. Use of the soil for bivouac is limited by wetness and caving of trench walls.

If Woodington soil is used for urban development, wetness, caving of ditchbanks and trench walls, and seepage are the main limitations. Wetness is the main limitation if this soil is used for recreational development.

YaA--Yaupon fine sandy loam, 0 to 3 percent slopes. This somewhat poorly drained to moderately well drained soil material is deposited by dredging operations. This soil is only near the Intracoastal Waterway. The small areas are cone-shaped and the large areas are irregular in shape with dikes surrounding the areas. The diked areas have sloping edges. Mapped areas range from 3 to 10 acres in size. Nearly all of the acreage is in woodland.

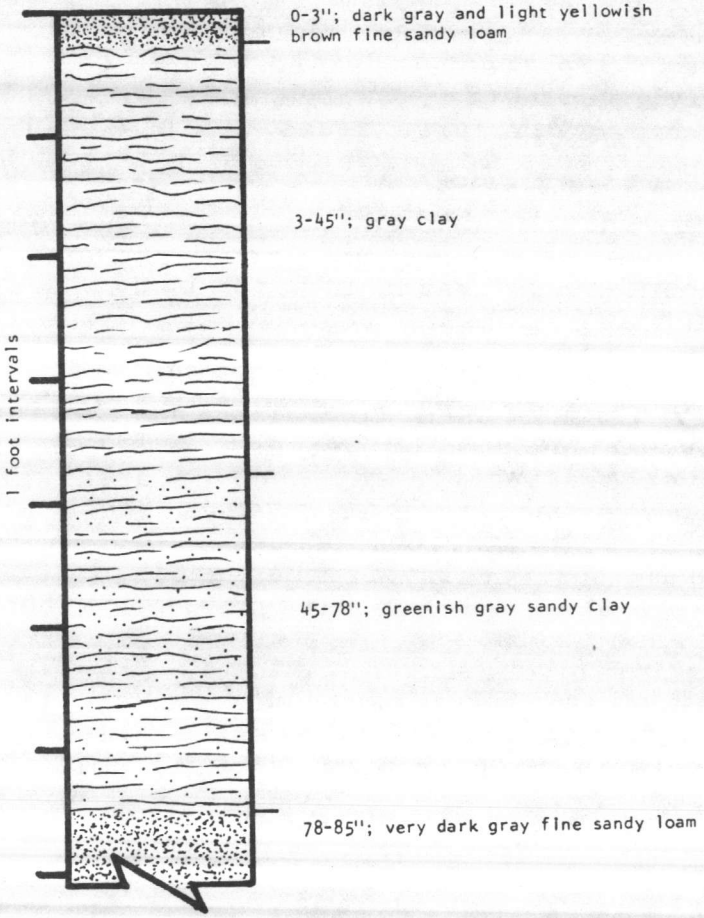


Figure 33. A typical pedon of Yaupon fine sandy loam, 0 to 3 percent slopes.

Infiltration is slow and surface runoff is medium. Permeability is slow, available water capacity is high, and the shrink-swell potential is high. The soil ranges from very strongly acid to medium acid in the surface layer unless the surface has been limed. The subsoil ranges from very strongly

acid to moderately alkaline throughout. Weathering alters the spoils; recent spoil areas are highly alkaline whereas the older spoil areas have been leached and have become quite acid. The seasonal high water table ranges from 2 to 3.5 feet below the surface.

Included with this soil in mapping are small areas of better drained, sandier spoil material. The included soil makes up about 20 percent of this map unit.

The dominant native trees are loblolly pine, eastern red-cedar, sweetgum, and red maple. Black cherry, Yaupon holly, live oak, myrtle oak, and waxmyrtle are important understory. The use of equipment is limited during wet periods.

The characteristics of this soil are unfavorable for military training areas because of wetness, low bearing strength of the clayey material, and because of its Outer Banks location.

This soil generally is not used for residential or recreational development. Wetness, high shrink-swell of the clayey subsoil, and slow permeability are the main limitations.

Use and Management of the Soils

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

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

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

The soil survey can help military personnel select the kinds of soil most suited for off-road maneuvers of tracked and heavy-wheeled vehicles, light vehicle traffic, and bivouac.

Planners, military personnel, and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of Camp Lejeune. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Planning and engineering personnel can use this survey to locate sources of sand, roadfill, and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

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

Military Training Uses

Danny D. Sharpe, Supervisory Ecologist, Marine Corps Base, Came Lejeune, N.C., helped prepare this section.

This section provides information that can be used by Marines in planning military training on unimproved grounds. Tables 5, 6, and 7 contain military training interpretations for Camp Lejeune. Each soil is rated according to limitations that affect its suitability for military training and possible damages to both the soil and vegetation. Some of the soil characteristics and surface features considered are wetness, content of organic matter, slope, texture, ponding of surface water, and flooding by stream overflow or tides. Possible damages to soil and vegetation are also assessed.

The ratings for each kind of soil were taken from Soil Conservation Service soil interpretation records for non-agricultural uses (8). Limitation ratings for some of the soils vary from those shown on the official series interpretation record. This was done to account for slightly different needs and short duration use arising from off-road maneuvers and bivouac.

For this report, ratings in Tables 9, 12, and 11 were adapted for military training uses based on observations made at Camp Lejeune.

Information compiled by the U. S. Army Corps of Engineers for tactical vehicle training areas was also studied (5). In rating the soils for military training uses, the tactical vehicles used by the Marine Corps were considered. The military training interpretations were made especially for the individual kinds of soils on Camp Lejeune.

The soils are rated according to the degree of limitation for, or damage from, a given use. The degree of limitation or damage is expressed as slight, moderate, or severe. Slight means the soil characteristics are generally favorable and limitations or damages to the soil are minor and easily overcome or repaired. Moderate means some characteristics are restrictive and the resulting limitations or damages can be overcome or minimized by planning, design, or special maintenance. Severe means that soil characteristics are unfavorable and that limitations or damages can be offset only by costly soil reclamation, special design or intensive maintenance, limited use, or by a combination of these measures. A soil is only rated for wet and dry conditions if changes in moisture conditions significantly alter soil behavior when traversed by tactical vehicles. Pertinent limitations and damages are noted in the tables for specified training uses along with a brief statement of the factors affecting the use of the soil.

Control and scheduling of tactical vehicle movement are essential to limiting soil damage and erosion under wet conditions. Unless essential to the training objective, tactical vehicles should be routinely confined to improved trails in order to minimize damage to soils and vegetation (5).

Table 5 rates each soil for off-road maneuvers of tactical vehicles and for foot traffic. Soil properties affecting the ease with which the area can be traversed were considered. The best soils are well drained, have good support strength, and are not subject to frequent flooding.

Table 6 rates each soil for bivouac sites. These ratings are for short term use ranging from overnight to two weeks. Soils are rated for tent sites, on-site waste disposal, shallow excavations, and recreation use. Generally the best soils for these uses are well drained, do not flood, and are neither too sandy nor too clayey.

Table 7 rates the possible damage to each soil and the vegetation from tactical vehicle movement on and off trails. In rating possible vegetation damage, the amount and kind of vegetation typical for each soil was considered.

Woodland Management and Productivity

Peter E. Black, Supervisory Forester, Marine Corps Base, Camp Lejeune, helped prepare this section.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity (10).

The first part of the ordination 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 w, indicates excessive water in or on the soil; and s, indicates sandy texture. The letter o indicates that limitations or restrictions are insignificant.

In table 8, slight, moderate, and severe indicate the degree of the major soil limitations to be considered in management.

Ratings for 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 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 for equipment limitations 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 in 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 to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of slight indicates that the expected mortality is less than 25 percent; moderate, 25 to 50 percent; and severe, more than 50 percent.

The potential productivity of merchantable or common 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. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

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

Camp Lejeune has an active forest management program. Management activities include fire protection (Fig. 34), thinning, harvesting, and other techniques common to modern forestry practices.

Figure 34. Plowing a firelane on Onslow loamy fine sand.

Recreation

Danny D. Sharpe, Supervisory Ecologist, Marine Corps Base, Camp Lejeune, helped prepare this section.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. Slight means that soil properties are generally favorable and that limitations are minor and easily overcome. Moderate means that limitations can be overcome or alleviated by planning, design, or special maintenance. Severe means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

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

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over a hardpan should be considered.

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

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

Wildlife Habitat

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

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, switchgrass, clover, and crownvetch.

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

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

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

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

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

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

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

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodpeckers, squirrels, and gray fox. Several areas provide prime habitat for the Red-cockaded woodpecker, an endangered species (Fig. 35.)

Figure 35. Red-cockaded woodpecker habitat on Baymeade fine sand, 0 to 6 percent slopes, near Combat Town.

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, redwing blackbirds, shore birds, muskrat, turtles, and alligators.

Engineering

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

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

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

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section.

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

This information can be used to (1) evaluate the potential of areas for residential, building complexes, and recreational uses; (2) make preliminary estimates of construction conditions; (3) evaluate routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered slight if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; moderate if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and severe if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

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

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

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

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered slight if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; moderate if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and severe if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of good indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; fair indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and poor indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed

to hold the seepage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. Generally, the surface layer and 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and content of organic matter.

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

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated good, fair, or poor as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and

gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source.

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

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

Soils rated good have friable, loamy material to a depth of at least 40 inches. They have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, respond well to lime and fertilizer, and are not so wet that excavation is difficult.

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

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

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered slight if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; moderate if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and severe if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly maintenance are required.

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

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

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

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

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

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

original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to a cemented pan or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic levels of substances in the root zone such as salts or sulfur. Availability of drainage outlets is not considered in the ratings.

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

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

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

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

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

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

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

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

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more that 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density,

and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

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

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of each soil series. Salinity affects the suitability of a soil for plant growth, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

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

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed. Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are low, a change of less than 3 percent; moderate, 3 to 6 percent; and high, more than 6 percent. Very high, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on

percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

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

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

In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Feature

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. None means that flooding is not probable; rare that it is unlikely but possible under unusual

weather conditions; common that it is likely under normal conditions; occasional that it occurs, on the average, no more than once in 2 years; and frequent that it occurs, on the average, 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.

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

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. The two numbers indicate the typical range of depth at which the seasonal high water table occurs. If a plus sign precedes the range in depth, the first numeral indicates how high the water table rises above the surface of the soil.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence of mineral materials results from closer packing of grains following the removal of water and its buoyancy effect. Subsidence also results from either desiccation and shrinkage or oxidation of

organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the expected initial subsidence, which usually is a result of drainage, and annual subsidence, which usually is a result of oxidation. Not shown in the table is subsidence caused by an imposed surface load.

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

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

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the described pedon is given. The detailed description of each soil horizon follows standards in the Soil Survey Manual (9). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (11). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Most pedon site locations are in other sections of Onslow County, but are representative of the soils in Camp Lejeune.

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

The Alpin series consists of excessively drained soil on uplands. The soil formed in coarse textured sediments. Slopes range from 1 to 6 percent.

A typical pedon of Alpin fine sand, 1 to 6 percent slopes, is 5 miles south of Hubert, 0.7 mile north of the intersection of Highway 172 and Bear Creek Tower Road, 100 feet west of Highway 172:

A--0 to 4 inches; gray (10YR 5/1) fine sand; single grained; loose; common fine particles of organic matter; very strongly acid; clear wavy boundary.

E1--4 to 13 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; medium acid; clear wavy boundary.

E2--13 to 48 inches; very pale brown (10YR 8/3) fine sand; few medium distinct brownish yellow (10YR 6/6) mottles; many pockets of coarse faint white (10YR 8/2) uncoated sand grains; few bodies of loamy fine sand; single grained; loose; medium acid; clear wavy boundary.

E/B--48 to 80 inches; white (10YR 8/2) fine sand; single grained; loose; few yellowish brown (10YR 5/8) loamy fine sand lamellae about 1/4 to 1 inch thick, about 2 to 5 inches apart; medium acid.

Range in Characteristics: The sandy A, E, and E/B horizons extend to a depth of 80 inches or more. The soil ranges from very strongly acid to medium acid throughout the profile. The E part of the E/B horizon ranges from 2 to 10 inches thick between B layers. The B part of the E/B horizon ranges from 1/4 to 1 inch thick, having a cumulative thickness of less than 6 inches.

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

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. Texture is fine sand.

The E part of the E/B horizon has hue of 10YR or 2.5Y, value of 7 or 8, and chroma of 1 to 4. The B part has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 4 to 8. The E part is fine sand and the B part is loamy fine sand or sandy loam.

The Baymeade series consists of well drained soil on uplands. The soil formed in moderately coarse textured sediments. Slopes range from 0 to 6 percent.

A typical pedon of Baymeade fine sand, 0 to 6 percent slopes, is 1.9 miles south of Hubert, 1.6 miles south of the intersection of Highway 24 and Highway 172, 100 feet west of the intersection of Highway 172 and a logging road:

A--0 to 2 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

E--2 to 9 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

E/Bh--9 to 15 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; few soft nodules of organic coated sand that are dark yellowish brown (10YR 4/4), 1/8 to 1/4 inch in diameter; few fine roots; strongly acid; clear wavy boundary.

E'--15 to 30 inches; white (10YR 8/2) fine sand; few coarse distinct very pale brown (10YR 7/4) mottles; single grained; loose; few brownish yellow (10YR 6/8) lamellae of fine sandy loam, 1/8 to 1/4 inch thick; strongly acid; clear wavy boundary.

Bt--30 to 40 inches; brownish yellow (10YR 6/6) fine sandy loam; weak fine subangular blocky structure; very friable; strongly acid; clear wavy boundary.

BC--40 to 56 inches; light yellowish brown (10YR 6/4) fine sandy loam with strata of fine sand; few fine distinct light gray (10YR 7/1) mottles; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

Cg--56 to 80 inches; light gray (10YR 7/2) fine sand with strata of loamy fine sand; common medium distinct brown (10YR 5/3) mottles; single grained; loose; strongly acid.

Range in Characteristics: The loamy and sandy layers extend to a depth of 72 inches or more. The soil ranges from very strongly acid to medium acid throughout the profile, unless the surface layer has been limed.

The A1 or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1.

The E and E' horizons have hue of 10YR, value of 6 to 8, and chroma of 1 to 4. The Bh portion of the E/Bh horizon constitutes 5 to 20 percent of this horizon and has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 or 4. Texture is fine sand, fine sandy loam, or sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is fine sandy loam or sandy clay loam.

The BC horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is loamy sand, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR, value of 6 to 8, and chroma of 1 to 8. Texture is fine sand or loamy fine sand.

The Bohicket series consists of very poorly drained soil on tidal marshes. The tidal flats are less than 3 feet above sea level. The soil formed in silty and clayey sediments that were washed from the drainage areas of fresh water streams. Slopes are less than 1 percent.

A typical pedon of Bohicket silty clay loam is on the east side of Sanders Channel, 0.2 mile east of inlet from Intracoastal Waterway:

A--0 to 8 inches; dark gray (N 4/) silty clay loam; massive; friable, slightly sticky, slightly plastic; slightly acid; gradual wavy boundary.

Cg1--8 to 38 inches; dark gray (N 4/) silty clay with pockets of silt loam; massive; friable, slightly sticky, slightly plastic; slightly acid; gradual wavy boundary.

Cg2--38 to 60 inches; gray (N 5/) loamy sand; massive; very friable; neutral.

Range in Characteristics: The loamy A horizons and clayey C horizons extend to a depth of 38 inches or more. The soil ranges from slightly acid to moderately alkaline throughout the profile. After drying, the soil is extremely acid.

The A horizon has hue of 10YR to 5G or is neutral, value of 2 to 5, and chroma of 2 or less.

The Cg horizon has hue of 10YR to 5GY or is neutral, value of 2 to 7, and chroma of 2 or less. Texture is silty clay, clay, or sandy clay. Below a depth of about 40 inches the texture of the C horizon is variable, ranging from sand to clay.

The Corolla series consists of moderately well drained to somewhat poorly drained soil on the Outer Banks. This soil formed in coarse textured sediments. Slopes range from 1 to 3 percent.

A typical pedon of Corolla fine sand is on Onslow Island, 0.3 mile northeast of Onslow Island Bridge, 200 feet northwest of Beach Road:

A--0 to 1 inch; pale brown (10YR 6/3) fine sand; single grained; loose; moderately alkaline; clear wavy boundary.

C1--1 inch to 8 inches; very pale brown (10YR 7/3) fine sand; single grained; loose; moderately alkaline; gradual wavy boundary.

C2--8 to 21 inches; pale brown (10YR 6/3) fine sand; single grained; loose; moderately alkaline; gradual wavy boundary.

Cg1--21 to 44 inches; light brownish gray (2.5Y 6/2) fine sand; single grained; loose; moderately alkaline; gradual wavy boundary.

Cg2--44 to 72 inches; grayish brown (10YR 5/2) sand; single grained; loose; 5 percent shells and small shell fragments; common black grains; moderately alkaline.

Range in Characteristics: The sandy horizons extend to a depth of 72 inches or more. The soil ranges from medium acid to moderately alkaline throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 0 to 3. The Alb horizon, where present, is 24 to 72 inches below the surface and is similar in color to the A horizon.

The upper part of the C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. The lower part of the C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. Texture ranges from fine sand to coarse sand.

The Craven series consists of moderately well drained soil on Coastal Plain uplands. This soil formed in fine textured marine sediments. Slopes range from 1 to 8 percent.

A typical pedon of Craven fine sandy loam, 1 to 4 percent slopes, is 1.7 miles northwest of Belgrade, 1.6 miles southeast of the intersection of State Road 1332 and State Road 1331, 20 feet north of State Road 1331:

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

BA--8 to 11 inches; brownish yellow (10YR 6/6) clay loam; weak fine subangular blocky structure; friable; few fine roots; very strongly acid; clear wavy boundary.

Bt1--11 to 20 inches; brownish yellow (10YR 6/6) clay; few medium distinct strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; very firm, sticky, very plastic; few fine roots between peds; thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2--20 to 34 inches; light yellowish brown (10YR 6/4) clay; common fine distinct light brownish gray (10YR 6/2) and few fine prominent red (2.5YR 5/8) mottles; moderate fine subangular blocky structure; very firm, sticky, very plastic; thin clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

Btg1--34 to 48 inches; gray (10YR 6/1) clay; common fine distinct light yellowish brown (10YR 6/4), few fine prominent red (2.5YR 5/8), and few medium distinct strong brown (7.5YR 5/8) mottles; moderate fine angular blocky structure; very firm, sticky, very plastic; thin clay films on faces of peds and in pores; very strongly acid; gradual wavy boundary.

BCg--48 to 55 inches; gray (10YR 6/1) clay loam; common coarse distinct yellowish brown (10YR 5/8) and common fine prominent red (10R 4/8) mottles; moderate fine angular blocky structure; firm, sticky, plastic; very strongly acid; clear wavy boundary.

Cg--55 to 80 inches; gray (10YR 6/1) sandy loam with lenses of loamy sand and sandy clay; common coarse distinct light gray (10YR 7/1) and few medium distinct reddish brown (5YR 5/4) mottles; massive; friable, slightly sticky, slightly plastic; very strongly acid.

Range in Characteristics: The loamy A and BA horizons and the clayey Bt horizon range from 40 to 60 inches in depth. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The BA horizon, where present, has hue of 10YR, value of 4 to 6, and chroma of 4 to 6. It is clay loam, loam, or sandy clay loam.

The Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 8 in the upper part, and chroma of 1 or 2 in the lower part. The texture is dominantly clay but ranges to silty clay, silty clay loam, or clay loam.

The BCg horizon is similar in color to the lower Bt horizon or is mottled. It is sandy clay loam, clay loam, or clay.

The C horizon is similar in color to the BC horizon. Texture ranges from loamy sand to clay.

The Croatan series consists of very poorly drained organic soil on Coastal Plain uplands. This soil formed from herbaceous plant residue deposited on loamy mineral soil. Slopes range from 0 to 2 percent.

A typical pedon of Croatan muck is 4 miles northwest of Deppe Lookout Tower, 0.5 mile northwest of the intersection of Deppe Trail and Roper Road, 50 feet northeast of Deppe Trail:

Oa1--0 to 9 inches; black (N 2/) broken face and rubbed sapric material; about 8 percent fibers undisturbed and 2 percent rubbed; weak fine granular structure; very friable; common fine and medium roots; few grains of clean sand; about 80 percent organic content; very strongly acid; gradual wavy boundary.

Oa2--9 to 23 inches; black (N 2/) broken face and rubbed sapric material; about 5 percent fibers undisturbed and 1 percent rubbed; weak medium granular structure; very friable; few fine and medium roots; few grains of clean sand; about 75 percent organic content; extremely acid; gradual wavy boundary.

Oa3--23 to 34 inches; black (7.5YR 2/1) broken face and rubbed sapric material; about 10 percent fibers, 2 percent rubbed; massive; very friable; few fine roots; few grains of clean sand; about 65 percent organic content; extremely acid; diffuse wavy boundary.

2Cg1--34 to 40 inches; dark reddish brown (5YR 2/2) mucky sandy loam; massive; very friable; about 80 percent mineral content; extremely acid; gradual wavy boundary.

2Cg2--40 to 50 inches; dark gray (10YR 4/2) sandy clay loam with strata of sandy loam; massive; friable, slightly sticky, slightly plastic; few nearly decomposed medium roots; extremely acid; gradual wavy boundary.

2Cg3--50 to 70 inches; grayish brown (10YR 5/2) sandy clay loam with strata of sandy loam; massive, slightly sticky, slightly plastic; few nearly decomposed medium roots; extremely acid; gradual smooth boundary.

2Cg4--70 to 80 inches; light brownish gray (10YR 6/2) sandy loam with strata of sandy clay loam; massive; very friable; extremely acid.

Range in Characteristics: The organic material ranges from 16 to 51 inches thick. The organic materials are extremely acid or very strongly acid unless the surface has been limed. The underlying mineral horizons range from extremely acid through slightly acid. Logs, stumps, and fragments of wood occupy 0 to 10 percent of the organic layers in undisturbed areas. Charcoal particles and pockets of ash occur in some pedons.

The organic horizons have hue of 7.5YR to 5Y, or neutral, value of 2 or 3, and chroma of 0 to 2. Fiber content of the organic tiers is 5 to 25 percent unrubbed and less than 10 percent after rubbing. The organic layers are typically massive under natural wet conditions. Upon drainage and cultivation a granular or blocky structure develops in all or part of the organic layers depending upon the nature and depth of the organic material as well as duration of drainage.

Underlying mineral layers are loamy. The mineral layers commonly have hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 3.

The Dorovan series consists of very poorly drained soil on low flood plains. This soil formed from plant residue deposited over sandy mineral sediments. Slopes are less than 1 percent.

A typical pedon of Dorovan muck is 1.7 miles southwest of Tar Landing, 0.1 mile east of the intersection of Deerfield and Wilberry roads, 0.7 mile east of the intersection of Wilberry and Woods Road, 300 feet north of power line:

Oe--0 to 4 inches; very dark grayish brown (10YR 3/2) muck; 60 percent fiber, about 20 percent rubbed; massive; many medium roots; about 25 percent silt and find sand; strongly acid; clear wavy boundary.

Oa1--4 to 32 inches; dark reddish brown (5YR 2/2) muck; 40 percent fiber, about 6 percent rubbed; massive; common fine roots; about 30 percent silt and fine sand; strongly acid; gradual wavy boundary.

Oa2--32 to 80 inches; dark reddish brown (5YR 2/2) muck; 25 percent fiber, about 5 percent rubbed; massive; about 30 percent silt and fine sand; very strongly acid; gradual wavy boundary.

2Cg--80 to 99 inches; very dark gray (10YR 3/2) sandy loam with strata of loamy sand; few medium distinct dark gray (10YR 4/1) mottles; massive; very friable; neutral.

Range in Characteristics: The decomposed organic layers extend to a depth of 51 inches or more. The soil is very strongly acid or strongly acid in the organic layers.

The surface and subsurface organic layers have hue of 5YR to 10YR, value of 2 to 3, and chroma of 1 or 2, with few to common clean sand grains.

The underlying materials range from sand to sandy loam.

This soil is a taxadjunct to the Dorovan series because the soil reaction is less acid than allowed within the series. There is little difference in use, management, and behavior.

The Duckston series consists of poorly drained soil that formed from wind blown sand deposited in shallow depressions or on flats between sand ridges and marshes. Slopes range from 0 to 2 percent.

A typical pedon of Duckston fine sand is on Onslow Island, 0.5 mile north of New River Inlet:

A--0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; single grained; loose; many fine roots; neutral; gradual wavy boundary.

Cg1--7 to 19 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; neutral; gradual wavy boundary.

Cg2--19 to 60 inches; gray (5Y 5/1) fine sand; single grained; loose; 4 percent fine shell fragments; neutral.

Range in Characteristics: The sandy horizons extend to a depth of 60 inches or more. The soil ranges from medium acid through moderately alkaline throughout the profile. Small calcareous shell fragments are present in some pedons. The soil contains few to common grains of black, red, pink, dark brown, and white minerals. Some pedons have a sulfur odor below the surface layer.

The A horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 0 to 2. The A horizon contains few to common pieces of undecomposed roots.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 0 to 2, or is greenish gray (5GY 5/1, 6/1). It is fine sand or sand.

The Foreston series consists of moderately well drained soil on uplands. This soil formed in moderately coarse textured sediments. Slopes range from 0 to 2 percent.

A typical pedon of Foreston loamy fine sand, 0 to 2 percent slopes, is 1.3 miles northeast of Piney Green, 0.7 mile east of the intersection of State Road 1411 and Lake Cole Road, north side of State Road 1414 in a road cut:

A--0 to 6 inches; dark gray (10YR 4/1) loamy fine sand; weak medium granular structure; very friable; common fine roots; strongly acid; clear wavy boundary.

EB--6 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak medium granular structure; very friable; very strongly acid; clear wavy boundary.

Bt1--12 to 21 inches; brownish yellow (10YR 6/6) fine sandy loam; weak medium granular structure; very friable; few patchy clay films on sand grains; very strongly acid; gradual wavy boundary.

Bt2--21 to 36 inches; brownish yellow (10YR 6/6) fine sandy loam; common coarse distinct light gray (10YR 7/1), and common fine distinct yellowish red (5YR 5/8) mottles; weak medium granular structure; very friable; few patchy clay films on sand grains; very strongly acid; gradual wavy boundary.

Btg--36 to 58 inches; light gray (10YR 7/1) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) and few coarse prominent red (2.5YR 5/8) mottles; weak medium granular structure; very friable; common patchy clay films on sand grains; very strongly acid; gradual wavy boundary.

BCg--58 to 70 inches; light gray (10YR 7/1) fine sandy loam with strata of sandy clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak medium granular structure; very friable; very strongly acid; gradual wavy boundary.

Cg--70 to 80 inches; light gray (10YR 7/1) loamy fine sand with strata of fine sand; single grained; loose; very strongly acid.

Range in Characteristics: The sandy and loamy horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, except where the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 4, and chroma of 1 or 2.

The E horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. The texture of the E horizon is loamy fine sand or loamy sand.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 to 6, and chroma of 4 to 6. The lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. Mottles are in shades of yellow, brown, or red. The texture of the Bt horizon is sandy loam or fine sandy loam.

The BCg and Cg horizons have hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. Texture is sand, loamy fine sand, loamy sand, sandy loam, fine sandy loam, or sandy clay loam.

The Goldsboro series consists of moderately well drained soil on Coastal Plain uplands. This soil formed in moderately fine textured sediments. Slopes range from 0 to 5 percent.

A typical pedon of Goldsboro fine sandy loam, 0 to 2 percent slopes, is 12 miles northeast of Jacksonville, 1.2 miles southeast of Deppe on State Road 1436, 25 feet south of State Road 1436:

Ap--0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; medium acid; abrupt smooth boundary.

E--7 to 11 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

EB--11 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; strongly acid; clear wavy boundary.

Bt1--13 to 24 inches; yellowish brown (10YR 5/4) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2--24 to 40 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium distinct light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg--40 to 60 inches; light gray (10YR 6/1) sandy clay loam; few medium prominent red (2.5YR 5/8) and common medium distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg--60 to 68 inches; light gray (10YR 7/1) sandy clay loam with thin strata of sandy loam; common fine faint brownish yellow (10YR 6/8) and few medium distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; very strongly acid; gradual wavy boundary.

Cg--68 to 80 inches; gray (10YR 6/1) sandy loam with thin strata of loamy sand; massive; friable; very strongly acid.

Range in Characteristics: The loamy horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The Ap or A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The E horizon, where present, has hue of 10YR, value of 6 or 7, and chroma of 3 or 4. The texture of the E horizon is fine sandy loam, sandy loam, loamy fine sand, or loamy sand.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 8. Gray mottles are within 20 to 30 inches of the surface of the soil. In the lower part mottles are red, strong brown, and brownish yellow. The Bt horizon is sandy clay loam or sandy loam in the upper part, sandy clay loam in the middle part, and sandy clay loam or sandy clay in the lower part.

The BCg and Cg horizons have hue of 10YR, value of 5 to 7, and chroma of 1 or 2, and is stratified with layers of sandy loam, loamy sand, and sandy clay loam.

The Kureb series consists of excessively drained soil on uplands. This soil formed in coarse textured sediments. Slopes range from 1 to 6 percent.

A typical pedon of Kureb fine sand, 1 to 6 percent slopes, is 1.1 miles southeast of Folkston, 1.1 miles southeast of the intersection of U.S. Highway 17 and State Road 1518, 50 feet north of State Road 1518:

A--0 to 6 inches; gray (10YR 6/1) fine sand; single grained; loose; organic matter and sand grains have salt and pepper appearance; few fine roots; very strongly acid; clear wavy boundary.

E--6 to 26 inches; light gray (10YR 7/1) fine sand; single grained; loose; few large roots; very strongly acid; clear irregular boundary.

C/Bh1--26 to 48 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; few tongues of light gray (10YR 7/1) extend from above horizon; few brown (7.5YR 4/2) concretions and bands along walls of tongues; very strongly acid; clear irregular boundary.

C/Bh2--48 to 62 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; few brown (7.5YR 4/2) horizontal and vertical bands and few dark reddish brown (5YR 3/3) concretions 1/4 to 1/2 inch in diameter; very strongly acid; gradual irregular boundary.

C1--62 to 69 inches; mottled pale brown (10YR 6/3), grayish brown (10YR 6/2), and dark grayish brown (10YR 4/2) fine sand with pockets of loamy fine sand; massive; very friable; very strongly acid; gradual irregular boundary.

C2--69 to 80 inches; light gray (10YR 6/1) fine sand with pockets of loamy fine sand; massive; very friable; few dark reddish brown (5YR 3/2) concretions 1/4 to 1/2 inch in diameter; very strongly acid.

Range in Characteristics: The sandy layers extend to a depth of 80 inches or more. The soil ranges from very strongly acid to neutral throughout the profile.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2.

The E horizon, if present, has hue of 10YR, value of 7 or 8, and chroma of 1 or 2. Texture is sand or fine sand.

The C part of the C/Bh horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 8. The Bh part of the C/Bh horizon has hue of 5YR to 7.5YR, value of 3 to 4, and chroma of 2 to 4. The C/Bh horizon is sand or fine sand.

The C horizon has hue of 10YR, value of 4 to 8, and chroma of 1 to 8. Texture is sand, fine sand, or loamy sand.

The Lafitte series consists of very poorly drained soil on flood plains of fresh water streams at elevations less than 5 feet. This soil formed from plant residue deposited over sandy mineral sediments. Slopes are less than 1 percent.

A typical pedon of Lafitte muck is 1.5 miles east of Silverdale, 0.3 mile southwest of State Road 1442 bridge, 50 feet south of State Road 1442:

Oa1--0 to 30 inches; dark brown (10YR 4/3) muck; 50 percent fiber, about 10 percent rubbed; massive; many medium roots; about 20 percent silt and fine sand; strongly acid; clear wavy boundary.

Oa2--30 to 50 inches; very dark brown (10YR 2/2) muck; 45 percent fiber, about 5 percent rubbed; massive; common fine roots; about 15 percent silt and fine sand; medium acid; gradual wavy boundary.

Oa3--50 to 70 inches; very dark brown (10YR 2/2) muck; 65 percent fiber, about 5 percent rubbed; massive; about 10 percent mineral grain; very strongly acid; gradual wavy boundary.

Oa4--70 to 85 inches; black (10YR 2/1) muck; broken face and rubbed very dark grayish brown (10YR 3/2); 20 percent fiber, about 3 percent rubbed; massive; 10 percent mineral grain; very strongly acid; clear wavy boundary.

Oa5--85 to 99 inches; very dark brown (10YR 2/2) muck; massive; 15 percent fiber, 3 percent rubbed; 25 percent mineral grains; very strongly acid.

Range in Characteristics: The decomposed organic layers range from 51 to 99 inches thick or more. The soil ranges from extremely acid to mildly alkaline throughout the profile.

The organic layers have hue of 10YR, value of 2 to 4, and chroma of 1 to 3, with a few to common clean sand grains.

The underlying material is stratified clayey, loamy, or sandy sediment.

The Lenoir series consists of somewhat poorly drained soil on uplands. This soil formed in fine textured marine sediments. Slopes are less than 2 percent.

A typical pedon of Lenoir loam is 2.5 miles west of Belgrade, 1.1 miles southeast of the intersection of State Road 1331 and State Road 1332, 50 feet south of State Road 1331:

A--0 to 4 inches; dark gray (10YR 4/1) loam; weak medium granular structure; very friable; common fine roots; very strongly acid; abrupt smooth boundary.

E--4 to 7 inches; brown (10YR 5/3) fine sandy loam; few medium faint dark grayish brown (10YR 4/2) mottles; weak medium granular structure; very friable; very strongly acid; clear smooth boundary.

BE--7 to 10 inches; brownish yellow (10YR 6/3) clay loam; few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Bt1--10 to 15 inches; mottled brownish yellow (10YR 6/6), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) clay; moderate fine angular blocky structure; firm, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg1--15 to 45 inches; gray (10YR 6/1) clay; few fine prominent red (2.5YR 5/8) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate fine angular blocky structure; firm, sticky, plastic; thin patchy clay films on faces peds; very strongly acid; gradual wavy boundary.

Btg2--45 to 60 inches; gray (10YR 6/1) clay; few coarse faint gray (10YR 5/1), few fine prominent reddish yellow (7.5YR 6/8), and few fine prominent red (2.5YR 4/8) mottles; moderate fine angular blocky structure; firm, sticky, plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg--60 to 70 inches; dark grayish brown (10YR 4/2) clay with strata of sandy clay loam; few fine distinct brownish yellow (10YR 6/6) mottles; moderate fine angular blocky structure; firm, sticky, plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg--70 to 80 inches; dark grayish brown (10YR 4/2) sandy clay loam with strata of sandy loam; few fine distinct brownish yellow (10YR 6/6) and few coarse faint very dark grayish brown (10YR 3/2) mottles; massive; friable; very strongly acid.

Range in Characteristics: The loamy A and E horizons and clayey Bt horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2.

The E horizon, if present, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3. Texture is loam or fine sandy loam.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. The lower part of the Bt has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles in the upper part are gray and in the lower part they are yellowish brown and red. Texture is clay or clay loam.

The BCg and Cg horizons have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Texture is clay, clay loam, sandy clay, sandy clay loam, or loam.

The Leon series consists of poorly drained soil on Coastal Plain uplands. This soil formed in coarse textured sediments. Slopes range from 0 to 3 percent.

A typical pedon of Leon fine sand is 2.7 miles northeast of Holly Ridge, 0.1 mile northwest of the intersection of U.S. Highway 17 and Forest Road, 0.2 mile southeast of railroad crossing:

A--0 to 5 inches; dark gray (10YR 4/1) fine sand; single grained; loose; about 1/3 of sand grains are uncoated; common medium and fine roots; extremely acid; clear wavy boundary.

E--5 to 17 inches; light gray (10YR 7/1) fine sand; single grained; loose; very strongly acid; abrupt wavy boundary.

Bh1--17 to 24 inches; dark reddish brown (5YR 2/2) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

Bh2--24 to 51 inches; dark reddish brown (5YR 3/2) fine sand; massive; weakly cemented; very strongly acid; gradual wavy boundary.

E'--51 to 59 inches; grayish brown (10YR 5/2) fine sand; massive; very friable; very strongly acid; clear wavy boundary.

B'h--59 to 95 inches; black (5YR 2/1) fine sand; massive; weakly cemented; very strongly acid.

Range in Characteristics: The sandy horizons are 80 inches thick or more. The soil is extremely acid or very strongly acid throughout the profile, unless the surface has been limed.

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

The E horizon has hue of 10YR, value of 6 to 8, and chroma of 1 or 2.

The Bh horizon has hue of 5YR, value of 2 or 3, and chroma of 1 to 3, and is weakly cemented when wet and strongly cemented when dry.

The E' horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2.

The B'h horizon is similar in color to the Bh horizon; it is weakly cemented when wet and strongly cemented when dry.

The Lynchburg series consists of somewhat poorly drained soil on uplands. This soil formed in moderately fine textured sediments. Slopes are less than 2 percent.

A typical pedon of Lynchburg fine sandy loam is 1.4 miles north of Deppe, 0.5 mile southwest of the intersection of State Road 1330 and U.S. Highway 17, 100 feet east of the intersection of State Road 1330 and farm path:

Ap--0 to 6 inches; dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; few medium roots; slightly acid; abrupt smooth boundary.

E--6 to 9 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

EB--9 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; few fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

Bt--13 to 21 inches; pale brown (10YR 6/3) sandy clay loam; few fine distinct brownish yellow (10YR 6/8) and few medium faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg1--21 to 36 inches; gray (10YR 6/1) sandy clay loam; common fine distinct reddish yellow (7.5YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2--36 to 45 inches; gray (10YR 6/1) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/8) and few fine prominent red (2.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg--45 to 63 inches; gray (10YR 6/1) sandy clay loam with strata of sandy clay; common fine distinct reddish yellow (7.5YR 6/8), few fine prominent red (2.5YR 5/8), and few fine faint light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable, sticky, plastic; very strongly acid; gradual wavy boundary.

Cg--63 to 80 inches; light brownish gray (10YR 6/2) sandy clay loam with strata of loamy sand and sandy loam; few fine distinct brownish yellow (10YR 6/6), and brown (7.5YR 5/2) mottles; massive; friable; very strongly acid.

Range in Characteristics: The loamy horizons are 60 inches thick or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

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

The E horizon, if present, has hue of 10YR, value of 5 to 7, and chroma of 2 or 3. The E horizon is sandy loam or fine sandy loam.

The EB horizon, if present, has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. Texture is sandy loam or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8, with few to many gray mottles in the upper part. Below a depth of 20 inches, the Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, with few to common mottles of brown or red. Texture is sandy clay loam in the upper and middle parts and sandy clay loam, sandy clay, or clay loam in the lower part.

The BCg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, and is stratified with layers of sandy clay, sandy clay loam, sandy loam, and loamy sand.

The Cg horizon has colors similar to the BCg horizon and is stratified with layers of loamy sand, sandy loam, and sandy clay loam.

The Marvyn series consists of well drained soil on uplands. This soil formed in moderately fine textured sediments. Slopes range from 6 to 15 percent.

A typical pedon of Marvyn loamy fine sand, 6 to 15 percent slopes, is 2 miles east of Richlands, 0.5 mile southeast of the intersection of State Road 1311 and State Road 1307, 200 feet southwest of State Road 1311:

Ap--0 to 4 inches; brown (10YR 5/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.

E--4 to 8 inches; pale brown (10YR 6/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

BE--8 to 12 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; clear wavy boundary.

Bt--12 to 26 inches; brownish yellow (10YR 6/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

BC--26 to 45 inches; brownish yellow (10YR 6/6) sandy loam; common medium distinct pale brown (10YR 6/3) and few fine distinct light yellowish brown (10YR 6/4) mottles; weak fine subangular blocky structure; friable; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg1--45 to 52 inches; gray (10YR 5/1) sandy clay loam with strata of fine sandy loam; few medium distinct strong brown (7.5YR 5/8) and common medium prominent red (2.5YR 4/8) mottles; massive; friable; very strongly acid; gradual wavy boundary.

Cg2--52 to 75 inches; light gray (10YR 7/1) loamy sand with strata of sandy loam, sandy clay loam, and sand; common fine prominent red (2.5YR 5/8) and common medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; very strongly acid.

Range in Characteristics: The sandy and loamy horizons are 40 to 60 inches thick or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

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

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

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

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

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 8. Red and gray mottles are few to common. It is stratified sandy loam, sandy clay loam, or loamy sand.

The Muckalee series consists of poorly drained soil on low flood plains. This soil formed in moderately coarse textured recent alluvium. Slopes range from 0 to 2 percent.

A typical pedon of Muckalee loam is 2 miles east of Richlands, 0.4 mile southeast of the intersection of State Road 1311 and State Road 1307, 200 feet northeast of State Road 1311:

A--0 to 10 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; many fine and medium roots; strongly acid; gradual wavy boundary.

Cg1--10 to 28 inches; gray (10YR 5/1) loam with strata of sandy loam; massive; friable; few fine roots; slightly acid; gradual wavy boundary.

Cg2--28 to 40 inches; gray (10YR 5/1) sandy loam with strata of clay loam; massive; friable; neutral; gradual wavy boundary.

Cg3--40 to 75 inches; grayish brown (10YR 5/2) sandy loam with strata of loamy sand; common coarse faint gray (10YR 6/1) mottles; massive; loose; slightly alkaline.

Range in Characteristics: The loamy A and C horizons extend to a depth of 72 inches or more. The A horizon is strongly acid and the C horizon ranges from medium acid to moderately alkaline.

The A horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. A horizons with value less than 3 are less than 6 inches thick.

The C horizon has hue of 10YR to 5Y, value of 4 to 7,and chroma of 1 or 2, with few gray brown, or yellow mottles. Texture is fine sandy loam, sandy loam, loam, loamy fine sand, and thin strata of clay loam, sandy clay loam, sandy loam, and loamy sand.

The Murville series consists of very poorly drained soil on uplands. This soil formed in coarse textured sediments. Slopes are less than 2 percent.

A typical pedon of Murville fine sand is 1.7 miles southeast of Holly Ridge, 0.1 mile southeast of the intersection of State Road 1538 and 1534, 50 feet northeast of State Road 1538:

A--0 to 5 inches; black (10YR 2/1) fine sand; weak medium granular structure; very friable; common medium and fine roots; extremely acid; gradual wavy boundary.

Bh1--5 to 20 inches; black (5YR 2/1) fine sand; massive; very friable; few large roots; extremely acid; gradual wavy boundary.

Bh2--20 to 46 inches; dark reddish brown (5YR 3/2) fine sand; massive; very friable; very strongly acid; gradual wavy boundary.

Bh3--46 to 55 inches; dark brown (7.5YR 3/2) fine sand; few fine faint dark reddish brown (5YR 3/2) mottles; massive; very friable; very strongly acid; gradual wavy boundary.

Cg--55 to 75 inches; grayish brown (10YR 5/2) sand with strata of sandy loam; massive; very friable; very strongly acid.

Range in Characteristics: The sandy horizons extend to a depth of 72 inches or more. The soil ranges from extremely acid to strongly acid throughout the profile.

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

The Bh horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. Sand grains are coated with organic matter and have a soft, loamy feel, but the texture is sand or fine sand.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is sand, loamy sand, or sandy loam.

The Newhan series consists of excessively drained soil that formed from coastal sands deposited by wind. Slopes range from 0 to 30 percent.

A typical pedon of Newhan fine sand, 0 to 30 percent slopes, is on Onslow Island, 2.6 miles southwest of the intersection of Onslow Island Road and Onslow Beach Road, 100 feet east of observation tower:

C1--0 to 36 inches; light gray (10YR 7/2) fine sand; single grained; loose; neutral; gradual wavy boundary.

C2--36 to 60 inches; light gray (10YR 7/2) fine sand; single grained; loose; about 3 percent small fragments of marine shells; neutral; gradual wavy boundary.

C3--60 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose; common black minerals; neutral.

Range in Characteristics: The sandy horizons are 72 inches thick or more. The soil is neutral or mildly alkaline throughout the profile. Calcareous shell fragments, mostly of sand size, make up 0 to 25 percent of the soil by volume. The soil contains few to common grains of dark minerals.

The A horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is fine sand or sand.

The C horizons have hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 1 to 4. They are fine sand or sand.

The Norfolk series consists of well drained soil on uplands. This soil formed in moderately fine textured sediments. Slopes range from 0 to 6 percent.

A typical pedon of Norfolk loamy fine sand, 0 to 2 percent slopes, is 0.7 mile south of Jarman's Crossroads, 0.3 mile southwest of the intersection of State Road 1238 and farm road, 20 feet west of farm road:

Ap--0 to 6 inches; brown (10YR 5/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; slightly acid; abrupt smooth boundary.

E--6 to 10 inches; pale brown (10YR 6/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; slightly acid; clear wavy boundary.

Bt1--10 to 25 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2--25 to 47 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine faint light olive brown (2.5Y 5/4) and few fine distinct yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3--47 to 68 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium prominent yellowish red (5YR 5/8), few fine distinct light gray (10YR 7/1), and common medium faint light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; firm, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg--68 to 80 inches; mottled light gray (10YR 7/1), brownish yellow (10YR 6/8), and yellowish red (5YR 5/8) sandy clay loam; massive; friable; very strongly acid.

Range in Characteristics: The sandy and loamy horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 5, and chroma of 1 to 3.

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

The Bt horizon has hue of 10YR or 7.5YR, value of 5 to 8, and chroma of 4 to 8. The lower part may have mottles in chroma of 1 or 2. Textures are sandy clay loam or clay loam in the upper part and can range to sandy clay in the lower part.

The BC horizon is commonly mottled in hue of 10YR to 2.5YR, value of 5 to 8, and chroma of 1 to 8. These layers commonly are stratified. Texture ranges from loamy sand to sandy clay.

The Onslow series consists of moderately well drained and somewhat poorly drained soil on uplands. This soil formed in moderately fine textured sediments. Slopes range from 0 to 3 percent.

A typical pedon of Onslow loamy fine sand is 0.6 mile southwest of Swansboro, 0.3 mile north of the intersection of State Road 1444 and State Road 1447, 100 feet east of State Road 1444:

A--0 to 4 inches; very dark gray (10YR 3/1) loamy fine sand; weak medium granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

E--4 to 8 inches; gray (10YR 6/1) loamy fine sand; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

E/Bh--8 to 14 inches; very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) loamy fine sand; massive; very friable; reddish yellow (5YR 5/4) strongly cemented concretions; about 1/3 of the horizon is weakly cemented and 1/3 is concretions ranging from 1/4 to 3/4 inch is size; few fine roots; very strongly acid; clear wavy boundary.

E'--14 to 17 inches; very pale brown (10YR 7/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

EB--17 to 21 inches; brownish yellow (10YR 6/6) fine sandy loam; few coarse distinct very pale brown (10YR 7/3) mottles; weak fine subangular blocky structure; very friable; few fine roots; very strongly acid; clear wavy boundary.

Bt1--21 to 30 inches; brownish yellow (10YR 6/6) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and light gray (10YR 7/1) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few medium roots; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2--30 to 41 inches; mottled light yellowish brown (10YR 6/4), strong brown (7.5YR 5/8), and light gray (10YR 7/2) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg--41 to 53 inches; light gray (10YR 7/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) and few fine prominent yellowish red (5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

BCg--53 to 68 inches; light gray (10YR 7/1, 6/1) sandy clay loam with lenses of sandy loam; common fine distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few small bodies of clean sand; very strongly acid; gradual wavy boundary.

Cg--68 to 80 inches; white (10YR 8/1) sandy loam with common lenses of loamy sand; few medium distinct light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/8) mottles; massive; friable; very strongly acid.

Range in Characteristics: The sandy and loamy horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. The texture is fine sandy loam or loamy fine sand.

The E/Bh horizon has hue of 5YR, 10YR, or 2.5Y, value of 4 to 7, and chroma of 3 or 4. The E/Bh horizon is loamy fine sand that is very friable in about 1/3 of its volume, weakly cemented in about 1/3, and contains strongly cemented concretions in about 1/3 of its volume.

The E' horizon, where present, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. The E' horizon is fine sandy loam or loamy fine sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8. The middle or lower Bt has mottles in shades of gray, brown, or red. It is sandy clay loam, sandy loam, or clay loam.

The Cg horizon has hue of 10YR to 5Y, value of 6 to 8, and chroma of 1 or 2. Texture is sandy clay loam, clay loam, sandy loam, loamy sand, or sand.

The Pactolus series consists of moderately well drained and somewhat poorly drained soil on uplands and stream terraces. This soil formed in coarse textured sediments. Slopes range from 1 to 3 percent.

A typical pedon of Pactolus fine sand is 8.3 miles south of Hubert, 2.4 miles northeast of the intersection of Highway 172 and Sneeds Ferry Road, 0.6 mile east of the intersection of Highway 172 and Anti-tank Range Road:

A1--0 to 3 inches; gray (10YR 5/1) fine sand; single grained; loose; few fine roots; strongly acid; clear smooth boundary.

A2--3 to 6 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; strongly acid; clear wavy boundary.

C1--6 to 18 inches; light yellowish brown (10YR 6/4) fine sand; few fine faint brownish yellow (10YR 6/6) mottles; single grained; loose; few strong brown (7.5YR 5/6) and dark brown (7.5YR 3/2) soft concretions 1/8 to 1/4 inch in diameter; few fine roots; medium acid; clear wavy boundary.

C2--18 to 30 inches; very pale brown (10YR 7/3) fine sand; few medium faint light gray (10YR 7/1) mottles; single grained; loose; few strong brown (7.5YR 5/6) and dark brown (7.5YR 3/2) soft concretions 1/8 to 1/4 inch in diameter; medium acid; gradual wavy boundary.

Cg--30 to 80 inches; light gray (10YR 7/2) fine sand; few medium distinct brownish yellow (10YR 6/8) mottles; single grained; loose; strongly acid.

Range in Characteristics: The sandy horizons extend to a depth of 80 inches or more. The soil ranges from very strongly acid to medium acid throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2.

The upper part of the C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. The lower part of the C horizon has hue of 10YR or 2.5Y, value of 6 to 8, and chroma of 1 or 2. The C horizon is fine sand or loamy fine sand.

The Pantego series consists of very poorly drained soil on uplands. This soil formed in moderately fine textured sediments. Slope are 0 to 1 percent.

A typical pedon of Pantego mucky loam is 3.2 miles northwest of the intersection of U.S. Highway 17 and State Road 1327, 2.4 miles northwest of the intersection of State Road 1327 and Gum Swamp Road, 50 feet north of the intersection of Gum Swamp Road and Equipment Shed road:

Ap--0 to 6 inches; black (10YR 2/1) mucky loam; weak medium granular structure; very friable; common fine roots; common fine pores; very strongly acid; clear wavy boundary.

A--6 to 14 inches; black (10YR 2/1) mucky loam; weak medium granular structure; very friable; common fine roots; common fine pores; strongly acid; clear wavy boundary.

E--14 to 17 inches; grayish brown (10YR 5/2) fine sandy loam; few fine distinct very dark gray (10YR 3/1) mottles; weak medium granular structure; very friable; common fine roots; very strongly acid; clear wavy boundary.

EBg--17 to 23 inches; grayish brown (10YR 5/2) sandy clay loam; few fine distinct very dark gray (10YR 3/1) mottles; weak fine subangular blocky structure; friable; few large roots; very strongly acid; gradual wavy boundary.

Btg1--23 to 45 inches; grayish brown (10YR 5/2) sandy clay loam; few coarse faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; few large roots; extremely acid; gradual wavy boundary.

Btg2--45 to 60 inches; grayish brown (10YR 5/2) sandy clay loam with pockets of sandy clay; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; firm, slightly sticky, slightly plastic; thin patchy clay films on faces of peds; few large roots; extremely acid; gradual wavy boundary.

BCg--60 to 70 inches; gray (10YR 5/1) sandy clay loam with thin strata of sandy clay; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few large roots; very strongly acid; gradual wavy boundary.

Cg--70 to 80 inches; dark gray (10YR 4/1) sandy clay loam with strata of loamy sand and thin layers of clay; common coarse faint gray (10YR 5/1) mottles; massive; friable, slightly sticky, slightly plastic; very strongly acid.

Range in Characteristics: The loamy horizons have a thickness of 60 inches or more. The soil ranges from extremely acid to strongly acid throughout the profile, unless the surface has been limed.

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

The E horizon, where present, has hue of 10YR, value of 4 or 5, and chroma of 2. It is loam, fine sandy loam, or mucky loam.

The EB horizon, where present, has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is loam, sandy loam, or sandy clay loam.

The Btg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is sandy clay loam in the upper part and sandy clay loam, sandy clay, or sandy loam in the lower part.

The BC horizon, where present, has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is sandy clay loam with thin strata of sandy clay.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy clay loam or thinly stratified loamy sand, sandy loam, sandy clay loam, and clay.

The Rains series consists of poorly drained soil on uplands. This soil formed in moderately fine textured sediments. Slopes are less than 2 percent.

A typical pedon of Rains fine sandy loam is 2.0 miles north of the intersection of U.S. Highway 17 and State Road 1326, 0.5 mile east of the intersection of State Road 1324 and 1326, 0.1 mile northeast of the intersection of farm road and State Road 1324:

Ap--0 to 5 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

E--5 to 12 inches; grayish brown (10YR 5/2) fine sandy loam; few fine faint dark gray (10YR 4/1) mottles; weak medium granular structure; very friable; very strongly acid; clear wavy boundary.

Btg1--12 to 17 inches; gray (10YR 6/1) sandy clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; few root channels filled with dark gray material; few patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg2--17 to 45 inches; gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few root channels filled with gray material; very strongly acid; gradual wavy boundary.

Btg3--45 to 58 inches; light brownish gray (10YR 6/2) sandy clay; many medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few large root channels filled with grayish brown material; very strongly acid; gradual wavy boundary.

BCg--58 to 70 inches; gray (10YR 6/1) sandy clay loam with pockets of sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate fine angular blocky structure; friable, slightly sticky, slightly plastic; very strongly acid; gradual wavy boundary.

Cg--70 to 80 inches; gray (10YR 5/1) sandy loam with strata of sandy clay loam and loamy sand; common fine distinct dark grayish brown (10YR 4/2) mottles; massive; friable; very strongly acid.

Range in Characteristics: The loamy and clayey horizons extend to a depth of 60 inches or more. The soil is very strongly acid or strongly acid throughout the profile, unless the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The E horizon is fine sandy loam, loam, or sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, with brownish yellow, yellowish brown, or strong brown mottles. Textures are sandy clay loam or clay loam and may include sandy clay below a depth of 40 inches.

The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2, with brown and strong brown mottles. Texture includes sandy clay loam, sandy loam, loamy sand, and sandy clay.

The Stallings series consists of somewhat poorly drained soil on uplands. This soil formed in moderately coarse textured sediments. Slopes range from 0 to 3 percent.

A typical pedon of Stallings loamy fine sand is 4.8 miles northwest of Richlands, 0.3 mile south of the intersection of U.S. Highway 258 and State Road 1233, on the east side of State Road 1233 in a road cut:

A--0 to 7 inches; dark gray (10YR 4/1) loamy fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.

E--7 to 12 inches; pale brown (10YR 6/3) loamy fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.

EB--12 to 15 inches; very pale brown (10YR 7/3) fine sandy loam; few fine distinct brownish yellow (10YR 6/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; very friable; strongly acid; clear wavy boundary.

Bt--15 to 25 inches; light yellowish brown (10YR 6/4) fine sandy loam; common fine distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; very friable; few patchy clay coatings on sand grains; strongly acid; gradual wavy boundary.

Btg--25 to 45 inches; light gray (10YR 7/1) fine sandy loam; few fine prominent red (2.5YR 5/8) and common medium distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; very friable; strongly acid; gradual wavy boundary.

BCg--45 to 66 inches; light gray (10YR 7/1) fine sandy loam with pockets of sandy clay loam; few fine prominent red (2.5YR 5/8) and common coarse distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Cg--66 to 80 inches; mottled brownish yellow (10YR 6/6), gray (10YR 6/1), and red (10R 4/8) sandy clay loam with strata of fine sandy loam; massive; friable; very strongly acid.

Range in Characteristics: The sandy and loamy horizons extend to a depth of 60 inches or more. The soil ranges from extremely acid to strongly acid throughout the profile, unless the surface has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. The E horizon is loamy fine sand, fine sandy loam, or loamy sand.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6, with gray, light gray or light brownish gray mottles. The lower part has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, with brownish yellow, strong brown or red mottles. The Bt horizon is sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2, or it is mottled. Texture is sand, loamy sand, fine sandy loam, or sandy clay loam.

The Torhunta series consists of very poorly drained soil on Coastal Plain uplands. This soil formed in moderately coarse textured sediments. Slopes range from 0 to 2 percent.

A typical pedon of Torhunta fine sandy loam is 9.3 miles north of Richlands, 0.8 mile northwest of Huffman, 0.3 mile north of the intersection of Forest Roads in a large ditch bank on the east side of Forest Road:

A1--0 to 9 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 2 percent uncoated sand grains; very strongly acid; clear wavy boundary.

A2--9 to 14 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; very friable; common fine and medium roots; extremely acid; gradual wavy boundary.

BA--14 to 22 inches; dark gray (10YR 4/1) fine sandy loam; few fine faint very dark gray (10YR 3/1) mottles and few light gray (10YR 7/1) uncoated sand grains; weak medium granular structure; very friable; few fine and medium roots; extremely acid; gradual wavy boundary.

Bg--22 to 47 inches; grayish brown (10YR 5/2) fine sandy loam; few coarse faint very dark gray (10YR 3/1) mottles; weak fine subangular blocky structure; very friable; extremely acid; gradual wavy boundary.

Cg1--47 to 72 inches; light gray (10YR 6/1) stratified loamy fine sand with strata of sandy clay loam; massive; very friable; very strongly acid; clear wavy boundary.

Cg2--72 to 80 inches; light greenish gray (5GY 7/1) sandy loam with strata of sandy clay loam; few medium distinct brownish yellow (10YR 6/8) mottles; massive; friable; very strongly acid.

Range in Characteristics: The loamy horizons are 20 to 50 inches thick. The soil is extremely acid or very strongly acid throughout the profile, unless the surface has been limed.

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

The Bg horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR or 5GY, value of 4 to 7, and chroma of 1 or 2. It is stratified loamy sand, loamy fine sand, sand, sandy loam, and sandy clay loam.

The Wando series consists of excessively drained soil on uplands. This soil formed in coarse textured sediments. Slopes range from 1 to 6 percent.

A typical pedon of Wando fine sand, 1 to 6 percent slopes, is 5.6 miles south of Hubert, 1.2 miles east of the intersection of N.C. Highway 172 and Bear Creek Tower Road, 50 feet north of Bear Creek Tower Road:

A--0 to 6 inches; grayish brown (10YR 5/2) fine sand; single grained; loose; few fine roots; medium acid; clear wavy boundary.

C1--6 to 16 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; few fine roots; medium acid; clear wavy boundary.

C2--16 to 31 inches; strong brown (7.5YR 5/6) fine sand; few fine distinct dark yellowish brown (10YR 4/4) mottles; single grained; loose; few medium brownish yellow (10YR 6/8) weakly cemented concretions; medium acid; clear wavy boundary.

C3--31 to 36 inches; yellow (10YR 7/6) fine sand; single grained; loose; medium acid; gradual wavy boundary.

C4--36 to 47 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; medium acid; clear wavy boundary.

C5--47 to 75 inches; very pale brown (10YR 7/4) fine sand; few medium distinct brownish yellow (10YR 6/8) mottles; single grained; loose; medium acid; clear wavy boundary.

C6--75 to 85 inches; light yellowish brown (10YR 6/4) fine sand; single grained; loose; slightly acid.

Range in Characteristics: The sandy horizons range from 60 to 80 inches or more in depth. The soil is medium acid or slightly acid throughout the profile.

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

The C1, C2, and C3 horizons have hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 6. The lower part of the C horizon has hue of 10YR, value of 6 to 8, and chroma of 3 or 4. Texture is fine sand or loamy fine sand in the upper part and fine sand or sand in the lower part.

The Woodington series consists of poorly drained soil on uplands. This soil formed in moderately coarse textured sediments. Slopes range from 0 to 2 percent.

A typical pedon of Woodington loamy fine sand is 1.8 miles northeast of the intersection of U.S. Highway 258 and State Road 1235, 1.3 miles east of the intersection of U.S. Highway 258 and Paper Company Road, 50 feet north of the road:

Ap--0 to 6 inches; very dark gray (10YR 3/1) loamy fine sand; weak medium granular structure; very friable; common fine roots; strongly acid; clear smooth boundary.

E--6 to 12 inches; grayish brown (10YR 5/2) loamy fine sand; weak medium granular structure; very friable; common fine roots; strongly acid; gradual wavy boundary.

Btg1--12 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few patchy clay films on sand grains; very strongly acid; gradual wavy boundary.

Btg2--30 to 50 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; very strongly acid; gradual wavy boundary.

BCg--50 to 65 inches; gray (10YR 6/1) fine sandy loam with strata of loamy sand and sandy clay loam; few fine prominent strong brown (7.5YR 5/8), few fine distinct brownish yellow (10YR 6/6), and few medium distinct brown (7.5YR 5/2) mottles; massive; friable, slightly sticky; very strongly acid; gradual wavy boundary.

Cg--65 to 80 inches; light gray (10YR 7/2) sandy loam with strata of sandy clay loam; few fine prominent strong brown (7.5YR 5/8) and common medium distinct brown (7.5YR 5/2) mottles; massive; friable, slightly sticky; very strongly acid.

Range in Characteristics: The sandy and loamy horizons extend to a depth of 60 inches or more. The soil ranges from extremely acid to strongly acid throughout the profile.

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

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The E horizon is fine sandy loam, loamy fine sand, or sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2 with yellowish brown, brownish yellow, and strong brown mottles. It is fine sandy loam or sandy loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2 with pale brown, pale yellow, brownish yellow, brown, or strong brown mottles. Texture is sandy loam, sandy clay loam, loamy sand, or sand.

The Yaupon series consists of somewhat poorly drained to moderately well drained soil material near the edges of the Intracoastal Waterway. This soil formed in fine textured soil material deposited by dredging operations. Slopes range from 0 to 3 percent.

A typical pedon of Yaupon fine sandy loam, 0 to 3 percent slopes, is 0.5 mile east of Thomas Landing, 1.3 miles southwest of the bridge over Highway 210 and the Intracoastal Waterway at end of dredge spoil island near the channel of the waterway:

A1--0 to 1 inch; dark gray (10YR 4/1) fine sandy loam; weak medium granular structure; very friable; few fine roots; very strongly acid; abrupt smooth boundary.

A2--1 inch to 3 inches; light yellowish brown (10YR 6/4) fine sandy loam; massive; single grained; few fine roots; very strongly acid; clear smooth boundary.

Cg1--3 to 45 inches; gray (N/5) clay; few medium distinct brownish yellow (10YR 6/8) mottles; massive; very firm, very sticky, very plastic; few small shells; medium acid; clear smooth boundary.

Cg2--45 to 78 inches; greenish gray (5GY 5/1) sandy clay; few medium distinct olive yellow (2.5Y 6/8) mottles; massive; firm, very sticky, very plastic; neutral; clear smooth boundary.

Cg3--78 to 85 inches; very dark gray (5G 3/1) fine sandy loam; massive; very friable; neutral.

Range in Characteristics: Thickness of the dredge spoil soil material ranges from 20 to 80 inches or more. Cracks open at the surface as a result of shrinkage. The cracks range from 15 to 35 inches apart, 2 to 8 inches wide, about 30 inches deep, and are commonly filled with fine sand or silt loam. The soil ranges from very strongly acid to medium acid in the surface layer unless the surface has been limed. It ranges from very strongly acid to moderately alkaline in the underlying material. There are few to common small shells and fragments of shells in most layers. The gley color is not indicative of the present drainage but of the condition of the original sediments.

The A horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 4.

The C horizon has hue of 10YR to 5G or 5B, value of 3 to 6, and chroma of 1 to 8, or neutral. It is fine sandy loam, sandy clay, clay loam, silty clay, or clay. The 10 to 40 inch control section averages from 35 to 60 percent clay and from 15 to 65 percent silt. The underlying buried material is variable in color and texture.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (11). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in $T3sol$T1. An example is Entisol.

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

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

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological

activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Factors of soil formation

Soil is the product of the combined effects of plants and animals, climate, parent material, relief, and time. These five factors determine the characteristics of the soil in any of the natural soil bodies. These five factors interact in a dynamic relationship through a variety of processes. The processes of soil formation include: (1) additions of organic and mineral material to the soil as solids, liquids, and gasses; (2) losses of this material from the soil; (3) translocation of material from one point to another within the soil; and (4) transformation of material and organic substances within the soil (7).

The net results of the dynamic interaction of these five soil forming factors change across the landscape and through time. That is why soils can be so very different from place to place.

Plant and animal life

Plants and animals determine the kind and thickness of organic matter that forms and the way it is incorporated into the soil. Pine forests cover most of the dissected uplands in Camp Lejeune. Pond pine and shrubs cover the undissected interstream areas. Cypress, sweetgum, red maple, swamp tupelo, bay, black willow, swamp chestnut oak, Carolina ash, and other hardwoods are predominant on the flood plain above 5 feet in elevation. Marsh grass and a few cypress trees cover the flood plains in lower-lying areas and the tidal marshes.

Roots take up nutrients from the lower horizons, and animals transfer soil particles from one horizon to another. Plants and animals add organic matter, and plant roots increase soil structure and porosity. The organic matter is the energy source for the biological activity in which microorganisms consume oxygen in a saturated A horizon. The microorganisms can reduce the oxygen levels of the ground water and the resultant anaerobic conditions can exist for several days or even weeks. The saturation and anaerobic conditions are responsible for the gray subsoil in the poorly drained soils.

Climate

Climate is a major determinant of the kinds of plants and animals living in and on the soil. The climate of Camp Lejeune is warm and humid. Summers are long and hot, and winters are short and mild. Mild temperatures and abundant rainfall promote rapid decomposition of organic matter, hasten chemical reactions, speed leaching of soluble bases, and increase translocation of the less soluble fine particles in the soil profile.

Consequently, the soils, except for those that formed in marl, are acid, strongly leached, and low in natural fertility. In general the soils have a higher content of clay in the B horizon than in the A or C horizon.

Parent material

Parent material has been an important factor in the formation of the soils of Camp Lejeune. Characteristics such as thickness and texture of horizons, mineralogy, and the chemistry of the soil are strongly influenced by the parent material.

The soils in Camp Lejeune formed in (1) surficial sediment of the Wicomico, Talbot, and Pamlico marine terraces, (2) alluvium recently deposited in drainageways, and (3) accumulation of organic material on the broad, undissected interstream areas.

Many differences in the soils of Camp Lejeune are attributed to differences in the parent material from which the soils were formed.

Bohicket, Craven, Lenoir, and Yaupon soils formed in sediment that have a high percentage of clay and silt.

Goldsboro, Lynchburg, Marvyn, Norfolk, Onslow, Pantego, and Rains soils formed in sediments that have a relatively low percentage of silt and sand, with moderate amounts of clay.

Alpin, Corolla, Duckston, Kureb, Leon, Murville, Newhan, Pactolus, and Wando soils formed in sediment consisting of nearly all sand.

Baymeade, Foreston, Muckalee, Stallings, Torhunta, and Woodington soils formed in sediments that have a relatively high percentage of sand and low to moderate amounts of clay.

Muckalee soil formed in non-acid sediments that have a high content of calcium carbonate, and as a result, this soil has a high base saturation.

Masontown, Croatan, Dorovan, and Lafitte soils formed in a thick accumulation of organic matter.

Bohicket, a mineral soil, and Lafitte, a muck soil, formed in parent material flooded by tides. These tidal marsh soils are usually alkaline and always wet.

Relief

The relief in Camp Lejeune is largely the result of the dissection of about two-thirds of the original, nearly level plains by the New River and White Oak River, their tributaries, and the Atlantic Ocean drainageways. Dissection of the landscape affects the formation of soils by influencing the depth of the water table and the geologic removal of soil material by slope retreat.

Near the short, sharply rounded side slopes, the soils have a deep water table, a light-colored A horizon, a thick E horizon, and a bright colored B horizon. The soils in these areas are the Baymeade, Craven, Goldsboro, Foreston, Marvyn, Norfolk, and Onslow.

The soils in the smooth, broad, nearly level interstream areas have a shallow water table, a dark colored A horizon, a thin E horizon, and a gray Bt horizon with lenses of bodies low in clay content. The soils in these areas are Lenoir, Lynchburg, Pantego, Rains, Stallings, Torhunta, and Woodington.

The large interstream areas have an accumulation of organic matter in the less dissected parts. The rainfall exceeds both evapotranspiration and the slow overland flow of water to the shallow streams nearby. The major soil is Croatan muck.

Time

The horizons in a profile take a long time to develop. Relief changes with time. Some of the differences in the soils in Camp Lejeune reflect a difference in age and changes in relief because of natural or geologic erosion. The older soils, for example, Alpin, Baymeade, Norfolk, Goldsboro, and Rains soils on the more stable, nearly level upland divides have well developed horizons and thick profiles. By contrast, younger soils such as Muckalee have almost no horizon development because of recent flood plain sediments. Marvyn and Craven soils have well developed horizons because they developed in older more weathered sediments, but thin profiles as a result of slope retreat.

References

1. American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

2. American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. In 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

3. Daniels, R. B., E. E. Gamble, W. H. Wheeler, J. W. Gilliam, E. H. Wiser, C. W. Welby. 1978. Water Movement in Surficial Coastal Plain Sediments, Inferred from Sediment Morphology. North Carolina Agricultural Experiment Station, North Carolina State University at Raleigh, Publ., p. 31, illus.

4. Dolan, R. and L. Vincent. 1970. Shoreline changes along the Outer Banks of North Carolina. U.S. Department of the Interior, Technical Report 70-5.

5. Lacey, R. M. and W. D. Severinghaus. 1981. Natural Resource Considerations for Tactical Vehicle Training Areas. U.S. Army Corps of Engineers - Construction Engineering Research Laboratory, Publ., pp. 38-46.

6. Marine Corps Base and the Onslow County Soil and Water Conservation District. 1975. Natural Resource Management Plan - Camp Lejeune, North Carolina. USDA - Soil Conservation Service, Publ., 344, pp., illus.

7. Simonson, Roy W. 1959. Outline of a generalized theory of soil genesis. Soil Science Society. Am. Proc. 23: 152-156, illus.

8. Soil Survey Staff. 1978. Guide for Interpretation of Soils. USDA - Soil Conservation Service, Publ., pp. 56.

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

10. United State Department of Agriculture. 1965. Silvies of forest trees of the United States. U.S. Dept. Agric. Handb 271, 762 pp., illus.

11. United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil-Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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 - 9 to 12

Very high - more than 12

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

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

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

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

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse-grained soil. Soils in which at least 50 percent of the soil material is coarser that very fine sand.

Coarse textured soil. Sand or loamy sand.

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 ironoxide 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 difficulty between thumb and forefinger.

Soft.--When dry, breaks into powder or individual grains under very slight pressure.

Cemented.--Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.--Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.--Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.--Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.--Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.--Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.--Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.--Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or in layers that blanket the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess humus (in tables). Excess decomposed organic materials in the soil that restrict construction or trafficability because of low strength and high compressability.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). 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.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water had drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

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. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers of lower case letter that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the Soil Survey Manual. The major horizons of mineral soil are as follows:

O horizon.--An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.--The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.--The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.--The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.--The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.--Consolidated rock 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.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential.

They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2 - very low

0.2 to 0.4 - low

0.4 to 0.75 - moderately low

0.75 to 1.25 - moderate

1.25 to 1.75 - moderately high

1.75 to 2.5 - high

More than 2.5 - very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are--

Sprinkler.--Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Lamellae. Very thin, mostly horizontal layers of clay accumulation common in some sands or loamy sands; associated with soil development, not geologic deposition. Used in Soil Taxonomy to classify some soils in which they occur.

Leaching. The removal of soluble material from soil or other material by percolating water.

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

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables--hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, bronze, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow - less than 0.06 inch

Slow - 0.06 to 0.2 inch

Moderately slow - 0.2 to 0.6 inch

Moderate - 0.6 inch to 2.0 inches

Moderately rapid - 2.0 to 6.0 inches

Rapid - 6.0 to 20 inches

Very rapid - more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

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

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. $T2The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical, 2-dimensional crossection of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure 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

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

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

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

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

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

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil blowing (in tables). Soil that is highly susceptible to movement by wind when vegetation is removed and the soil is exposed.

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:

Millimeters

Very coarse sand - 2.0 to 1.0

Coarse sand - 1.0 to 0.5

Medium sand - 0.5 to 0.25

Fine sand - 0.25 to 0.10

Very fine sand - 0.10 to 0.05

Silt - 0.05 to 0.002

Clay - less than 0.002

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are--platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsides (in tables). A term applied to soils that experience a pronounced reduction in volume when drained due to the removal of water, shrinkage of organic materials, and the oxidation of organic compounds. Usually associated with soils having a high organic matter content.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

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

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The quality of a soil to permit passage of vehicles or troops.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

(Data were recorded in the period 1951-79 at Maysville, NC)

Month	Temperature					Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than	2 years in 10 will have-- Minimum temperature lower than	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than	2 years in 10 will have-- More than	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	56.3	31.0	43.7	78	9	69	4.10	2.36	5.64	8	1.2
February	58.3	32.2	45.3	79	9	55	4.01	2.38	5.46	7	.8
March	65.5	38.3	51.9	85	18	155	3.96	2.37	5.38	8	.5
April	74.7	46.0	60.4	90	25	312	3.11	1.66	4.36	5	.0
May	80.8	54.5	67.7	95	32	549	4.80	3.23	6.24	8	.0
June	85.5	61.7	73.6	97	42	708	6.00	3.18	8.47	8	.0
July	88.6	66.4	77.5	97	51	853	7.01	4.64	9.17	10	.0
August	87.9	65.7	76.8	97	50	831	6.87	4.03	9.39	9	.0
September	83.8	59.9	71.9	93	39	657	5.96	2.80	8.67	7	.0
October	75.2	48.9	62.1	88	23	381	3.34	1.30	5.04	5	.0
November	67.4	39.3	53.4	83	17	147	3.11	1.58	4.43	5	.0
December	59.1	32.8	46.0	78	10	85	3.69	1.91	5.23	6	.4
Yearly:											
Average	73.6	48.1	60.9	---	---	---	---	---	---	---	---
Extreme	---	---	---	98	6	---	---	---	---	---	---
Total	---	---	---	---	---	4,802	55.96	47.23	64.30	86	2.9

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Data were recorded in the period 1951-79 at Maysville, NC)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 14	April 26	May 7
2 years in 10 later than--	April 6	April 20	May 2
5 years in 10 later than--	March 23	April 8	April 22
First freezing temperature in fall:			
1 year in 10 earlier than--	October 25	October 19	October 8
2 years in 10 earlier than--	November 1	October 24	October 13
5 years in 10 earlier than--	November 14	November 5	October 24

TABLE 3.--GROWING SEASON LENGTH

(Data were recorded in the period 1951-79 at Maysville, NC)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	201	179	162
8 years in 10	212	190	170
5 years in 10	235	210	184
2 years in 10	257	231	198
1 year in 10	269	242	205

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

Map symbol	Soil name	Acres	Percent
AnB	Alpin fine sand, 1 to 6 percent slopes	1,090	1.3
BmB	Baymeade fine sand, 0 to 6 percent slopes	21,295	24.7
BaB	Baymeade-Urban land complex, 0 to 6 percent slopes	4,783	5.6
Bo	Bohicket silty clay loam	1,998	2.3
Co	Corolla fine sand	121	0.1
CrB	Craven fine sandy loam 1 to 4 percent slopes	182	0.2
CrC	Craven fine sandy loam, 4 to 8 percent slopes	202	0.2
Ct	Croatan muck	747	0.9
Da	Dorovan muck	1,150	1.3
Dc	Duckston fine sand	202	0.2
FoA	Foreston loamy fine sand, 0 to 2 percent slopes	908	1.0
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	545	0.6
GpB	Goldsboro-Urban land complex, 0 to 5 percent slopes	969	1.1
KuB	Kureb fine sand, 1 to 6 percent slopes	4,360	5.1
La	Lafitte muck	40	0.05
Le	Lenoir loam	40	0.05
Ln	Leon fine sand	7,650	8.9
Ly	Lynchburg fine sandy loam	141	0.2
MaC	Marvyn loamy fine sand, 6 to 15 percent slopes	8,820	10.3
Mk	Muckalee loam	4,400	5.2
Mu	Murville fine sand	3,472	4.0
NeE	Newhan fine sand, 0 to 30 percent slopes	1,433	1.6
NfC	Newhan fine sand, dredged, 2 to 10 percent slopes	606	0.7
NoA	Norfolk loamy fine sand, 0 to 2 percent slopes	101	0.1
NoB	Norfolk loamy fine sand, 2 to 6 percent slopes	868	1.0
On	Onslow loamy fine sand	6,903	8.0
Pa	Pactolus fine sand	1,776	2.1
Pn	Pantego mucky loam	161	0.2
Pt	Pits	363	0.4
Ra	Rains fine sandy loam	686	0.8
St	Stallings loamy fine sand	1,211	1.4
To	Torhunta fine sandy loam	1,655	1.9
Ud	Udorthents, loamy	654	0.7
Ur	Urban land	969	1.1
WaB	Wando fine sand, 1 to 6 persent slopes	4,622	5.4
Wo	Woodington loamy fine sand	989	1.1
YaA	Yaupon fine sandy loam, 0 to 3 percent slopes	61	0.1
	Total Land Area	86,173	100.0
	Water	75	
	Total Area	86,248	

TABLE 5--OFF ROAD MANEUVERS--LIMITATIONS OF SOILS FOR TRAVERSE BY:

Soil name and map symbol	Track and heavy wheeled vehicles	Light wheeled vehicles	Foot traffic
AnB Alpin	Slight:	Severe: too sandy, (poor traction)	Moderate: too sandy.
BaB, BmB Baymeade	Slight:	Moderate: too sandy, (poor traction)	Moderate: too sandy.
Bo Bohicket	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, too clayey.
Co Corolla	Moderate: wetness, too sandy.	Moderate: too sandy, wetness.	Severe: too sandy.
CrB, CrC Craven	(Dry) Slight: (Wet) Severe: low strength, too clayey.	(Dry) Slight (Wet) Severe: low strength, too clayey.	(Dry) Slight:---- (Wet) Slight:----
Ct Croatan	Severe: wetness, ponding, excess humus, low strength.	Severe: wetness, ponding, excess humus, low strength.	Severe: wetness, ponding, excess humus.
Da Dorovan	Severe: wetness, ponding, excess humus, low strength.	Severe: wetness, ponding, excess humus, low strength.	Severe: wetness, ponding, excess humus.
Dc Duckston	Moderate: wetness, floods.	Moderate: wetness, floods.	Severe: wetness, floods.
FoA Foreston	(Dry) Slight: (Wet) Slight:	(Dry) Slight: (Wet) Moderate: excess fines.	(Dry) Slight:---- (Wet) Slight:----
GoA, GpB Goldsboro	(Dry) Slight: (Wet) Severe: excess fines, (lower bearing strength).	(Dry) Slight: (Wet) Severe: excess fines, (lower bearing strength).	(Dry) Slight:---- (Wet) Slight:----
KuB Kureb	Moderate: too sandy, (poor traction).	Severe: too sandy, (poor traction).	Severe: too sandy, (poor traction).
La Lafitte	Severe: wetness, floods, excess humus, low strength.	Severe: wetness, floods, excess humus, low strength.	Severe: wetness, floods, excess humus.

TABLE 5--OFF ROAD MANEUVERS--LIMITATIONS OF SOILS FOR TRAVERSE BY:

Soil name and map symbol	Track and heavy wheeled vehicles	Light wheeled vehicles	Foot traffic
Le Lenoir	Severe: wetness, too clayey, low strength.	Severe: wetness, too clayey, low strength.	Moderate: wetness, ponding.
Ln Leon	Moderate: too sandy, wetness.	Severe: too sandy, wetness.	Moderate: wetness, too sandy.
Ly Lynchburg	Moderate: wetness, excess fines.	Severe: wetness, excess fines.	Moderate: wetness.
MaC Marvyn	Slight	Slight	Slight
Mk Muckalee	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
Mu Murville	Severe: wetness, ponding, excess. humus.	Severe: wetness, ponding, excess humus.	Severe: wetness, ponding, very dense vegetation.
NeE, NfC Newhan	Severe: too sandy (poor traction), slopes.	Severe: too sandy (poor traction), slopes.	Severe: too sandy.
NoA, NoB Norfolk	(Dry) Slight: (Wet) Moderate: excess fines (lower bearing strength).	(Dry) Slight: (Wet) Moderate: excess fines (lower bearing strength).	(Dry) Slight: (Wet) Slight:
On Onslow	(Dry) Slight: (Wet) Severe: excess fines (lower bearing strength).	(Dry) Slight: (Wet) Severe: excess fines (lower bearing strength).	(Dry) Slight: (Wet) Slight:
Pa Pactolus	Slight	Severe: too sandy (poor traction).	Moderate: too sandy.
Pn Pantego	Severe: wetness, ponding, excess humus.	Severe: wetness, ponding, excess humus.	Severe: wetness, ponding, excess, humus, dense vegetation.
Pt Pits*			

TABLE 5--OFF ROAD MANEUVERS--LIMITATIONS OF SOILS FOR TRAVERSE BY:

Soil name and map symbol	Track and heavy wheeled vehicles	Light wheeled vehicles	Foot traffic
Ra Rains	Severe: wetness, ponding, excess fines.	Severe: wetness, ponding, excess fines.	Severe: wetness, ponding.
St Stallings	Slight	Moderate: wetness, excess fines.	Moderate: wetness.
To Torhunta	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
Ud Udorthents*			
Ur Urban*			
WaB Wando	Slight	Severe: too sandy (poor traction).	Moderate: too sandy.
Wo Woodington	Moderate: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding.
YaA Yaupon	Moderate: wetness, low strength.	Severe: wetness, low strength.	Moderate: wetness.

*These units were not rated for any use and require on-site investigations. Refer to mapping unit descriptions for more detailed information.

TABLE 6--OFF ROAD MANEUVERS - LIMITATIONS OF SOILS FOR BIVOUAC SITES

Soil name and may sybmol	Temporary tent sites	Temporary on-site waste disposal	Temporary shallow excavations	Temporary recreation area
AnB Alpin	Slight:	Slight:	Moderate: cutbanks cave.	Moderate: too sandy.
BaB, BmB Baymeade	Slight:	Slight:	Moderate: cutbanks cave.	Moderate: too sandy.
Bo Bohicket	Severe: floods, wetness, too clayey.	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.
Co Corolla	Slight:	Severe: wetness.	Severe: cutbanks cave, wetness.	Moderate: too sandy.
CrB, CrC Craven	Slight:	Moderate: wetness, percs slowly.	Moderate: wetness.	Slight:
Ct Croatan	Severe: excess humus, wetness, ponding.	Severe: wetness, ponding, excess humus.	Severe: wetness.	Severe: excess humus, wetness, ponding.
Da Dorovan	Severe: floods, excess humus, wetness.	Severe: wetness, floods, excess humus.	Severe: floods, wetness.	Severe: excess humus, floods, wetness.
Dc Duckston	Severe: floods, wetness.	Severe: wetness, floods.	Severe: cutbanks cave, floods, wetness.	Moderate: floods, wetness, too sandy.
FoA Foreston	Slight:	Moderate: wetness.	Moderate: cutbanks cave.	Slight:
GoA, GpB Goldsboro	Slight:	Moderate: wetness.	Moderate: wetness.	Slight:
KuB Kureb	Slight:	Slight:	Severe: cutbanks cave.	Severe: too sandy.
La Lafitte	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.
Le Lenoir	Severe: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Ln Leon	Moderate: wetness.	Severe: wetness, hard pan.	Severe: wetness, cutbanks cave, hardpan.	Moderate: wetness, too sandy.
Ly Lynchburg	Severe: wetness, dense vegetation.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, dense vegetation.

TABLE 6--OFF ROAD MANEUVERS - LIMITATIONS OF SOILS FOR BIVOUAC SITES

Soil name and may sybmol	Temporary tent sites	Temporary on-site waste disposal	Temporary shallow excavations	Temporary recreation area
MaC Marvyn	Moderate: slope.	Slight:	Slight:	Moderate: slope.
Mk Muckalee	Severe: floods, wetness, dense vegetation.	Severe: floods, wetness.	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness, dense vegetation.
Mu Murville	Severe: wetness, ponding, excess humus, dense vegetation.	Severe: excess humus, wetness, ponding.	Severe: wetness, ponding, cutbanks cave.	Severe: wetness, ponding, dense vegetation.
NeE, NfC Newhan	Severe: slope.	Severe: slope.	Severe: cutbanks cave.	Severe: too sandy, slope.
NoA, NoB Norfolk	Slight:	Slight:	Slight:	Slight:
On Onslow	Slight:	Moderate: wetness.	Moderate: wetness.	Slight:
Pa Pactolus	Slight:	Moderate: wetness.	Moderate: cutbanks cave, wetness.	Slight:
Pn Pantego	Severe: wetness, ponding, dense vegetation.	Severe: wetness, ponding.	Severe: wetness, ponding.	Severe: wetness, ponding, dense vegetation.
Pt Pits (See map unit)				
Ra Rains	Severe: wetness, ponding, dense vegetation.	Severe: wetness, ponding.	Severe: wetness, ponding.	Moderate: wetness, ponding, dense vegetation.
St Stallings	Moderate: wetness, dense vegetation.	Severe: wetness.	Moderate: wetness, cutbanks cave.	Moderate: wetness, dense vegetation.
To Torhunta	Severe: wetness, ponding, dense vegetation.	Severe: wetness, ponding.	Severe: wetness, ponding, cutbanks cave.	Severe: wetness, ponding, dense vegetation.
Ud Udorthents (See map unit)				

TABLE 6--OFF ROAD MANEUVERS - LIMITATIONS OF SOILS FOR BIVOUAC SITES

Soil name and may sybmol	Temporary tent sites	Temporary on-site waste disposal	Temporary shallow excavations	Temporary recreation area
Ur Urban (See map unit)				
WaB Wando	Slight:	Slight:	Moderate: cutbanks cave.	Moderate: too sandy.
Wo Woodington	Severe: wetness, dense vegetation.	Severe: wetness.	Severe: wetness, cutbanks cave.	Moderate: wetness, dense vegetation.
YaA Yaupon	Moderate: wetness, dense vegetation.	Severe: percs slowly, wetness.	Severe: too clayey, wetness.	Moderate: too clayey, wetness, dense vegetation.

TABLE 7--OFF ROAD MANEUVERS--POSSIBLE DAMAGE TO SOILS AND VEGETATION

Soil name and map sybmol	Soils: Track and heavy wheeled vehicles.	Soils: Light wheeled vehicles	Vegetation: Track and heavy wheeled vehicles	Vegetation: Light wheeled vehicles
AnB Alpin	Moderate: large deep holes, erosion in trails.	Slight	Moderate: crushes sparse woody vegetation.	Moderate: bends sparse woody vegetation.
BaB, BmB Baymeade	Moderate: large deep holes, erosion in trails,	Slight	Moderate: crushes sparse woody vegetation.	Moderate: bends sparse woody vegetation.
Bo Bohicket	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes grassy vegetation, breaks roots in ruts.	Severe: bends grassy vegetation, breaks roots in ruts.
Co Corolla	Moderate: large deep holes.	Slight	Severe: crushes sparse woody vegetation.	Moderate: bends sparse woody vegetation.
CrB, CrC Craven	(Dry) Moderate: compaction. (Wet) Severe: rutting, erosion in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Severe: rutting, erosion in ruts, compaction.	Severe: crushes woody vegetation and breaks roots in ruts.	Moderate: bends woody vegetation and breaks roots in ruts.
Ct Croatan	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes very dense woody vegetation, breaks roots in ruts.	Moderate: bends very dense woody vegetation, breaks roots in ruts.
Da Dorovan	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes very dense woody vegetation, breaks roots in ruts.	Moderate: bends very dense woody vegetation, breaks roots in ruts.
Dc Duckston	Moderate: large holes.	Slight	Moderate: crushes grassy vegetation.	Moderate: bends grassy vegetation.
FoA Foreston	(Dry) Moderate: compaction. (Wet) Moderate: rutting, erosion in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Moderate: rutting, erosion in ruts, compaction.	Severe: crushes woody vegetation.	Moderate: bends woody vegetation.
GoA, GpB Goldsboro	(Dry) Moderate: compaction. (Wet) Severe: rutting, erosion in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Severe: rutting, erosion in ruts, compaction.	Severe: crushes woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.
KuB Kureb	Moderate: large deep holes, erosion in trails.	Slight	Slight	Slight

TABLE 7--OFF ROAD MANEUVERS--POSSIBLE DAMAGE TO SOILS AND VEGETATION

Soil name and map sybmol	Soils: Track and heavy wheeled vehicles.	Soils: Light wheeled vehicles	Vegetation: Track and heavy wheeled vehicles	Vegetation: Light wheeled vehicles
La Lafitte	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes grassy vegetation, breaks roots in ruts.	Moderate: bends grassy vegetation, breaks roots in ruts.
Le Lenoir *Limited extent only located in airfield area.	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes grass.	Moderate: crushes grass.
Ln Leon	Severe: large deep holes.	Severe: large deep holes.	Severe: crushes sparse grassy vegetation.	Moderate: crushes sparse grassy vegetation.
Ly Lynchburg	Severe: rutting, compaction.	Severe: rutting, compaction.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends dense woody vegetation, breaks roots in ruts.
MaC Marvyn	(Dry) Moderate: compaction. (Wet) Severe: rutting, gullying in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Severe: rutting, gullying in ruts, compaction.	Severe: crushes woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.
Mk Muckalee	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.
Mu Murville	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes very dense woody vegetation.	Severe: breaks vegetation and roots in ruts.
NeE, NfC Newhan	Severe: increases wind erosion.	Slight:	Slight:	Slight:
NoA, NoB Norfolk	(Dry) Moderate: compaction. (Wet) Severe: deep rutting, erosion in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Severe: deep rutting, erosion in ruts, compaction.	Severe: crushes woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.
On Onslow	(Dry) Moderate: compaction. (Wet) Severe: rutting, compaction.	(Dry) Moderate: compaction. (Wet) Severe: rutting, compaction.	Severe: crushes woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.
Pa Pactolus	Severe: large deep holes, erosion in trails.	Slight:	Severe: crushes woody vegetation, breaks roots in ruts.	Moderate: bends woody vegetation, breaks roots in ruts.

TABLE 7--OFF ROAD MANEUVERS--POSSIBLE DAMAGE TO SOILS AND VEGETATION

Soil name and map sybmol	Soils: Track and heavy wheeled vehicles.	Soils: Light wheeled vehicles	Vegetation: Track and heavy wheeled vehicles	Vegetation: Light wheeled vehicles
Pn Pantego	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Severe: bends dense woody vegetation, breaks roots in ruts.
Pt Pits (See map unit)				
Ra Rains	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends dense woody vegetation, breaks roots in ruts.
St Stallings	Severe: rutting, compaction.	Severe: rutting, compaction.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends dense woody vegetation, breaks roots in ruts.
To Torhunta	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Severe: bends dense woody vegetation, breaks roots in ruts.
Ud Udorthents (See map unit)				
Ur Urban (See map unit)				
WaB Wando	Moderate: large deep holes, erosion in trails.	Slight:	Slight:	Slight:
Wo Woodington	Severe: deep rutting.	Severe: deep rutting.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends dense woody vegetation, breaks roots in ruts.
YaA Yaupon	(Dry) Moderate: compaction. (Wet) Severe: deep rutting, erosion in ruts, compaction.	(Dry) Moderate: compaction. (Wet) Severe: deep rutting, erosion in ruts, compaction.	Severe: crushes dense woody vegetation, breaks roots in ruts.	Moderate: bends dense woody vegetation, breaks roots in ruts.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation**	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
AnB Alpin	3s	Slight	Slight	Moderate	Loblolly pine	85	Slash pine, loblolly pine.
					Slash pine	90	
					Longleaf pine	70	
					Turkey oak	---	
					Post oak	---	
					Blackjack oak	---	
					Bluejack oak	---	
BmB Baymeade	3s	Slight	Slight	Moderate	Loblolly pine	80	Loblolly pine, slash pine, longleaf pine.
					Slash pine	80	
					Longleaf pine	65	
BaB Baymeade	3s	Slight	Slight	Moderate	Loblolly pine	80	Loblolly pine, slash pine, longleaf pine.
					Slash pine	80	
					Longleaf pine	65	
Urban land.							
CrB, CrC Craven	3w	Slight	Moderate	Slight	Loblolly pine	81	Loblolly pine, slash pine.
					Longleaf pine	67	
					Water oak	---	
					Sweetgum	---	
					White oak	---	
					Southern red oak	---	
					Red maple	---	
Ct Croatan	4w	Slight	Severe	Severe	Pond pine	55	Loblolly pine.
					Water tupelo	60	
					Baldcypress	---	
					Loblolly pine	70	
					Sweetgum	---	
					Swamp tupelo	---	
					Atlantic white-cedar	---	
Da Dorovan	4w	Slight	Severe	Severe	Blackgum	70	Baldcypress.
					Sweetbay	---	
FoA Foreston	2w	Slight	Slight	Slight	Slash pine	90	Slash pine, loblolly pine.
					Loblolly pine	90	
					Longleaf pine	75	
GoA Goldsboro	2w	Slight	Moderate	Slight	Loblolly pine	90	Loblolly pine, slash pine, yellow-poplar, American sycamore, sweetgum.
					Slash pine	93	
					Longleaf pine	77	
					Sweetgum	90	
					Southern red oak	---	
					White oak	---	
GpB* Goldsboro	2w	Slight	Moderate	Slight	Loblolly pine	90	Loblolly pine, slash pine, yellow-poplar, American sycamore, sweetgum.
					Slash pine	93	
					Longleaf pine	77	
					Sweetgum	90	
					Southern red oak	---	
					White oak	---	
Urban land.							

See footnotes at end of table

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation**	Seedling mortality	Common trees	Site index	
KuB---- Kureb	5s	Slight	Moderate	Severe	Longleaf pine	52	Longleaf pine, slash pine.
					Slash pine	---	
					Sand pine	---	
Le---- Lenoir	2w	Slight	Moderate	Moderate	Loblolly pine	90	Loblolly pine, slash pine, longleaf pine, sweetgum, American sycamore.
Ln---- Leon	4w	Slight	Moderate	Moderate	Slash pine	70	Slash pine.
					Longleaf pine	65	
Ly---- Lynchburg	2w	Slight	Moderate	Slight	Slash pine	91	Slash pine, loblolly pine, American sycamore, sweetgum.
					Loblolly pine	86	
					Longleaf pine	74	
					Yellow-poplar	92	
					Sweetgum	90	
					Southern red oak	---	
					White oak	---	
					Blackgum	---	
MaC---- Marvyn	2o	Slight	Slight	Slight	Loblolly pine	90	Loblolly pine.
					Shortleaf pine	80	
					Longleaf pine	80	
Mk---- Muckalee	2w	Slight	Severe	Severe	Sweetgum	90	Sweetgum, loblolly pine, American sycamore, eastern cottonwood, Nuttall oak.
					Loblolly pine	90	
					Slash pine	90	
					Water oak	90	
					Green ash	85	
					Eastern cottonwood	100	
Mu---- Murville	2w	Slight	Severe	Severe	Loblolly pine	75	Loblolly pine, slash pine.
					Slash pine	75	
NoA, NoB---- Norfolk	2o	Slight	Slight	Slight	Loblolly pine	86	Slash pine, loblolly pine.
					Longleaf pine	68	
					Slash pine	86	
On---- Onslow	3o	Slight	Slight	Slight	Loblolly pine	76	Slash pine, loblolly pine.
					Slash pine	80	
					Longleaf pine	67	
Pa---- Pactolus	3w	Slight	Slight	Moderate	Loblolly pine	84	Loblolly pine, slash pine.
					Longleaf pine	70	
					Slash pine	83	

See footnotes at end of table

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation**	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
Pn Pantego	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.
Ra Rains	2w	Slight	Severe	Severe	Loblolly pine Slash pine Sweetgum	94 91 90	Loblolly pine, slash pine, sweetgum, American sycamore.
St Stallings	3w	Slight	Moderate	Slight	Loblolly pine Slash pine Longleaf pine Sweetgum Yellow-poplar Water oak	79 --- --- --- --- ---	Loblolly pine, slash pine, yellow-poplar, American sycamore, sweetgum.
To Torhunta	2w	Slight	Severe	Severe	Loblolly pine Slash pine Sweetgum Water tupelo	90 86 90 ---	Loblolly pine, sweetgum, slash pine, American sycamore, Shumard oak.
WaB Wando	3s	Slight	Slight	Moderate	Longleaf pine Loblolly pine Slash pine	70 80 80	Loblolly pine, longleaf pine, slash pine.
Wo Woodington	3w	Slight	Severe	Severe	Slash pine Loblolly pine Sweetgum White oak Southern red oak Water tupelo	--- 83 --- --- --- ---	Slash pine, loblolly pine, American sycamore, water tupelo, water oak, sweetgum.
YaA Yaupon	3w	Slight	Moderate	Slight	Loblolly pine Longleaf pine Water oak Sweetgum	--- --- --- ---	Loblolly pine, longleaf pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

** Equipment limitations given for some soils in this table are less restrictive than shown on the official series interpretation record. This was done to account for the large and varied kinds of equipment available to resource managers at Camp Lejeune.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AnB Alpin	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
BmB Baymeade	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
BaB*: Baymeade	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate droughty.
Urban land.					
Bo Bohicket	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess salt, flooding.	Severe: ponding, flooding.	Severe: ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Co Corolla	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
CrB Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight
CrC Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Slight	Slight
Ct Croatan	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: too acid, wetness.
Da Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Dc Duckston	Severe: flooding, wetness, too sandy.	Severe: too sandy.	Severe: too sandy, wetness, flooding.	Severe: too sandy.	Severe: droughty, flooding.
FoA Foreston	Slight	Slight	Slight	Slight	Moderate: droughty.
GoA Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight

See footnote at end of table

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GpB*: Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight
Urban land.					
KuB Kureb	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
La Lafitte	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, ponding, flooding.
Le Lenoir	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ln Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
Ly Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MaC Marvyn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Mk Muckalee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Mu Murville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NeE Newhan	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
NfC Newhan	Severe: too sandy	Severe: too sandy.	Severe: too sandy	Severe: too sandy	Severe: droughty
NoA Norfolk	Slight	Slight	Slight	Slight	Slight
NoB Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight
On Onslow	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pa Pactolus	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: too sandy.	Moderate: too sandy.
Pn Pantego	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
St Stallings	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
To Torhunta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
WaB Wando	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
Wo Woodington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
YaA Yaupon	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight

* See description of the map unit for composition and behavior characteristics of the map unit.
** Reaction ratings given for some soils in this table are less restrictive than shown on the official soil series interpretation record. This was done to account for the low intensity and intermittent nature of recreational activities at Camp Lejeune.

TABLE 10.-WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that 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
AnB--Alpin	Poor	Fair	Fair	Poor	Fair	Very poor	Very poor	Fair	Fair	Very poor
BmB--Baymeade	Poor	Fair	Fair	Poor	Fair	Very poor	Very poor	Fair	Fair	Very poor
BaB--Baymeade	Poor	Fair	Fair	Poor	Fair	Very poor	Very poor	Fair	Fair	Very poor
Urban land.										
Bo--Bohicket	Very poor	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
Co--Corolla	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Very poor
CrB--Craven	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CrC--Craven	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Ct--Croatan	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Da--Dorovan	Very poor	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
Dc--Duckston	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	Fair	Very poor	Very poor	Poor
FoA--Foreston	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
GoA--Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
CpB*:										
Goldsboro	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Urban land.										
KuB--Kureb	Very poor	Poor	Poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor

See footnote at end of table

TABLE 10.-WILDLIFE HABITAT--Continued

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that 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
La-Lafitte	Very poor	Very poor	Very poor	Very poor	Very poor	Good	Very poor	Very poor	Very poor	Good
Le-Lenoir	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Ln-Leon	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor
Ly-Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
MaC-Marvyn	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Mk-Muckalee	Poor	Poor	Fair	Good	Fair	Good	Fair	Poor	Fair	Fair
Mu-Murville	Very poor	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair
NeE, NfC-Newhan	Very poor	Poor	Poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor
NoA, NoB-Norfolk	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
On-Onslow	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Pa-Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Pn-Pantego	Poor	Poor	Fair	Good	Good	Good	Good	Poor	Fair	Fair
Ra-Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Fair
St-Stallings	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Very poor
To-Torhunta	Poor	Poor	Fair	Good	Good	Good	Good	Poor	Fair	Fair

See footnote at end of table

TABLE 10.-WILDLIFE HABITAT--Continued

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that 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
WaB---------- Wando	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Wo---------- Woodington	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Fair
YaA---------- Yaupon	Good	Good	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.-BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AnB Alpin	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
BmB Baymeade	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
BaB*: Baymeade	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
Urban land.						
Bo Bohicket	Severe: wetness, flooding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding; ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Co Corolla	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, wetness.	Severe: droughty.
CrB Craven	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight
CrC Craven	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight
Ct Croatan	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness.	Severe: too acid, wetness.
Da Dorovan	Severe: excess humus, flooding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
Duckston	cutbanks cave, wetness.	flooding, wetness.	flooding, wetness.	flooding, wetness.	flooding.	droughty, flooding.
FoA Foreston	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
GoA Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight

See footnote at end of table

TABLE 11.-BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GpB*: Goldsboro Urban land.	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight
KuB Kureb	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
La Lafitte	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: excess salt, ponding, flooding.
Le Lenoir	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Ln Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Ly Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MaC Marvyn	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.	Moderate: slope.
Mk Muckalee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Mu Murville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NeE Newhan	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
NfC Newhan	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: slope.	Severe: droughty.
NoA Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight
NoB Norfolk	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight
On Onslow	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table

TABLE 11.-BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pa Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Pn Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
St Stallings	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
To Torhunta	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
WaB Wando	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Wo Woodington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
YaA Yaupon	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Slight

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.-SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields**	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AnB Alpin	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
BmB Baymeade	Slight	Severe: Seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BaB*: Baymeade	Slight	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land.					
Bo Bohicket	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
Co Corolla	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: seepage, too sandy.
CrB, CrC Craven	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Ct Croatan	Severe: wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, thin layer.
Da Dorovan	Severe: flooding, ponding, poor filter.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.
Dc Duckston	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, too sandy.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
FoA Foreston	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness.

See footnote at end of table

TABLE 12.-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
GoA Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
GpB*: Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Urban land.					
KuB Kureb	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
La Lafitte	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
Le Lenoir	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ln Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Ly Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
MaC Marvyn	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Mk Muckalee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Mu Murville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
NeE Newhan	Severe: poor filter, slope.	Severe: seepage, flooding, slope.	Severe: slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
NfC Newhan	Severe: poor filter.	Severe: seepage, flooding.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
NoA, NoB Norfolk	Moderate: wetness.	Moderate: seepage.	Slight	Slight	Slight

See footnote at end of table

TABLE 12.-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
On Onslow	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
Pa Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
Pn Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ra Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
St Stallings	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: thin layer.
To Torhunta	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
WaB Wando	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Wo Woodington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
YaA Yaupon	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Sanitary facility ratings given for some soils in this table are less restrictive than shown on the official soil series interpretation record. This was done to account for the intermittent nature of waste disposal during military training operations.

TABLE 13.-CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AnB Alpin	Good	Probable	Improbable: too sandy.	Poor: too sandy.
BmB Baymeade	Good	Probable	Improbable: too sandy.	Poor: too sandy.
BaB*: Baymeade Urban land.	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Bo Bohicket	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
Co Corolla	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
CrB, CrC Craven	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ct Croatan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
Da Dorovan	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Dc Duckston	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
FoA Foreston	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Good
GoA Goldsboro	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good
GpB*: Goldsboro Urban land.	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good
KuB Kureb	Good	Probable	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table

TABLE 13.-CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
La Lafitte	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
Le Lenoir	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ln Leon	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Ly Lynchburg	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MaC Marvyn	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
Mk Muckalee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Mu Murville	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
NeE Newhan	Fair: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
NfC Newhan	Good	Probable	Improbable: too sandy.	Poor: too sandy.
NoA, NoB Norfolk	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
On Onslow	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Pa Pactolus	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy
Pn Pantego	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ra Rains	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
St Stallings	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
To Torhunta	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.

See footnote at end of table

TABLE 13.-CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WaB Wando	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Wo Woodington	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
YaA Yaupon	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.-WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
AnB Alpin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water.	Droughty, soil blowing.	Droughty.
BmB Baymeade	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water.	Droughty, fast intake, slope.	Droughty.
BaB*: Baymeade	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water.	Droughty, fast intake, slope.	Droughty.
Urban land.						
Bo Bohicket	Slight	Severe: hard to pack, ponding, excess salt.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly	Wetness, excess salt, percs slowly.
Co Corolla	Severe: seepage.	Severe: seepage, wetness, piping.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, droughty, fast intake.	Droughty.
CrB Craven	Slight	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly.	Wetness, percs slowly.	Erodes easily, percs slowly.
CrC Craven	Slight	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, percs slowly.
Ct Croatan	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, subsides.	Wetness, percs slowly.	Wetness, percs slowly.
Da Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding, flooding.	Wetness.
Dc Duckston	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
FoA Foreston	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, droughty, fast intake.	Droughty.
GoA Goldsboro	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable	Wetness.	Favorable

See footnote at end of table

TABLE 14.-WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
GpB*: Goldsboro	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable	Wetness.	Favorable
Urban land.						
KuB Kureb	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water.	Droughty, fast intake, slope.	Droughty.
La Lafitte	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Wetness, excess salt.
Le Lenoir	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly.	Wetness, percs slowly, erodes easily.	Wetness, erodes easily, percs slowly.
Ln Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, droughty, fast intake.	Wetness, droughty.
Ly Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness.	Wetness.
MaC Marvyn	Severe: slope.	Moderate: piping, hard to pack.	Severe: no water.	Deep to water.	Fast intake, slope.	Slope.
Mk Muckalee	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, flooding.	Wetness, droughty.
Mu Murville	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, fast intake.	Wetness.
NeE Newhan	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water.	Droughty, fast intake, slope.	Slope, droughty.
NfC Newhan	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water.	Droughty, fast intake, slope.	Droughty.
NoA Norfolk	Moderate: seepage.	Slight	Severe: deep to water.	Deep to water.	Fast intake.	Favorable
NoB Norfolk	Moderate: seepage.	Slight	Severe: deep to water.	Deep to water.	Slope.	Favorable

See footnote at end of table

TABLE 14.-WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
On Onslow	Moderate: seepage.	Severe: piping, wetness.	Moderate: deep to water.	Favorable	Wetness, fast intake.	Favorable
Pa Pactolus	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, droughty, fast intake.	Droughty.
Pn Pantego	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Favorable	Wetness.	Wetness.
Ra Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness.	Wetness.
St Stallings	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, fast intake.	Wetness.
To Torhunta	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave.	Wetness.	Wetness.
WaB Wando	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water.	Droughty, fast intake, soil blowing.	Droughty.
Wo Woodington	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave.	Wetness, fast intake.	Wetness.
YaA Yaupon	Slight	Severe: hard to pack.	Severe: slow refill.	Percs slowly.	Percs slowly.	Percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.-ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
	—									
AnB----------	0-13	Fine sand---------	SP-SM, SM	A-3, A-2-4	95-100	90-100	60-100	5-20	---	NP
Alpin	13-48	Fine sand, sand	SP-SM	A-3, A-2-4	95-100	90-100	60-100	5-20	---	NP
	48-80	Fine sand, sand	SP-SM, SM	A-2-4	95-100	90-100	60-100	11-20	---	NP
BmB----------	0-30	Fine sand---------	SM, SP-SM	A-2, A-3	100	100	51-100	5-20	---	NP
Baymeade	30-56	Fine sandy loam, sandy clay loam, sandy loam.	SC, SM, SM-SC	A-2, A-4	100	100	60-90	30-49	1-22	2-9
	56-80	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	100	100	51-75	5-30	---	NP
BaB*:----------	0-30	Fine sand---------	SM, SP-SM	A-2, A-3	100	100	51-100	5-20	---	NP
Baymeade	30-56	Fine sandy loam, sandy clay loam, sandy loam.	SC, SM, SM-SC	A-2, A-4	100	100	60-90	30-49	1-22	2-9
	56-80	Loamy fine sand, sand, loamy sand.	SM, SP-SM	A-2, A-3	100	100	51-75	5-30	---	NP
Urban land.										
Bo----------	0-8	Silty clay loam	CH, MH	A-7	100	99-100	90-100	80-100	60-100	15-60
Bohicket	8-38	Silty clay, clay, sandy clay.	CH, MH	A-7	100	99-100	80-100	70-95	50-100	16-60
	38-60	Variable---------	---	---	---	---	---	---	---	---
Co----------	0-72	Fine sand---------	SW, SP-SM, SP	A-2, A-3	100	98-100	60-75	3-12	---	NP
Corolla										
CrB, CrC----------	0-8	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	100	100	75-100	45-90	<35	NP-7
Craven	8-55	Clay, silty clay, clay loam.	CH	A-7	100	100	90-100	65-98	51-70	24-43
	55-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	100	95-100	50-100	15-49	<35	NP-15
Ct----------	0-34	Muck	PT	---	---	---	---	---	---	---
Croatan	34-40	Sandy loam, fine sandy loam, mucky sandy loam.	SM, SC, SM-SC	A-2, A-4	100	100	60-85	25-49	<30	NP-10
	40-70	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	100	100	75-100	36-95	<36	NP-15
	70-80	Variable---------	---	---	---	---	---	---	---	---
Da----------	0-4	Muck----------	PT	---	---	---	---	---	---	---
Dorovan	4-80	Muck----------	PT	---	---	---	---	---	---	---
	80-99	Sand, loamy sand, sandy loam.	SP-SM, SM-SC, SM	A-1, A-3, A-4, A-2-4	100	100	5-70	5-49	<20	NP-7
Dc----------	0-60	Fine sand---------	SP-SM, SP	A-3	100	95-100	60-75	3-12	---	NP
Duckston										

See footnote at end of table

TABLE 15.-ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
FoA Foreston	0-8	Loamy fine sand	SM	A-2	100	100	60-100	15-30	---	NP
	8-70	Sandy loam, fine sandy loam.	SM	A-2	100	100	70-100	18-35	<25	NP-4
	70-80	Loamy fine sand, loamy sand, fine sand.	SP-SM, SM	A-2, A-3	100	100	50-98	6-25	---	NP
GoA Goldsboro	0-13	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	90-100	75-100	50-100	15-45	<25	NP-14
	13-80	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	98-100	95-100	60-100	25-55	16-37	4-18
GpB* Goldsboro	0-13	Fine sandy loam	SM, SM-SC, SC	A-2, A-4, A-6	90-100	75-100	50-100	15-45	<25	NP-14
	13-80	Sandy clay loam, sandy loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	98-100	95-100	60-100	25-55	16-37	4-18
Urban land.										
KuB Kureb	0-80	Fine sand	SP, SP-SM	A-3	100	100	60-100	0-7	---	NP
La Lafitte	0-99	Muck	PT	A-8	---	---	---	---	---	---
Le Lenoir	0-7	Loam	ML, CL, CL-ML	A-4	100	100	85-95	60-85	20-35	4-10
	7-80	Clay, sandy clay loam, clay loam.	CL, CH	A-6, A-7	100	100	85-95	55-95	30-55	11-35
Ln Leon	0-17	Fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
	17-51	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-3, A-2-4	100	100	80-100	3-20	---	NP
	51-95	Sand, fine sand	SP, SP-SM	A-3, A-2-4	100	100	80-100	2-12	---	NP
Ly Lynchburg	0-13	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2, A-4	92-100	90-100	75-100	25-55	<30	NP-7
	13-80	Sandy clay loam, sandy loam, clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	92-100	90-100	70-100	25-67	15-40	4-18
MaC Marvyn	0-12	Loamy fine sand	SM	A-2	95-100	90-100	50-80	13-30	---	NP
	12-52	Sandy clay loam, sandy loam.	ML, SC, SM-SC, SM:	A-4, A-5	95-100	90-100	60-80	30-55	24-45	3-15
	52-75	Loamy sand, sandy loam, sandy clay loam.	SM, SC, ML: CL	A-1, A-2, A-4	95-100	90-100	45-85	20-55	<40	NP-10
Mk Muckalee	0-28	Loam	ML, SC, SM: SM-SC	A-2, A-4	95-100	90-100	50-95	30-60	<30	NP-10
	28-75	Sandy loam, loamy sand.	SM	A-2, A-4	95-100	80-100	60-90	20-40	<20	NP-4

See footnote at end of table

TABLE 15.-ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Mu---------- Murville	0-5	Fine sand	SP-SM, SM	A-2, A-3	100	100	85-100	5-30	---	NP
	5-55	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2	100	100	85-100	5-20	---	NP
	55-75	Variable	---	---	---	---	---	---	---	---
NeE, NfC--------- Newhan	0-80	Fine sand	SP	A-3	95-100	95-100	60-75	0-5	---	NP
NoA, NoB--------- Norfolk	0-10	Loamy fine sand	SM	A-2	95-100	92-100	50-95	13-30	<20	NP
	10-47	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	95-100	91-100	70-96	30-63	20-38	4-15
	47-80	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	100	98-100	65-98	36-72	20-52	4-23
On---------- Onslow	0-21	Loamy fine sand	SM, SP-SM	A-2, A-3, A-4	100	95-100	60-95	5-38	---	NP
	21-68	Sandy clay loam, sandy loam, clay loam.	SM, CL, SM-SC, SC	A-2, A-4, A-6	100	95-100	60-95	30-55	<30	NP-14
	68-80	Variable	---	---	---	---	---	---	---	---
Pa---------- Pactolus	0-80	Fine sand	SP	A-2	100	90-100	51-95	13-30	---	NP
Pn---------- Pantego	0-14	Mucky loam	OL-ML, SM-SC	A-2, A-4	100	95-100	60-95	25-75	<35	NP-10
	14-45	Sandy clay loam, sandy loam, clay loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2	100	95-100	80-100	30-80	20-40	4-16
	45-80	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	100	95-100	90-100	36-80	25-49	11-24
Ra---------- Rains	0-12	Fine sandy loam	SM, ML	A-2, A-4	100	95-100	50-85	25-56	<35	NP-10
	12-45	Sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	100	95-100	55-98	30-70	18-40	4-20
	45-80	Sandy loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	100	95-100	60-95	30-60	15-40	3-18
St---------- Stallings	0-12	Loamy fine sand	SM	A-2	100	95-100	51-100	15-35	---	NP
	12-66	Sandy loam, fine sandy loam.	SM	A-2, A-4	100	95-100	51-100	20-50	<25	NP-3
	66-80	Sandy clay loam, loamy sand, loamy fine sand.	SM, SP-SM, SM-SC	A-2, A-4	100	95-100	51-100	10-50	<25	NP-4
To---------- Torhunta	0-14	Fine sandy loam	SM	A-2, A-4	100	95-100	70-85	20-49	<25	NP-4
	14-47	Sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	100	95-100	70-85	20-40	<25	NP-7
	47-80	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	100	95-100	65-85	5-25	<25	NP-4

See footnote at end of table

TABLE 15.-ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
WaB---------- Wando	0-6 6-85	Fine sand--------- Sand, fine sand	SP-SM, SM SP, SP-SM, SM	A-2, A-3 A-2, A-3	96-100 98-100	95-100 98-100	60-98 51-98	5-25 2-20	--- ---	NP NP
Wo---------- Woodington	0-12 12-80	Loamy fine sand Sandy loam, fine sandy loam.	SM SM	A-2 A-2, A-4	100 100	95-100 95-100	50-100 50-100	15-49 20-50	--- < 25	NP NP-3
YaA---------- Yaupon	0-3 3-78 78-85	Fine sandy loam Silty clay, clay, sandy clay. Variable---------	SM CL, CH, MH ---	A-2, A-4 A-6, A-7 ---	100 100 ---	90-100 90-100 ---	85-100 85-100 ---	13-41 51-90 ---	--- 30-65 ---	NP 20-38 ---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.-PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cm³ [3/]	In/hr	In/in	pH				Pct
AnB--Alpin	0-13	1-12	1.35-1.55	2.0-6.0	0.05-0.10	4.5-6.0	Very low	0.10	5	0-2
	13-48	1-7	1.40-1.55	6.0-20.0	0.03-0.09	4.5-6.0	Very low	0.10		
	48-80	5-8	1.45-1.65	2.0-6.0	0.06-0.09	4.5-6.0	Very low	0.10		
BmB--Baymeade	0-30	0-8	1.60-1.75	6.0-20	0.02-0.06	4.5-6.5	Low	0.10	5	.5-1
	30-56	8-26	1.45-1.60	2.0-6.0	0.10-0.14	4.5-6.5	Low	0.10		
	56-80	0-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.5	Low	0.10		
BaB*--Baymeade	0-30	0-8	1.60-1.75	6.0-20	0.02-0.06	4.5-6.5	Low	0.10	5	.5-1
	30-56	8-26	1.45-1.60	2.0-6.0	0.10-0.14	4.5-6.5	Low	0.10		
	56-80	0-12	1.60-1.75	6.0-20	0.02-0.10	4.5-6.5	Low	0.10		
Urban land.										
Bo--Bohicket	0-8	30-60	1.20-1.40	0.06-0.2	0.02-0.06	6.1-8.4	High	0.28	5	5-25
	8-38	35-60	1.30-1.60	<0.06	0.02-0.06	6.1-8.4	High	0.24		
	38-60	---	---	---	---	---	---	---		
Co--Corolla	0-72	0-3	1.60-1.70	>20	0.01-0.03	5.6-7.8	Low	0.10	5	<.5
CrB, CrC--Craven	0-8	6-20	1.30-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Low	0.37	5	.5-2
	8-55	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate	0.32		
	55-80	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low	0.32		
Ct--Croatan	0-34	0.-0.	0.40-0.65	0.06-6.0	0.35-0.45	<5.0	Low			25-60
	34-40	8-20	1.40-1.60	0.2-6.0	0.10-0.15	3.6-6.5	Low			
	40-70	10-35	1.40-1.60	0.2-2.0	0.12-0.20	3.6-6.5	Low			
	70-80	---	---	---	---	---	---			
Da--Dorovan	0-4	---	0.25-0.40	0.6-2.0	0.25-0.50	3.6-4.4				25-60
	4-80	---	0.35-0.55	0.6-2.0	0.25-0.50	3.6-4.4				
	80-99	5-20	1.40-1.65	6.0-20	0.05-0.08	4.5-5.5	Low			
Dc--Duckston	0-60	0-4	1.60-1.70	>20	0.02-0.05	3.6-8.4	Low	0.10	5	.5-1
FoA--Foreston	0-8	5-12	1.20-1.40	6.0-20	0.05-0.10	4.5-6.5	Low	0.15	5	.5-2
	8-70	10-18	1.20-1.40	2.0-6.0	0.09-0.13	4.5-5.5	Low	0.10		
	70-80	4-12	1.30-1.60	6.0-20	0.03-0.10	4.5-5.5	Low	0.10		
GoA--Goldsboro	0-13	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.20	5	.5-2
	13-80	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low	0.24		
GpB*--Goldsboro	0-13	5-15	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.20	5	.5-2
	13-80	18-30	1.30-1.50	0.6-2.0	0.11-0.15	4.5-5.5	Low	0.24		
Urban land.										
KuB--Kureb	0-80	0-3	1.60-1.80	6.0-20	<0.05	4.5-7.3	Low	0.10	5	<2

See footnote at end of table

TABLE 16.-PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cm³ 3/	In/hr	In/in	pH				Percent
La Lafitte	0-99	---	0.05-0.50	2.0-6.0	0.20-0.50	3.6-8.4	Low			30-70
Le Lenoir	0-7 7-80	6-20 35-60	1.30-1.50 1.20-1.35	0.6-2.0 0.06-0.2	0.14-0.18 0.13-0.15	4.5-5.5 4.5-5.5	Low Moderate	0.37 0.32	5	2-4
Ln Leon	0-17 17-51 51-95	1-6 2-8 1-6	1.40-1.65 1.50-1.70 1.40-1.65	6.0-20 0.6-6.0 0.6-6.0	0.02-0.05 0.05-0.10 0.02-0.05	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.10 0.15 0.10	5	.5-4
Ly Lynchburg	0-13 13-80	5-20 18-35	1.30-1.60 1.30-1.50	2.0-6.0 0.6-2.0	0.09-0.13 0.12-0.16	3.6-5.5 3.6-5.5	Low Low	0.20 0.20	5	.5-5
MaC Marvyn	0-12 12-52 52-75	2-15 18-35 10-30	--- --- ---	2.0-6.0 0.6-2.0 0.2-2.0	0.07-0.12 0.12-0.17 0.07-0.14	4.5-6.0 4.5-6.0 4.5-6.0	Low Low Low	0.24 0.32 0.32	3	<2
Mk Muckalee	0-28 28-75	10-25 5-20	--- ---	0.6-2.0 0.6-2.0	0.09-0.15 0.08-0.12	5.1-7.3 5.6-8.4	Low Low	0.20 0.20	5	.5-2
Mu Murville	0-5 5-55 55-75	2-8 2-8 ---	1.60-1.75 1.60-1.75 ---	6.0-20 2.0-6.0 ---	0.05-0.09 0.05-0.09 ---	3.6-5.5 3.6-5.5 ---	Low Low ---	0.10 0.10 ---	5	2-4
NeE, NfC Newhan	0-80	---	---	> 20	< 0.05	3.6-7.8	Low	0.10	5	<2
NoA, NoB Norfolk	0-10 10-47 47-80	2-8 18-35 20-40	1.55-1.75 1.35-1.45 1.30-1.40	6.0-20 0.6-2.0 0.6-2.0	0.06-0.11 0.10-0.15 0.10-0.15	4.5-6.0 4.5-5.5 4.5-5.5	Low Low Low	0.20 0.24 0.24	5	.5-2
On Onslow	0-21 21-68 68-80	2-8 15-35 ---	1.60-1.75 1.30-1.50 ---	> 6.0 0.6-2.0 ---	0.07-0.11 0.12-0.17 ---	3.6-5.5 3.6-5.5 ---	Low Low ---	0.17 0.24 ---	4	.5-2
Pa Pactolus	0-80	2-12	1.60-1.75	6.0-20	0.05-0.10	4.5-6.0	Low	0.10	5	.5-2
Pn Pantego	0-14 14-45 45-80	5-15 18-35 18-40	1.20-1.40 1.30-1.40 1.25-1.40	0.6-2.0 0.6-2.0 0.6-2.0	0.20-0.30 0.12-0.20 0.15-0.20	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.10 0.28 0.28	5	10-15
Ra Rains	0-12 12-45 45-80	5-20 18-35 15-45	1.30-1.60 1.30-1.50 1.30-1.60	2.0-6.0 0.6-2.0 0.6-2.0	0.10-0.14 0.11-0.15 0.10-0.15	4.5-6.5 4.5-5.5 4.5-5.5	Low Low Low	0.20 0.24 0.28	5	1-6
St Stallings	0-12 12-66 66-80	2-10 5-18 2-18	1.5-1.6 1.4-1.6 1.5-1.6	6.0-20 2.0-6.0 2.0-20	0.06-0.11 0.10-0.15 0.06-0.15	3.6-5.5 3.6-5.5 3.6-5.5	Low Low Low	0.10 0.17 0.17	5	1-4
To Torhunta	0-14 14-47 47-80	5-18 5-18 2-18	1.35-1.65 1.35-1.60 1.45-1.65	2.0-6.0 2.0-6.0 6.0-20	0.10-0.15 0.10-0.15 < 0.05	3.6-5.5 3.6-5.5 3.6-6.5	Low Low Low	0.15 0.15 0.10	5	3-10

See footnote at end of table

TABLE 16.-PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cm³ [3/]	In/hr	In/in	pH				Percent
WaB----------	0-6	2-15	1.30-1.60	6.0-20	0.05-0.08	5.6-7.3	Low----------	0.10	5	< 1
Wando	6-85	1-10	1.30-1.60	6.0-20	0.03-0.07	5.6-7.3	Low----------	0.10		
Wo----------	0-12	2-10	1.50-1.70	6.0-20	0.06-0.11	3.6-5.5	Low----------	0.10	5	2-4
Woodington	12-80	5-18	1.45-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.20		
YaA----------	0-3	5-20	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	2	< 1
Yaupon	3-78	35-60	1.30-1.50	< 0.06	0.12-0.18	5.6-8.4	High---------	0.32		
	78-85	---	---	---	---	---	------	---		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.-SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol means less than; means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AnB--Alpin	A	None	---	---	> 6.0	---	---	Low	High.
BmB--Baymeade	A	None	---	---	4.0-5.0	Apparent	Dec-Apr	Low	Moderate.
BaB*:---	A	None	---	---	4.0-5.0	Apparent	Dec-Apr	Low	Moderate.
Baymeade									
Urban land.									
Bo--Bohicket	D	Frequent	Very brief	Jan-Dec	+3-0	Apparent	Jan-Dec	High	High.
Co--Corolla	D	Rare	---	---	1.5-3.0	Apparent	Nov-May	Low	Low.
CrB, CrC--Craven	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	High	High.
Ct--Croatan	D	Rare	---	---	0-1.0	Apparent	Dec-May	High	High.
Da--Dorovan	D	Frequent	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	High.
Dc--Duckston	D	Frequent	Brief	Jan-Dec	1.0-2.0	Apparent	Jan-Dec	Low	Low.
FoA--Foreston	C	None	---	---	2.5-3.5	Apparent	Dec-Apr	Moderate	High.
GoA--Goldsboro	B	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
GpB*:---	B	None	---	---	2.0-3.0	Apparent	Dec-Apr	Moderate	High.
Goldsboro									
Urban land.									
KuB--Kureb	A	None	---	---	> 6.0	---	---	Low	Low.
La--Lafitte	D	Frequent	Brief to long.	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	Moderate.

See footnote at end of table

TABLE 17.-SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Le Lenoir	D	None	---	---	1.0-2.5	Apparent	Dec-May	High	High.
Ln Leon	D	None	---	---	0-1.0	Apparent	Jun-Feb	High	High.
Ly Lynchburg	C	None	---	---	0.5-1.5	Apparent	Nov-Apr	High	High.
MaC Marvyn	B	None	---	---	>6.0	---	---	Moderate	High.
Mk Muckalee	D	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Dec-Mar	High	Moderate.
Mu Murville	D	None	---	---	0-1.0	Apparent	Nov-May	High	Moderate.
NeE, NfC Newhan	A	Rare	---	---	>6.0	---	---	High	Low.
NoA, NoB Norfolk	B	None	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
On Onslow	B	None	---	---	1.5-3.0	Apparent	Dec-Apr	High	High.
Pa Pactolus	C	None	---	---	1.5-3.0	Apparent	Dec-Apr	Low	High.
Pn Pantego	D	None	---	---	0-1.5	Apparent	Dec-May	High	High.
Ra Rains	D	None	---	---	0-1.0	Apparent	Nov-Apr	High	High.
St Stallings	C	None	---	---	1.0-2.5	Apparent	Dec-Apr	High	High.
To Torhunta	C	None	---	---	0.5-1.5	Apparent	Dec-May	High	High.
WaB Wando	A	None	---	---	4.0-6.0	Apparent	Jan-Mar	Low	Moderate.

See footnote at end of table

TABLE 17.-SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
Wo Woodington	D	None	---	---	0.5-1.0	Apparent	Dec-May	High	High.
YaA Yaupon	D	None	---	---	2.0-4.0	Apparent	Dec-Mar	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.-CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alpin	Thermic, coated Typic Quartzipsamments
Baymeade	Loamy, siliceous, thermic Arenic Hapludults
Bohicket	Fine, mixed, nonacid, thermic Typic Sulfaquents
Corolla	Thermic, uncoated Aquic Quartzipsamments
Craven	Clayey, mixed, thermic Aquic Hapludults
Croatan	Loamy, siliceous, dysic, thermic Terric Medisaprists
*Dorovan	Dysic, thermic Typic Medisaprists
Duckston	Siliceous, thermic Typic Psammaquents
Foreston	Coarse-loamy, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Kureb	Thermic, uncoated Spodic Quartzipsamments
Lafitte	Euic, thermic Typic Medisaprists
Lenoir	Clayey, mixed, thermic Aeric Paleaquults
Leon	Sandy, siliceous, thermic Aeric Haplaquods
Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Marvyn	Fine-loamy, siliceous, thermic Typic Hapludults
Muckalee	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Murville	Sandy, siliceous, thermic Typic Haplaquods
Newhan	Thermic, uncoated Typic Quartzipsamments
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Onslow	Fine-loamy, siliceous, thermic Spodic Paleudults
Pactolus	Thermic, coated Aquic Quartzipsamments
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Stallings	Coarse-loamy, siliceous, thermic Aeric Paleaquults
Torhunta	Coarse-loamy, siliceous, acid, thermic Typic Humaquepts
Wando	Siliceous, thermic Typic Udipsamments
Woodington	Coarse-loamy, siliceous, thermic Typic Paleaquults
Yaupon	Clayey, mixed, nonacid, thermic Aquic Udorthents

* This soil is a taxadjunct to the Dorovan series because the soil reaction is less acid than allowed within the series. There is little difference in use, management, and behavior.